

Queensland Floods Commission of Inquiry

Statement of Michael Francis Birchley

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QUEENSLAND FLOODS
COMMISSION OF INQUIRY

STATEMENT OF MICHAEL (MIKE) FRANCIS BIRCHLEY

I, **MICHAEL (MIKE) FRANCIS BIRCHLEY**, of c/- 400 George Street Brisbane in the State of Queensland, Assistant Director-General, Regional Service Delivery, Department of Environment and Resource Management, solemnly and sincerely affirm and declare:

Requirement from Queensland Floods Commission of Inquiry

1. I have seen a copy of a letter dated 29 August 2011 from the Commissioner, Queensland Floods Commission of Inquiry to me requiring a written statement under oath or affirmation, which is attachment **MFB-01** ("Requirement") and which details the topics my statement should cover. For the purposes of the Requirement, the Commissioner has advised that "mine", "mines" and "mining" should be taken to include coal seam gas operations.

Role

2. I am currently the Assistant Director-General, Regional Service Delivery Division within the Office of the Environmental Regulator Business Group in the Department of Environment and Resource Management (DERM). I was appointed to this position in a permanent capacity on 28 June 2011. Prior to the appointment I was acting in the position from 3 January 2011. From 1 October 2011 to 2 January 2011 I was in my then substantive role of Regional Services Director, South West Region and I reported directly to the then Assistant Director-General, Regional Service Delivery Division, Mr [REDACTED].

Item 1: A brief overview of the role and responsibilities of the Department of Environment and Resource Management (DERM) as to the regulation of mining operations in Queensland, including mining dams

3. The current laws that govern environmental management of Queensland's mining industry commenced in January 2001. Under these arrangements, the administering authority under the *Environmental Protection Act 1994* (EP Act) (which is currently DERM but before March 2009 was other departments) assumed responsibility for environmental impact assessment and administration of environmental authorities, as well as compliance, auditing and monitoring relating to the environmental management of mining.
4. The EP Act incorporates the environmental management regulation of mining activities. This legislation creates environmental impact assessment processes and heads of power for government decision-making implemented by the administering authority.

5. The EP Act and subordinate legislation governs the roles and responsibilities of DERM in the environmental regulation of mining activities in Queensland. The stated objective of the EP Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. This is referred to as ecologically sustainable development.
6. Authorities are issued with conditions that may authorise a level of environmental harm to occur whilst seeking to protect overall environmental values. Both the EP Act and environmental authorities require companies to develop and implement a range of environmental management documents to ensure that authorised activities are carried out in a manner that minimises unexpected environmental impacts.
7. Dams that form part of mining activities are regulated by DERM for two primary purposes:
 - (a) to ensure dam design, construction and operation is carried out in a manner that does not threaten the community's safety or environment through collapse or failure; and
 - (b) to ensure management of dam contents, including releases, does not result in adverse impacts on the environment through contamination.
8. Accordingly, dams that store hazardous wastes are regulated under environmental authorities. There are a number of conditions on environmental authorities in relation to such dams, including requirements that they be designed and constructed to stated standards, be certified in their design and construction, and be annually inspected for integrity. Dams may or may not be authorised to release in emergency events or under certain environmental conditions.

Item 2: The involvement of DERM in granting environmental authorities to operators of mines under the Environmental Protection Act 1994 (Qld)

9. The environmental approvals process is administered in accordance with the EP Act. This process may also occur in conjunction with the tenure process for mining activities under the *Mineral Resources Act 1989* and *Petroleum and Gas (Production and Safety) Act 2004* as an applicant must have applied for or currently hold a relevant resource authority prior to lodging an application for approval under the EP Act.
10. The holder of a mining tenement cannot carry out any mining activities on site unless those activities are authorised by an environmental authority for the relevant tenement. Therefore, the applicant for a mining tenement must also apply for an environmental authority. All applications for environmental authorities and mining tenements for new mining projects must be made on the approved application form and lodged with the Department of Employment, Economic Development and Innovation (DEEDI).

Environmental Impact Statement

11. Major mining and petroleum projects may undergo an environmental impact statement (EIS) assessment process as part of the considerations by DERM as to whether an environmental authority should be granted.
12. If the project is determined by the Coordinator-General to be of state or national significance then the proponent may be required to prepare an EIS under either the *State Development and Public Works Organisation Act 1971* (SDPWO Act) administered by DEEDI, or the *Environment Protection and Biodiversity Conservation Act 1999 (Cwlth) Act* (EPBC Act) administered by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities.
13. If a project is not determined by the Coordinator-General to be a significant project then a proponent may be required, or may voluntarily apply, to undertake an EIS process as set out in Chapter 3 of the *EP Act*. The purpose of an environmental impact assessment is to assist the mining industry in achieving ecologically sustainable development, meet environmental management responsibilities and to encourage community comment and participation in the process. See attached "DERM Information Sheet (mining) Environmental Impact Statements" (exhibit **MFB-02-01**) for further information.
14. The "DERM Guideline (Mining), The environmental impact statement (EIS) process for level 1 mining projects" (exhibit **MFB-02-02**) provides comprehensive information to project proponents on the Chapter 3 EIS process.
15. Proponents for mining and petroleum projects may alternatively apply to DERM to voluntarily prepare an EIS where they have not made an application for a tenement and an environmental authority and therefore a formal assessment level decision has not been made. Information about the voluntary application process can be found in the "DERM Information sheet Voluntary Preparation of an EIS" (exhibit **MFB-02-03**).
16. The proponent is responsible for drafting the terms of reference (TOR) and subsequently advertising the draft terms of reference. The applicant must also make any required amendments following receipt of submissions on the draft TOR prior to the administering authority deciding on the final TOR to be used in the EIS process. The proponent is also responsible for the development and advertising of the draft EIS and making any amendments following the receipt of submissions on the draft EIS, prior to the administering authority issuing the EIS assessment report.
17. To assist a proponent to develop a TOR for their project's EIS, DERM has published a generic Terms of Reference (exhibit **MFB-02-04**) which sets out the range of matters that might need to be addressed in the EIS.
18. The EIS Assessment Report must include matters set out in section 59 of the EP Act. If the environmental management plan proposed for the project is determined to be adequate and draft Environmental Authority conditions have

been finalised and included in the Assessment Report, then the project can proceed to the public objection phase of the approval process.

Environmental Authorities

19. Under Chapter 5 (Mining activities) and Chapter 5A (Other Environmental Authorities) of the EP Act, a mining project is either a level 2 or a level 1 environmentally relevant activity depending on whether it does or does not comply with criteria in the *Environmental Protection Regulation 2008* (EP Reg). Each mining project requires an environmental authority under the EP Act.
20. DERM completes the assessment of submitted applications for all environmental authorities. Level 1 application documentation must include an Environmental Management Plan (EM Plan). The purpose of an EM Plan is to provide information to support the application for an environmental authority and propose environmental protection commitments to assist the administering authority prepare the draft environmental authority for the project and in setting specific conditions for the mining activity.
21. Applicants for environmental authorities for code compliant level 2 mining projects must include enough information (such as a description of the proposed project and the likely environmental impacts) to demonstrate that they can comply with the conditions of the relevant code of environmental compliance and operate within the criteria. A copy of the "Code of Environmental Compliance for Mining lease projects" is provided at attachment **MFB-02-05**. If, however, an applicant believes they cannot comply with the conditions but will operate within the criteria, and feel their operation will still be a level 2 mining project, they may apply to have additional conditions included in their environmental authority. The resulting environmental authority for the level 2 mining project will be non-code compliant.

Coordinator-General Report

22. Projects declared as state significant pursuant to the SDPWO Act are subject to the discretionary powers of the Coordinator-General to impose conditions on a project, specify when those conditions take effect and determine which entity is to have jurisdiction for the imposed conditions. Accordingly DERM may be required to impose conditions from the Coordinator-General's Report. The EP Act reflects the requirement for the administering authority to include 'imposed conditions' in an environmental authority. This requirement does not prevent DERM from including additional conditions within an environmental authority provided they are not inconsistent with the Coordinator-General's conditions.

Public notification

23. During the assessment period for both the EIS and conditioning of the environmental authority, public notification provisions pursuant to the EP Act may be triggered. If this is the case, stakeholders and the public have the opportunity to make a submission on an application. In deciding to grant an

environmental authority for which a valid submission has been made, the assessing officer and delegate must consider those submissions.

Deciding applications

24. When making any decision under the EP Act, including whether to issue an environmental authority, the department must consider the “Standard Criteria” (MFB-02-06) as specified in Schedule 4 of the EP Act. Furthermore, parts 2 and 3 of the EP Reg (MFB-02-07) stipulate requirements for all environmental management decisions and additional regulatory considerations with respect to potential emissions from proposed activities.

Public Objections, Planning and Environment Court and Land Court

25. An entity has a right to object about an application for environmental authority, a draft environmental authority or a condition included in the draft. If a properly made objection exists following the objection period specified by the EP Act, the administering authority under the EP Act (currently DERM) is obliged to refer the application to the Land Court for an objections decision.

Item 3: The means by which DERM regulates compliance with environmental authorities granted to operators of mines

26. DERM is responsible for enforcement action in response to non-compliance and exercises its discretion to take enforcement action in accordance with its Enforcement Guidelines (MFB-03-02). The Enforcement Guidelines set out the considerations for implementing an enforcement response and the use of the tools provided for in the EP Act, which include environmental evaluations, environmental protection orders, direction notices, clean-up notices, cost recovery notices, emergency powers, emergency directions to release a contaminant and transitional environmental programs. Other enforcement tools include warning letters, penalty infringement notices, prosecution, restraint orders, enforcement orders and suspension of authorities or cancellation.
27. DERM’s compliance approach is set by the “Compliance Strategy 2010-14” (MFB-03-01), which specifies the principles that guide DERM’s compliance activities. These principles are that DERM will:
- (a) ensure that regulatory clients understand their obligations;
 - (b) encourage voluntary compliance with those obligations;
 - (c) work with the regulated community to improve performance;
 - (d) monitor compliance with DERM’s legislation; and
 - (e) take consistent and proportionate enforcement responses where necessary.
28. DERM’s Enforcement Guidelines (MFB-03-02) set out the principles that govern when DERM will take enforcement action and the nature of that action. The guidelines apply to decisions to commence a prosecution as well as to take other types of enforcement action such as the use of a statutory tool.

29. DERM's Annual Compliance Plan sets out the proactive compliance activities that DERM will undertake in a given year, and include strategic compliance projects that target activities or issues that have been identified as carrying a high risk to the environment or natural resources. The annual compliance plans for 2009-10 and 2010-11 are attachments **MFB-03-03** and **MFB-03-04** respectively. The Annual Compliance Plan 2011-12 is currently awaiting Ministerial approval.
30. DERM's frontline EP Act compliance officers (known as 'Environmental Officers') are located within regional offices and are part of the Regional Service Delivery Division of the department. These Environmental Officers are responsible for responding to and managing all potential breaches of Environmental Authority conditions which do not require court action to resolve. There are four regions covering Queensland including South East Region, South West Region, Central West Region and North Region (refer to map **MFB-03-05**). Each Region is headed by a Regional Services Director who reports directly to my position.
31. These officers' roles include compliance activities such as inspections and audits, issuing notices and directions to ensure compliance and reviewing monitoring data against environmental standards. These officers are also involved in regulatory environmental assessment activities such as considering proposals to change or upgrade environmental management infrastructure in order to achieve compliance with an EA and stipulating specific environmental conditions. In addition, officers provide education and advice.
32. DERM has also played a lead role in establishing the Liquefied Natural Gas (LNG) Enforcement Unit, which comprises specialist officers with expertise in groundwater management, environmental compliance and case management. Officers from DEEDI specialising in land access and gas safety also form part of this multidisciplinary unit. The unit is also supported by centralised business units involved in assessments and approvals, technical operations, policy support and development.
33. DERM has undertaken approximately 178 audits and inspections on the mining industry in the last 12 months. A further 67 were undertaken in relation to gas extraction activities.
34. The frontline staff undertaking compliance activities within the Regional Service Delivery Division are supported by centralised business units from DERM's Environment and Natural Resource Regulation Division. These business units are the Compliance and Investigations Unit and the Litigation Unit.
35. The Compliance and Investigations Unit has a number of roles in regulating mine operators' compliance with environmental authorities although it should be noted that the Unit's role extends beyond mining to include the whole range of DERM's regulatory responsibilities. Following escalation of a compliance matter from a regional office, this unit investigates serious breaches of environmental authorities, for which prosecution or other court action is the appropriate response and prepares briefs of evidence following those investigations.

36. The Unit also provides support to regional officers who regulate mines by developing procedural guides, templates and other material to support both the use of statutory tools under the *EP Act* and other compliance responses (such as the issue of penalty infringement notices). Copies of the current procedural guides, templates and other material are attached at exhibits **MFB-03-06** to **MFB-03-94**. Copies of superseded procedural guides, templates and other material that were current at some stage since 1 October 2007 are attached at exhibits **MFB-03-95** to **MFB-03-106**.
37. The Litigation Unit is responsible for prosecutions and Planning and Environment Court matters involving DERM. Its role in regulating compliance with environmental authorities granted to operators of mines is to review briefs of evidence submitted by the Compliance and Investigations Unit and provide advice on sufficiency of evidence, prospects of success and likely penalty range. The Litigation Unit also provides legal advice as required in relation to specific cases of non-compliance.
38. In addition to its on-ground compliance activities, DERM has developed administrative processes that require self assessment and statutory declarations of compliance performance by environmental authority holders, such as:
- (a) Annual Returns requiring a statement of compliance against Environmental Authority conditions; and
 - (b) Plans of Operations that require auditing against residual rehabilitation liability for the purpose of determining an appropriate level of financial assurance.
39. The EP Act contains offence provisions relating to the provision of false and misleading information.

Item 4: The role of DERM in granting transitional environmental programs to operators of mines

40. Transitional environmental programs (TEPs) are specific programs that, when complied with, achieve compliance with the EP Act for an activity by reducing environmental harm, detailing the transition of the activity to an environmental standard or detailing the transition of the activity to comply with a condition of a development approval, an environmental authority or code of environmental compliance. The requirements for TEPs and the process for assessing and approving them is set out in chapter 7, part 3 of the EP Act. In the event a TEP is proposed to extend beyond a 3 year period, public notification requirements are triggered.
41. If an approved TEP authorises the holder of the TEP to do or not do something, the holder may do or not do that thing despite anything in a regulation, an environmental protection policy, an environmental authority held by the holder of the TEP, a development approval, a standard condition of a code of environmental compliance for a chapter 4 activity or an accredited environmental risk management plan.

42. Draft TEPs may be submitted voluntarily by a mine operator, or DERM may require an operator to submit a draft TEP. In either case, the draft TEP is prepared by the operator. DERM's role is to assess the draft TEP against the requirements of the EP Act and either approve the TEP, approve the TEP with conditions, or refuse to approve the TEP. Prior to making its decision, DERM may also (and as a matter of practice often does) enter into discussions with the proponent of a draft TEP and suggest amendments to the draft TEP.
43. Mine operators typically voluntarily submit TEPs to DERM when they are seeking authorisation to discharge water from the mine site in circumstances where the discharge is not authorised by the environmental authority. Many TEP applications were received by the department following the 2010/2011 wet season.
44. DERM typically requires mine operators to submit a draft TEP where DERM becomes aware that there is a non-compliance at the mine site that will require a significant amount of time and/or investment by the operator to rectify.

Assessing draft TEPs

45. Once a draft TEP is submitted to DERM there is often a discussion between the environmental officer involved in the matter and the mine operator about the contents of the draft TEP. This is an opportunity for DERM to raise any concerns with the draft document, and for the operator to take steps to address those concerns before DERM makes a decision about the draft TEP.
46. DERM has produced guidance material to assist environmental officers in assessing draft TEPs. (Exhibits **MFB-04-01** and **MFB-04-02**)

Item 5: DERM's actions in response to the Hart Report on Fitzroy River Water Quality Issues recommendations numbers 1, 2, 3, 4, 5, 10, 11, 12 and 13

47. The Hart Report on Fitzroy River Water Quality Issues is attachment **MFB-05-01**.
48. This report, completed in November 2008, contains a review of the situation regarding water quality in the Fitzroy River resulting from the discharge of 138 GL (gigalitres) of mine-affected floodwater from the Ensham Resources Pty Ltd (Ensham) coal mine located near Emerald in Central Queensland in 2008.
49. The Terms of Reference (ToR) for this review were to advise the Premier of Queensland on:
 - (a) any short and long-term risks to human health, aquatic ecology, agriculture and industry that could result from the mine-affected floodwaters discharged from the Ensham coal mine, and how these should be managed;
 - (b) the scope of the water quality and biological monitoring program to be undertaken by the EPA to assess the potential impacts of the mine-affected floodwater discharge from Ensham coal mine;
 - (c) any changes that might be made to conditions of Environmental Authorities

- (for mining activities) and associated statutory documents under the EP Act in order to ensure that the impacts of discharges of mine-affected waters in Central Queensland are appropriately managed and monitored; and
- (d) Any other matters that might be of relevance to this issue.

50. The department is in the process of finalising a report on the implementation of both the 'Hart report' in consultation with the Fitzroy Water Quality Advisory Group. Further information relevant to water quality issues in the Fitzroy catchment can be found on the department's Fitzroy River website: <http://www.fitzroyriver.qld.gov.au/>

51. Action taken in response to the recommendations of Professor Hart's report that are of particular interest to the Inquiry are as follows.

Recommendation 1: Environmental Protection Agency (now the Department of Environment and Resource Management; DERM) to undertake a review of procedures for granting a Transitional Environmental Program

52. The department reviewed the procedures for granting a Transitional Environmental Program and on 1 January 2009, a new Environmental Protection Regulation 2008 (Attachment **MFB-05-02**) came into effect. This defined the issues that must be considered when deciding whether to approve a Transitional Environmental Program. These include:
- (a) impacts from contaminants entering the environment including the cumulative impacts;
 - (b) the order of occupancy between the person carrying out the activity and the affected person;
 - (c) the capacity of the receiving environment to accept contaminants while protecting the environmental values;
 - (d) risk management of the way in which contaminants are released;
 - (e) the need to monitor to ensure discharges meet the terms of the program; and
 - (f) the potential toxic effects of likely contaminants.

Recommendation 2: A process for random audits of laboratories used by mining companies for analysing trace concentrations of heavy metals

53. The new water license conditions (Attachment **MFB-05-03**), developed by the department in concurrence with coal mining companies, are intended to improve the certainty of trace metal results reported by coal mining companies. Mining companies are now required to use analytical methods accredited by the National Association of Testing Authorities (NATA). Determinations and analysis of water quality are to be performed by an appropriately experienced and qualified operator and done in accordance with methods prescribed in the latest edition of the departments *Water Quality Sampling Manual* shown in Attachment **MFB-05-04**. Additionally, samples are to be collected from authorised monitoring locations and be representative of the water body.

Recommendation 3: Environmental Protection Agency to include Professor Hart's review comments in the Fitzroy water quality monitoring project and include a longer timeline for the study

54. The department has provided funding to the Fitzroy Basin Association (FBA), to design an integrated monitoring program for the Fitzroy Basin under the project name *Fitzroy Partnership for River Health*. This partnership aims to deliver an ongoing monitoring program that assesses Fitzroy river health and provide longer timeframes for water quality studies. More details of this program are available online at <http://riverhealth.org.au/> and in Attachment **MFB-05-05**.

Recommendation 4: Expand the Environmental Flows Assessment Program in the wet season following the major releases of 2008 to measure effects of higher salinity on fish spawning and recruitment

55. The department expanded its Environmental Flows Assessment Program (Attachment **MFB-05-06**) in the wet season of 2008/2009 to include an assessment of the affects of higher salinity on fish spawning and recruitment.

56. Surveys were done at four sites:

- (a) Nogoia River at Glenlees, which is upstream Fairbairn Dam on 20 November 2008;
- (b) Mackenzie River at Riley's Crossing, which is downstream of the Comet River junction on 1 December 2008;
- (c) Mackenzie River at Honeycomb, which is downstream of Bingegang Weir on 26 November 2008 and 2 December 2008; and
- (d) Comet River at the Comet Weir on 1 December 2008. Freshwater flows returned water quality to normal and precluded any further surveys.

57. There were no sightings of fish spawning in the surveys performed and fish sample volumes overall were too small to form an objective view about the effects of higher salinity water. The low fish numbers could be due to many varying factors and one-off sampling results should be interpreted with caution. Information about fish trends in the Fitzroy Basin are incorporated into the ecological assessment reports for the Fitzroy Basin Water Resource Plan (WRP) 10 year review which has resulted in the current draft plan. See attachments **MFB-05-07** and **MFB-05-08**

Recommendation 5: Bio-security Queensland study of health of fish in weirs to be repeated and enhanced

58. Bio-security Queensland undertook two sampling projects on fish health. Results have been presented in a report that is currently being peer reviewed. Further fish health studies will be included in future monitoring programs.

Recommendation 10: *Develop an emergency water management plan to improve water quality in the Nogoa-Mackenzie-Fitzroy River system between storages. This plan will need to be innovative and not constrained by the current restrictive Resource Operations Plan rules.*

59. Substantial natural inflows throughout the system which occurred within two months of the release of Professor Hart's report returned water quality conditions of the Nogoa-Mackenzie-Fitzroy River system to normal.
60. The contingency plans that form part of the Drinking Water Quality Management Plans, which are Attachment **MFB-05-09**, are required under the new provisions of the *Water Supply (Safety and Reliability) Act 2008* and are intended to ensure that emergency water quality issues are addressed by drinking water providers such as Local Governments.
61. Since 2008, the installation of automatic salinity loggers by the department has increased monitoring efficiency and advanced the surveillance of water-quality conditions within the Fitzroy Basin. The department's "Procedural Guide 2.10 - Mine Industry Incidents" (**MFB-05-019**) was created to provide the essential guidance on roles, responsibilities and tactical responses for incidents in the mining industry where contaminants have been released to the environment. Additionally, Section 320C of the EP Act (which is yet to commence and commences on 5 October 2011) now stipulates community notification of any emergency situation relating to water quality management.
62. Furthermore, the Fitzroy Water Resource Plan and its subordinate Resource Operations Plan (Attachment **MFB-05-10** and **MRB-05-11**) provide for environmental flows to maintain good water quality in the river between the storages and downstream over the longer-term.

Recommendation 11: *For the review of the Fitzroy Water Resource Plan, the department is to consider a more equitable balance between consumptive use and the environment, and to include the provision of a state owned contingency allocation.*

63. The new draft Fitzroy Basin Water Resource Plan (FB WRP) was released in December 2010. This is Attachment **MFB-05-12**. While the new draft plan aims to ensure an appropriate balance between consumptive use and the environment, it does not provide for State-owned contingency allocations from major storages. The Overview Report for the FB WRP (S1.5.5) (Attachment **MFB-05-07**) gives the reasons, which are fundamentally:
 - (a) A State-owned contingency allocation would provide little or no benefit in mitigating water quality issues well downstream of any storage and would not assist with problems that may occur with water quality in un-supplemented streams. For example, it is estimated that a volume of some 90,000 ML (megalitres) from Fairbairn Dam would be required to address a serious water quality issue in the Fitzroy Barrage at Rockhampton. To successfully flush and dilute poor quality water in the barrage would necessitate releasing this total volume at rates of over 10,000 ML per day (approximately 20 days travel over 625 km);

- (b) It would be very expensive to acquire a significant allocation from an existing water supply scheme, and
 - (c) There would be impacts on the local economy since significant quantities of water would no longer be available for consumptive use.
64. The limited benefits of state-owned contingency allocations come with high costs. The establishment of tradable water allocations however, does allow the government to acquire such contingency allocations in the future if this was considered appropriate. The alternative of the government granting itself a contingency allocation at no cost would come with significant impacts on existing water allocation holders and have an adverse impact on an established water market. With regards to new infrastructure, any contingency allocation would either come at significant cost to the project or reduce the volume available for new water supplies.
65. It is still possible for an entity to gain access to any short or long term water supplies in order to support an environmental mitigation activity through the permanent acquisition or seasonal assignment of water allocation.
66. The new draft plan (Schedule 6) will provide for the continuation of the Seasonal Baseflow and First Post Winter Flow management strategies which are intended to support good water quality. It is proposed to provide more flexibility in the infrastructure operating rules of the Fitzroy Basin Resource Operations Plan (the ROP) to allow releases from storages in emergency circumstances, as was the case in 2008 when discharges from the flooded Ensham mine created issues for downstream water supplies. The Fitzroy ROP is due for review after the approval of the new Fitzroy WRP and is planned to be finalised within 2–4 years.

Recommendation 12: Government to consider the appointment of a lead agency as a 'river health caretaker', to prepare a catchment management plan and a co-ordinated monitoring and assessment program

67. The Department of Environment and Resource Management is the lead agency for natural resource management and the support of catchment based natural resource management groups. The department is presently supporting the development of a monitoring and assessment program for the Fitzroy Basin, the *Fitzroy Partnership for River Health*, which is being co-ordinated by the Fitzroy Basin Association.

Recommendation 13: Develop a set of Emergency Response Principles relevant to the mining industry to be applied in future situations similar to the "Ensham" emergency of 2008.

68. The department developed policy principles relevant to emergency situations within the mining industry that pertain to contaminant releases to the environment. The principles were developed in consultation with key stakeholders, including members of the Fitzroy Water Quality Advisory Group, and have been incorporated into the department's "Procedural Guide 2.10 - Mine Industry Incidents" (MFB-05-019). State-wide training on the Guide was conducted for departmental staff in 2010 and 2011.

69. In addition, the EP Act has been amended in response to community concerns that the operators of mines and coal seam gas activities should be required to notify adjacent landholders of any chemicals spills or discharges that have the potential to impact on the landholders. Section 320C of the EP Act (which has yet to commence and which commences on 5 October 2011) requires any person operating a facility who becomes aware of an event that causes or threatens material environmental harm, to give written notice of the event, its nature and the circumstances in which it happened to persons on affected land. The Department will release a guideline explaining the new requirements and the duty to notify of environmental harm, in due course prior to 5 October 2011.

Item 6: The process by which the Final Model Water Conditions for Coal Mines in the Fitzroy Basin were drafted, relevant parties were consulted, and the terms were negotiated, finalised and amended (all relevant meeting minutes, internal and external reports, briefing notes and memoranda should be attached to the statement)

70. On 16th October 2008, the then Minister for Sustainability, Climate Change and Innovation the Hon. Andrew McNamara, announced that the then Environmental Protection Agency (EPA) would undertake a study of the cumulative impact of mining on the health of the Fitzroy River. The project plan for the Study is included at (MFB-06-01).

71. Prior to that announcement, on or around 16 October 2009, the Premier, the Hon. Anna Bligh, signed a letter of reply (MFB-06-01a) to the then President of the Queensland Resources Council (QRC), [REDACTED] which included the words-

"I have requested that relevant Ministers direct their departments to undertake a specific study 'Review of Water Quality Arrangements for Mines Discharging Water into the Fitzroy River System'. I have attached the terms of reference for this study."

72. The EPA was then given the task of completing the Study in keeping with the Terms of Reference. As the study required the analysis of existing mine water discharges, the EPA wrote to each coal mine operator in the Fitzroy Basin, asking the operator to submit electronic water quality results for all mine water discharges over the previous 5 years. The proforma letter used for that purpose is provided at (MFB-06-01b).

73. On 11 May 2009, Cabinet considered and adopted the Department of Environment and Resource Management (DERM) report entitled, Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin <<http://www.fitzroyriver.qld.gov.au/pdf/cumulativeimpactassessment.pdf>> (MFB-06-01c) and supported the three recommendations in the report which were for DERM to:

- (a) develop appropriate conditions in environmental authorities for mine water discharges;
- (b) develop local water quality guidelines; and

- (c) develop a model for assessing cumulative impacts across the region.
74. In relation to recommendation 1 the report noted that the aim of that recommendation was to, *“standardise environmental authority conditions relating to water discharges so that consistent and appropriate conditions exist across the Fitzroy River Basin.”*
75. The report also noted that, *“The aim is to work with mining companies to achieve this by convening a small working group comprising DERM and mining company technical specialists that would consider how discharge limits are set, what limits are acceptable and what this should be based on, when discharges may occur and what monitoring should occur. This is to occur by the end of June 2009.”*
76. And that, *“The preferred option for implementing changes is via voluntary agreement with mining companies. If this is not possible, then it may be necessary to implement changes after requiring and reviewing an environmental audit or by changes to the EP Act to allow for the immediate review and amendment of coal mining authority conditions using the issues identified in this study. Changes to environmental authorities are to occur by the end of December 2009.”*
77. The Government’s decision on Recommendation 1 formed the basis for DERM commencing a project to work with Fitzroy Basin mining companies to agree to and implement a set of standardised environmental authority conditions for water and wastewater management issues on coal mine sites, including:
- (a) on-mine water management,
 - (b) wastewater discharges to rivers and streams, and
 - (c) water quality monitoring of wastewater discharges and the rivers and streams receiving waste discharges.
78. The project proposal and work plan for the project (**MFB-06-02**) reflected the intended completion date of 31 December 2009 for the amendment of the water and wastewater conditions in environmental authorities for all coal mines in the Fitzroy Basin.
79. The deadline given by the then Minister Jones and Minister Swarten for finalisation of the draft conditions was 30 June 2009
<<http://www.cabinet.qld.gov.au/mms/StatementDisplaySingle.aspx?id=64797>>
(**MFB-06-02a**) and this deadline was also reflected in the project plan.
80. The attached draft briefing note (**MFB-06-03**), dated 5 June 2009, prepared for the Associate Director General Terry Wall, notes that in relation to Project 1:
- (a) DERM met with mining company and Queensland Resources Council (QRC) representatives on 28 May 2009 (preparatory notes for that meeting are provided at **MFB-06-04**); and
 - (b) The project team had met that week to prepare new draft discharge conditions for distribution to mining companies, prior to a full-day workshop scheduled in Brisbane for 18 June 2009 when the conditions would be discussed in detail.

81. The draft briefing note also indicated that:
- (a) a small working group of three DERM representatives and three industry representatives would be formed at the conclusion of the workshop to refine the conditions based on DERM's mandate and industry comment; and
 - (b) a final version of draft conditions would be developed by 30 June 2009 and then discussed with individual mines, site by site, for implementation by December 2009.
82. The first draft of the model conditions was developed by a team of DERM employees, including [REDACTED] – a specialist in stream water quality and ecology. These draft model conditions are provided at **MFB-06-05**.
83. On 18 June 2009, DERM's set of draft conditions was workshopped with technical representatives from coal mining companies and the QRC. The workshop was facilitated by [REDACTED], formerly of the University of Central Queensland.
84. The notes from the workshop (**MFB-06-06**) indicate that it was agreed that DERM would incorporate comments from the workshop into Version 1.1 of the model conditions by close of business on 24 June 2009, and that that this new draft set of conditions would be distributed to the working group members for further refining.
85. It was also agreed that the version revised by the working group needed to go back to the wider group present at the workshop for further comment. The draft "Model Water Conditions for Coal Mines in the Fitzroy Basin" as at 30 June 2009 is provided at **MFB-06-07** and the final set of model conditions that were adopted is provided at **MFB-06-08**.
86. The package of administrative support and guidance material provided to DERM staff to use in the amendment of water conditions in environmental authorities for individual coal mines in the Fitzroy Basin included:
- (a) a flowchart outlining the process for amending environmental authorities (**MFB-06-09**);
 - (b) the final set of model conditions;
 - (c) a checklist for making an assessment level-decision for amending a non-standard environmental authority under the *EP Act* (**MFB-06-10**);
 - (d) a proforma EA/ Development Assessment (DA) Assessment Report crafted specifically to deal with amendment of water conditions for a coal mine (**MFB-06-11**);
 - (e) a proforma Coordinated Assessment Committee Report used to make recommendations on the 'assessment level' for the amendment of a coal mine environmental authority (**MFB-06-12**);
 - (f) a proforma Notice of Decision – Amendment Application (**MFB-06-13**);
 - (g) a checklist for Environmental Impact Statement 'triggers' for the proposed amendment (**MFB-06-14**);
 - (h) A DERM document entitled, Conditions for Coal Mines in the Fitzroy Basin - Approach to Discharge Licensing (**MFB-06-15**);
 - (i) A proforma letter to send to the operators of individual mines in the Fitzroy Basin (**MFB-06-16**).

86b As is shown in the flowchart (**MFB-06-09**), the process taken by DERM in dealing with individual mining companies in the Fitzroy Basin was that:

- (a) The proforma letter (with attachments **MFB-06-08**, **MFB-06-09** and an amendment application form) was sent to the operator of each coal mine in the Fitzroy Basin, requesting submission of an environmental authority amendment application to DERM, in accordance with section 240 of the EP Act, by 1 September 2009;
- (b) Pre-lodgement meetings were then arranged between DERM staff and representatives of each mine (where possible, each of these meeting was attended by the DERM Project Manager, DERM Regional Manager and DERM's Chief Scientist, Water Quality);
- (c) During the pre-lodgement meetings, DERM offered mining companies the opportunity to submit a business case with their application, setting out if and why its new water conditions should differ from the model conditions;
- (d) On receipt of completed amendment applications from mines, DERM staff prepared EIS Trigger Checklists and Assessment Level Decision recommendations for the Coordinated Assessment Committee;
- (e) After DERM made its Assessment Level Decision and EIS Decision for each application, in accordance with section 246 of the EP Act, the amendment application was assessed by DERM in accordance with section 256 – 258A of the EP Act;
- (f) Prior to making its final decision on the application, DERM would provide each mine operator with a final draft set of environmental authority conditions and seek feedback from mining companies;
- (g) After DERM made a decision to grant the amendment application a copy of the environmental authority was given to the applicant in accordance with s258 of the EP Act; and
- (h) Using the approach outlined above, environmental authorities for some 40 coal mines in the Fitzroy Basin were amended by 24 December 2009.

87. In August 2009, DERM established a new website <<http://www.fitzroyriver.qld.gov.au/>> as a way of sharing information about water quality in the Fitzroy Basin. This information included regular updates on progress with the DERM project to amend the water management conditions in environmental authorities for all coal mines in the Fitzroy Basin.

88. On 11 August 2009, at the request of Minister Jones then the Minister for Climate Change and Sustainability, DERM called the first meeting of the Fitzroy Water Quality Advisory Group (FWQAG) (**MFB-06-16a**) to address future management of water quality in the Fitzroy River Basin. The role established for the group was (amongst other things) to advise the Government on implementing the recommendations of the DERM report, "Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin", including the recommendation to amend the water conditions in environmental authorities for coal mines in the Fitzroy Basin. A media release about the new group and the new web site can be found at <<http://www.cabinet.qld.gov.au/MMS/StatementDisplaySingle.aspx?id=65699>> (**MFB-06-16b**)

2011 Review of Fitzroy Water Conditions

89. Condition W39 of the Model Water Conditions for Coal Mines in the Fitzroy Basin (with reference to **MFB- 06-05**) forecast an agreed process of review of the model conditions following a process of monitoring and, in particular, development of local water quality guidelines. On 3 November 2010, DERM met with QRC and industry representatives to discuss the model conditions. A copy of the correspondence and meeting record is provided at **MFB-06-17**. While some changes were made to the model conditions at this time, item 7 of the meeting record outlines the decision to undertake a review in mid 2011 once more monitoring data was available to inform it.
90. A Terms of Reference (ToR) was developed for the 2011 Fitzroy Model Water Conditions Review to provide a structured overview of the review objectives, considerations and process. A copy of the ToR is provided at **MFB-06-18** and it outlines an industry consultation process consisting of two staggered DERM internal workshops on 9/10 May and 9 June 2011 (minutes and action items provided at **MFB-06-19** and **MFB-06-20**) and two staggered DERM, QRC and Industry workshops on 31 May and 29 June 2011 (minutes and action items provided at **MFB-06-21** and **MFB-06-22**). The consultation was structured in this way to clarify focal points for the review and provide opportunities for consideration of arguments, exchange of different points of view and informed debate about outcomes.
91. As outlined in the ToR, following the industry consultation phase of the 2011 review, the working draft of the model conditions was distributed to members of the Fitzroy Water Quality Advisory Group and DERM representatives attended a meeting of the group on 7 July 2011 to present likely key changes to the model conditions and to invite comment. The only comments received through that group were from the Fitzroy Basin Association whose comments are attached at **MFB-06-23**.
92. Following final consideration of comments received, a briefing note requesting approval from the General Manager – Strategic Implementation, Coal and Coal Seam Gas was prepared requesting approval of the proposed reviewed model conditions and progression of a briefing note to the Minister to inform her of the review outcomes (refer to attachments **MFB-06-24a** to **MFB-06-24d**). The General Manager approved the changes to the model conditions on 3 August 2011.
93. In order to expedite both industry and internal understanding of the Model Condition changes ahead of the next wet season, DERM provided an industry training session on 25 August 2011, which also included a number of internal DERM attendees. A copy of that training presentation is provided at **MFB-06-25**.

Item 7: A description of the activities DERM was involved in during the 2010/2011 wet season regarding the grant of transitional environmental programs to operators of mines

94. A list of water management related TEPs granted to mines between 1 December 2010 and 23 Aug 2011 is provided as attachment **MFB-07-01**. A version of this list was published on the DERM website and updated on a weekly basis throughout 2011.
95. A total of 110 TEPs or amendment to existing TEPs were approved between 1 December 2010 and 23 August 2011.
96. The great majority of water management related TEP activity as a result of the 2010/2011 wet season related to coal mines in the Bowen Basin (92 of the 110 TEPs granted). While other mining operations such as CSG operations, metalliferous mines and coal mines in other parts of the state were affected it was on a considerably smaller scale than the Bowen Basin coal mines. As such, a detailed account of TEP activities relating to Bowen Basin coal mines is presented below.

Bowen Basin Coal Mines

97. Prior to the onset of the 2010/2011 wet season the department engaged mining companies across the Bowen Basin and carried proactive compliance inspections of 20 high risk sites identified from the 43 active coal mines in the Fitzroy Basin in an effort to establish their level of preparedness for the upcoming wet season. These inspections and associated discussions also allowed the department to assess the risk of operations discharging mine affected water outside of Environmental Authority (EA) conditions.
98. At this time, a number of mines were invited to submit Transitional Environmental Programs (TEP) to reduce the risk of non-compliant discharges and to develop a detailed release strategy that would provide the best outcome for the environment and community downstream of the mine.
99. While some companies did take the opportunity to submit an application for a TEP, the majority of companies did not submit TEPs until January 2011. The department responded by meeting with those companies who intended to submit TEPs to discuss release strategies and to expedite approvals prior to the wet season.
100. Following initial heavy rains throughout November 2010 and at the beginning of December 2010 the department formally invited mining companies to submit TEPs for immediate consideration (Attached **MFB-07-02** – Letter from D.Brown, ADG, RSD). The advice provided to mining companies clearly indicated that the department would assess all flood and weather related TEPs as quickly as possible.
101. To further expedite the TEP process, the department in consultation with the QRC developed and circulated a template of a streamlined TEP to industry for

use by mine operators. The template detailed the correct format and type of information required by the department in order to make a decision on a TEP in order to assist mining operators to progress their TEP applications in a swift and efficient manner (Attached **MFB-07-03**).

102. The department deployed significant resources to the task of processing TEP applications through the wet season and, together with the streamlined application, enabled the majority of TEPs to be processed within three to five days (the assessment period for a TEP in accordance with the *EP Act* is typically 20 business days).
103. Between 9 December 2010 and 23 August 2011, the department dealt with 109 applications for new and amended TEPs to allow discharges of mine affected water from coal mines in the Bowen Basin. On all occasions the department engaged directly with mining companies to assist them to develop conditions for discharge of water including flow triggers, end of pipe Electrical Conductivity (EC) limits, downstream EC values and monitoring requirements.
104. To assist in the development of appropriately conditioned TEPs for mine water releases, regional staff consulted extensively with the department's Environment and Resource Sciences Division in addition to experts located across the state in the field of aquatic ecosystem health and toxicology. Mining companies were also urged to engage external expert consultants to avoid assessment delays as a result of providing inadequate information.
105. Over the Christmas period staff worked for long hours, including over weekends and on public holidays, to ensure that TEPs were processed expeditiously and appropriately to ensure that any risks to the environment were properly managed and mine sites were able to take advantage of the large flows in the Fitzroy River system.
106. The department engaged extensively with mining companies in the development of TEPs for the discharge of mine affected water from Coal Mines in the Bowen Basin and the assessment of TEP applications was afforded the highest priority by all staff in an effort to expedite the approval process and avoid undue delays to flood recovery efforts at those mines.

Item 8: DERM's role, and an overview of activities undertaken between 1 October 2007 and 23 August 2011, with respect to any non-compliance with an environmental authority or transitional environmental program by an operator of a mine

107. DERM's role in relation to regulation of mining in relation to non-compliance with an Environmental Authority or TEP is described in items 1-4 of this statement
108. A list of non-compliance activities undertaken between 1 October 2007 and 23 August 2011 in relation to water management at mine sites is attached as **MFB-08-01**.

109. The list has been compiled from data held in multiple offices across the state and some of the data also comes from Environmental Protection Agency records prior to the amalgamation with the Department of Natural Resources and Water to form the Department of Environment and Resource Management.
110. Additionally, the water management non-compliance actions had to be manually identified and extracted from the greater pool of non-compliance actions that have occurred as these figures have not previously been reported on a separate basis.
111. Given the difficulties in obtaining the data and the short timeframe imposed by the Commission, it is possible that the records may include some inaccuracies and may be incomplete in some areas. However, this is the best and most accurate data the department can provide in the timeframe allowed.

Item 9: How DERM gathers information about the effect of releases of water from mines (including from dams at a mine site)

112. Conditions placed on the relevant EAs require the holder to monitor water quality both upstream and downstream from their operations. All releases of mine-affected water are monitored against certain water quality parameters and discharge triggers and the data must be collected and provided to the department within specified time periods listed on the EA.
113. In addition DERM gathers data on the status of the receiving environment prior to any release occurring. The baseline or receiving environment data assists in determining if there are impacts from a release. This is achieved through various means including:
 - (a) Baseline studies which are required as part of the application to gain approval (such as Environmental Impacts Statement / environmental management plans);
 - (b) Routine monitoring in accordance with the requirements of the Environmental Authority to establish the un-impacted condition of the receiving environment prior to any release taking place so that an assessment of the level of impact arising from a release can be made; and
 - (c) DERM also conducts pre wet season inspections on high risk mine sites to establish the baseline conditions at and surrounding the mine prior to any release.
114. Mines are required under conditions of the applicable EA to monitor the receiving environment surrounding a mine site at all times (even when releases are not occurring) to develop a baseline dataset of environmental values in the area. This data is used to design conditions for other mines in the basin and to increase understanding of the regional environment and the broader impact of mine sites, specifically in relation to aquatic ecosystems.
115. Mine operators are required to provide notification of incidents, such as releases which are outside the limits in their Environmental Authority, to DERM

as required by the conditions of their Environmental Authority and the notification requirements of the EP Act.

116. On notification of a non-compliant release DERM undertakes a site inspection as soon as possible after being notified. Where access is restricted, DERM has at times utilised helicopters to access site releases.
117. As part of the inspection DERM will undertake sampling and monitoring of the release and the receiving environment to establish the level of impact.
118. The conditions of the environmental authority may require the mine operator to conduct investigations in the event of a contaminated water release from the mine in accordance with the ANZECC (2000) methodology to establish the potential for environmental harm.
119. Conditions placed on TEPs require the holder to monitor all releases of mine affected water for those characteristics nominated by the EA but with additional requirements to monitor the receiving environment, and to a greater extent, to ensure environmental harm does not result from the releases. TEPs issued across the 2010/2011 wet season were conditioned to require monitoring downstream of mine sites and to cease any active release if water quality parameters were reached. This ensured the cumulative impact of a number of simultaneous releases was taken into consideration.
120. The department undertakes regular monitoring of streams as part of an ongoing monitoring program. This monitoring program includes a network of gauging stations that monitor real time flow in all major and some minor watercourses across the Bowen Basin along with water quality at a number of critical sites.
121. This monitoring was augmented during the 2010-11 wet season by manual sampling undertaken in a number of key areas throughout the Condamine and Fitzroy river systems. This enabled the department to independently monitor water quality, develop an additional dataset of water quality to use when making decisions about mine water releases and to more appropriately measure the impacts of such releases.
122. In some of the more recent environmental authorities issued in North Queensland, mining companies are being required through conditions in their environmental authority to install gauging stations to both identify flow regimes and also to assist in assessing impacts of any release

Item 10: DERM's role as to the assessment, regulation and communication of the effect of releases of water from mines (including from dams at a mine site)

123. Section 320 of the *EP Act* requires that releases that cause or threaten to cause environmental harm that have not been authorised through an environmental authority or transitional environmental program must be notified to DERM as soon as reasonably practicable. An amendment act was recently passed to

additionally require this notification to be provided the occupier of the relevant land.

124. Further, DERM has a general practice of including, as a conditions of environmental authority, a requirement that any releases which are not in accordance with environmental authority conditions must be notified to DERM as soon as reasonably practicable or no later than a specified time period (e.g. 24 hours after becoming aware of the release). Specifically notification is generally required of:
- (a) any release of contaminants to waters;
 - (b) any event where environmental harm (excluding environmental nuisance) has been caused or may be caused;
 - (c) any non-compliance with any condition of this environmental authority other than in relation to a release of contaminants;
 - (d) when the level of the contents of any regulated dam reaches the mandatory reporting level; or
 - (e) when a regulated dam will not have available storage to meet the design storage allowance on the 1 November of any year.
125. DERM officers may also attend certain incidents in the field and conduct an investigation in to the event. DERM's investigations may result in enforcement action being taken against the company which will be in accordance with DERM's Enforcement Guidelines.
126. As part of incident notification procedures, if a community within a Local Government area may potentially be impacted by the incident, it is common practice for DERM response staff to contact the responsible Local Government. Recommendations will be made to the Local Government and plans may be developed in-liaison with relevant Local Government personnel.
127. For CSG activities, impact to Local Government drinking water supplies are regulated by the *Water Supply (Safety and Reliability) Act 2008*. Where there is the potential for contaminants to adversely affect public drinking water supplies, for both surface and groundwater situations, the Office of the Water Supply Regulator, DERM and relevant water authorities and users will be contacted. Responsibilities of relevant stakeholders are as follows:
- (a) Office of the Water Supply Regulator, in conjunction with Queensland Health, may provide; public health advice and direction, interpretation of laboratory results and advice on safe levels of contaminants;
 - (b) Water supply authorities are responsible for water impoundments, water treatment and supply; and
 - (c) Stakeholders within the likely affected downstream areas are to be notified of the incident and precautionary actions.
128. In the event that an incident occurs or affects a landholder's property, DERM staff will make contact with the landholder. Contact will also be made if an incident has not impacted, but threatens to impact a landholder.

129. DERM Incident management personnel maintain an emergency contact listing with up to date details of Local Government contacts, as well as key contacts across the Department to assist with incident response.
130. DERM also provides and facilitates ongoing communication activities relating to mine discharges and river system water quality through websites, media and various key groups such as the Fitzroy Water Quality Advisory Group.

Item 11: DERM's role, and an overview of activities undertaken between 1 October 2010 and 23 August 2011, with respect to the effect of releases of water from mines (including from dams at a mine site) on:

131. Much of DERM's role and activities in relation to the effect of releases of water from mines has been covered in previous items. A few issues specific to each sub heading are included for completeness.

a. drinking water quality downstream

132. The EP Act and the subordinate *Environmental Protection (Water) Policy 2009* (EPP Water) provides for drinking water values for Queensland waters. Accordingly, the protection of these values must be demonstrated prior to any authority being granted authorising a contaminant release to surface waters. Conditions of the environmental authority will provide quality limits and environmental monitoring to ensure that discharge quality is sufficient to protect drinking water values.
133. During the 10/11 wet season, DERM staff liaised with Queensland Health on a regular basis to ensure that any authorised or un-authorised discharges from mine sites were managed to ensure the protection of drinking water quality.
134. TEPs issued during or as a result of the 10/11 wet season also considered the effects of any mine site release on drinking water and were conditioned to ensure that the discharge was managed in such a way as to ensure the protection of drinking water supplies.
135. Where a discharge from a coal seam gas activity is deemed to have a material impact on a raw drinking water supply source, an approved coal seam gas recycled water management plan under the *Water Supply (Safety and Reliability) Act 2008* will also be required to prove that the treatment process, and supporting management arrangements, will consistently deliver water of the quality required to protect public health in drinking water supplies. Alternatively an Exclusion Decision under the *Water Supply (Safety and Reliability) Act 2008* may be required. In administering the *Water Supply (Safety and Reliability) Act 2008*, DERM liaises with Queensland Health to ensure that public health is not at risk as a result of the discharge.

b. the downstream environment and ecology (as far as, and including, the Great Barrier Reef Marine Park)

136. The department's water monitoring activities have been detailed in previous items and, as such, will not be repeated here.
137. The effects of releases of water from mine sites are assessed prior to the grant of environmental authorities or transitional environmental programs. In applying to receive approval to discharge to a surface water, applicants must prepare information to support the application which identifies the environmental values, water quality objectives and management intent (that is, the goals to be achieved in terms of meeting water quality objectives and protecting environmental values) of the surface water. This framework is provided in the EPP Water. Applications must be able to demonstrate that the management intent for the receiving water will be met despite the discharge occurring. The application must also be accompanied by a detailed impact assessment, including water quality modelling to demonstrate the nature and extent of impacts to surface waters.
138. All applications for environmental authorities and TEPs submitted for the approval of discharge to surface waters must be assessed by DERM against the requirements of the EP Act which includes the EPP Water, including an impact assessment to ensure that environmental values of any surface water will be protected. In conducting these regulatory assessments, DERM has developed a number of decision support tools including the guideline "Protecting Environmental Values from CSG Water Discharged to Surface Waters" (2010, **MFB-11-01**), Conditions for Coal Mines in the Fitzroy Basin – Approach to Discharge Licensing (June 2010, **MFB-11-02**) and the Operational Policy "Waste water discharge to Queensland Waters" (2007, **MFB-11-03**) and associated procedural information (**MFB-11-04** and **MFB-11-05**). DERM has also prepared an "*Interim Decision Support Matrix Release of water produced in association with Coal Seam Gas activities to surface waterways*" (2010, **MFB-11-06**) which informs assessments and resultant authority conditions
139. The approach used by the department throughout the 2010-2011 wet season aimed to be consistent with state/national water quality guidelines e.g. The Queensland Water Quality Guidelines (2006), ANZECC/ARMCANZ Guidelines for Fresh and Marine Water Quality 2000, the Australian Drinking Water Quality Guidelines and the October 2010 released Draft for Consultation – Establishing Environmental Values, Water Quality Guidelines and Water Quality Objectives for Fitzroy Basin Waters. .
140. Strict controls and limitations are placed on authorities as conditions such as limits upon the volumes discharged, timing of discharge and required dilution and mixing zones for discharges. Conditions also include comprehensive contaminant monitoring programs for discharge quality which is supplemented by detailed receiving environment monitoring programs.
141. Releases of water from a dam at a mine site can be authorised by the conditions of an EA or via specific permission under a TEP. Regardless of the

statutory instrument, for releases of water from a dam at a mine site to be authorised, the assessment procedure described above would apply.

c. quality of water used for agricultural purposes

142. The use of waters for agricultural purposes is considered an environmental value under the EPP Water, and as such impacts on this value must be assessed as per the framework described above.

Item 12: Details of any of the following that DERM is aware of occurring during the period 1 October 2010 and 23 August 2011 related to the discharge of water from any mine site:

143. A table identifying known non-compliance issues over the period in question that had the potential to impact on an environmental value is provided as attachment **MFB-12-01**. Again, due to the time constraints placed on the department by the Commission there is a possibility of inaccuracies or omissions but it is the best available data that could be supplied by the department in the time frame allowed.

144. It should be noted that although a non-compliance issue may have had the potential to impact adversely on an environmental value this does not necessarily mean that this occurred. For completeness, all issues that had the potential to impact on an environmental value have been included in the table.

145. Further information specific to the currently elevated salinity levels in the Fitzroy river system and relevant to items 12a to 12e are supplied in the following paragraphs.

146. The department has observed that salinity (measured by Electrical Conductivity) in all water courses in the Fitzroy basin has increased following the 2010/2011 wet season. The high rainfall resulted in extensive recharge to the groundwater in the Fitzroy basin which increased contribution of groundwater to base flows in streams high in the catchment. At times, the salinity of this water is quite high (in excess of the EC 2500 micro Siemens per centimetre (uS/cm)). As a consequence, salinity in base flows in the larger streams of the Fitzroy catchment is higher than has been experienced in recent years when there was little or no groundwater contribution to stream flow.

147. The department does not believe that discharges from mine sites as a result of the 10/11 wet season have contributed significantly to the currently elevated electrical conductivity of the Fitzroy river system. Discharges from mine sites have been closely monitored in accordance with conditions set on both EAs and TEPs to ensure water quality downstream of mines remains within acceptable limits.

a. adverse effect on drinking water quality

148. This rising salinity is currently causing some minor issues in drinking water supplies in the lower Mackenzie and Fitzroy Rivers. The electrical conductivity (EC) in the Fitzroy Barrage, which supplies drinking water to Rockhampton and the Bedford Weir, which supplies drinking water to Tieri, Middlemount, Blackwater, and Bluff has risen to levels above 600uS/cm. At these levels part of the population are able to detect taste difference to the water normally supplied from these storages.

b. adverse effect on any plant or animal species

149. There is no evidence to suggest that any plant or animal species has been adversely impacted by the increased salinity in waterways across the Fitzroy river system.

c. adverse effect on any industry or agriculture

150. Whilst there have not been major impacts on electricity generation there has been some minor inconvenience and increased costs on electricity generation at the Stanwell power station. An increase in salinity in the raw water supply results in fewer cycles for cooling water. Consequently, to achieve the same levels of electricity generation increased volumes of cooling water sourced from the Fitzroy River are required.

151. The department has been informed that Stanwell Corporation have been able to handle the increase in salinity in their raw water through a temporary amendment to their Development Approval (DA). The amendment allows Stanwell to use larger volume of below down water at the same time not exceeding their current water quality discharge limits.

d. adverse effect on the environment

152. There is no evidence that rising EC in stream flow in the Fitzroy river system or mine water discharges across the state as a result of the 10/11 wet season have had any adverse impact on the environment. The department has investigated a number of breaches of conditions of both EA's and TEP's and has concluded that in the majority of cases there is no evidence that environmental harm has resulted from any non compliant release. There is still one investigation ongoing in the North West of the state and the department is currently reviewing the brief of evidence.

e. adverse effect on public health

153. Where salinity has risen in drinking water supplies in the lower Mackenzie and Fitzroy Barrage, there is some concern in particular for those people who are on low sodium diets and kidney dialysis in Tieri, Middlemount, Blackwater, Bluff and Rockhampton. Bio-medical services of the Central Queensland Health Service District have also reported that adjustments have had to be made to

dialysis and other equipment as a result of the associated increase in hardness of water.

154. As mentioned earlier in this statement, the department believes that the major cause of this increase in salinity and hardness is the increasing contribution of groundwater to stream flows rather than the effects of mine discharges.

Item 13: DERM's role and activities regarding the flood preparedness of mines in Queensland:

a. generally

155. As a regulator DERM's compliance activities are designed to strategically review the performance of individual regulated entities in a risk based way.

156. DERM's compliance approach is discussed previously, but it is useful here to reiterate activities undertaken around wet season cycles that are aimed at ensuring mine water management is undertaken by registered entities in as effective a way as possible.

157. DERM has and is undertaking pre wet season compliance programs to evaluate water management preparedness ahead of the coming wet season. This primarily involves evaluating past season performance, measures taken following and preparedness ahead of the next wet season in terms of having available dam storage capacity to meet the minimum design storage allowance on the 1 November of any year.

158. EAs include requirements for companies to prepare Water Management Plans that outline the overall mine water management strategy for their site. The EAs require an annual review of these plans to ensure learnings from past wet season performance are incorporated into forward plans and preparations for future wet seasons.

159. EAs also include dam structural design, construction and operation requirements relating to mine sites that are commensurate with flood risks given their locations, including:

- (a) certified hazard assessment required for all dams;
- (b) must be designed to prevent floodwaters from entering the dam, wall failure and overtopping up to and including a specified flood event based on AEP;
- (c) certified design plans, high risk dams reviewed by DERM technical experts;
- (d) having a marked "mandatory reporting level" above which DERM must be notified immediately, and actions put in place to prevent or minimise environmental harm
- (e) ensuring the dam is inspected at least annually by a suitably qualified and experienced person and provide the report to DERM;
- (f) undertaking reviews annually about the effectiveness of the dam during the preceding wet season and modifying the water management system accordingly
- (g) monitoring of water quality within the dam prior to the wet season; and

(h) maintaining a register of dams and relevant information.

b. specific activities undertaken in advance of the 2010/2011 wet season

160. In late 2010, information from the Bureau of Meteorology indicated that there was a 70-80% chance that the 2010/2011 wet season in Queensland might exceed median rainfall values. In response the department developed and implemented summer season preparedness and response plans for mining areas likely to be impacted by the wet season (Attachments **MFB-13-01**, **MFB-13-02**). This plan included a series of targeted mine-site inspections. The purpose of the plans was to:
- (a) identify all regulated water storage facilities that were at risk of unauthorised discharge;
 - (b) outlined the approach adopted to prepare for the wet season; and
 - (c) outline emergency response arrangements to incidents.
161. Prior to this, since the 2008/2009 summer season, the department had been working closely with mining companies to improve on-site water management systems and reduce the impacts of releasing mine affected water.
162. Specific activities to assist with preparedness in advance of the 2010/2011 wet season included the development and implementation of consistent and appropriate discharge conditions for coal mines as recommended by the '*Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin*' report. The agreed conditions were developed in accordance with the department, the QRC and technical experts from Fitzroy Basin coal mines and have been discussed in detail in item 6 of this statement.
163. Mines that identified they could not move immediately to the new standards were provided opportunities to include transitional conditions until such time they could comply. Where companies felt the existing conditions were not appropriate to manage site water, they were invited to apply for TEP's and/or amend conditions at their request.
164. Numerous inspections were undertaken by departmental officers across the state during 2010 leading up to the 2010/2011 wet season. The inspections focused on higher risk sites and had an emphasis on water management. Risk assessments for various sites are contained in the summer season preparedness and response plans mentioned earlier.
165. Mine operators are required under the conditions of the EA to conduct an annual inspection of all hazardous storages at each mine site prior to each wet season. The inspections focus on structural integrity and capacity requirements. These reports for mine sites were reviewed by DERM to ensure that any remedial measures recommended in the report were implemented.
166. During 2010 DERM monitored meteorological observations and forecasts both prior to and during the 2010/2011 wet season to adjust operational planning and resource allocation appropriately to minimise the risk of contaminated water releases from mines and maintained constant contact with the key mine sites.

166a. DERM developed a '*CSG Discharge Response Plan*' in December 2010 (MFB-13-03) which aimed to ensure a professional, consistent and timely initial response by DERM to major CSG discharge events from CSG project sites in DERM's South West and Central West Regions by setting out roles and responsibilities within DERM when responding to a major CSG discharge event.

c. specific activities planned to occur in advance of the 2011/2012 wet season

167. All regions throughout the state have planned a series of pro-active inspections for mine sites identified as higher risk of inundation or unauthorised release of mine affected water. These inspections will focus on establishing whether the mine in question is able to operate within the conditions of its Environmental Authority and/or Transitional Environmental Program and will obviously be focussed on water management. Where non-compliance was previously identified, the operators of the mine were required to implement, or commit to implement, actions to bring the site into compliance and these will also be reviewed as part of the inspection program.

168. DERM is currently engaging with mine operators from a number of mine sites on a range of works designed to minimise the risk of contaminated water releases in the 2011/2012 wet season. DERM will also act on any water management issues arising from the compliance inspection program that is currently being undertaken.

169. DERM are currently undertaking the annual review of the Mine Discharge Response Plans in preparation for the 2011/12 wet season. Regional staff are also ensuring equipment and staff are available to respond in the event of a mine discharge.

170. Mine operators are required to conduct an annual inspection of all hazardous storages at each mine site prior to the wet season. The inspections focus on structural integrity and capacity requirements. These reports will be reviewed by DERM as required to ensure that any remedial measures recommended in the report will be implemented.

171. DERM will monitor meteorological observations and forecasts both prior to and during the upcoming wet season to adjust operational planning and resource allocation appropriately to minimise the risk of contaminated water releases from mine sites in North Region and maintain constant contact with the key large mine sites.

172. As the coal mines in the Bowen Basin were some of the most severely impacted in the 10/11 wet season, the department's Central West Region have developed a *Central West Region – Coal Mine Water Inspections Project Outline* (Attached MFB-13-15). The aim of the program is to establish the current water management status of Central West coal mines (particularly those in the Fitzroy river system) leading into the 2011/2012 wet season and identify those mines that may be of high risk in relation to potential uncontrolled discharges of mine affected water. Officers will use a guide *Proactive Compliance Inspection –*

Standard Operating Procedure (Attachment **MFB-13-16**) developed specifically for the inspection program to ensure information is targeted and collected in a useable format.

173. A total of 30 coal mines will be inspected as part of this program. The program will focus on overall site water management particularly, storage capacity, water quality, water management plans and systems in place (including contingencies), proposed or planned infrastructure upgrades to improve water management systems including treatment and identification of any potential non-compliances with EA conditions.
174. The criteria for determining which sites have been included in the program for the 2011/12 wet season include:
- (a) coal mines that required a TEP during the 2010/2011 wet season; and
 - (b) coal mines that had non-compliances with environmental approvals during the 2010/2011 wet season; or
 - (c) coal mines that have been identified as high risk by the departmental Project Manager due to on-going water management issues.
175. The program is scheduled to commence on 6 September 2011 and is due for completion prior to the end of this wet season. A final report will be developed summarising the outcomes, findings and actions taken as a result of the program.
176. In addition to the pro-active inspection programs being implemented across the state, the department, in consultation with the Queensland Resources Council and other interested stakeholders has completed a review of the *Fitzroy Model Water Conditions*. More detailed information on this has been provided at item 6 of this statement.
177. Since the 2010/2011 wet season, regional officers have been liaising with industry and encouraging mines with outstanding concerns in relation to water management and compliance with EA conditions to proactively apply for a TEP. The department has reiterated that the TEP's must detail the actions being undertaken by the mine operator to identify water management issues and improve site infrastructure to enable compliance with their environmental approvals and EP Act.
178. Written correspondence to all CSG companies drafted requiring wet season planning including a status report of all dams and stormwater ponds and an emergency or contingency strategy or plan which includes procedures for:
- (a) situation responses including protocols for water level management;
 - (b) the identification of potentially impacted stakeholders and communication methodologies;
 - (c) investigation, monitoring and reporting of releases;
 - (d) post release impact assessment and remediation;
 - (e) staff training and awareness of contingency plans;
 - (f) notification procedures for the department and local government; and
 - (g) identification of the minimum amount of information that will be provided as part of notification in the event of a release.

Item 14: The interaction during floods or times when mines are releasing water arising out of or related to floods between DERM and:

a. operators of mines

179. Examples and a detailed description of interaction between the department and mine operators have been provided as part of the responses to other items in this statement. As such, they will not be repeated for this item.
180. During the wet season DERM maintain close contact with key mine sites to continually assess and reassess the potential for any discharge and to ensure all authorised and un-authorised discharges were being managed wherever possible to minimise the potential for unacceptable impacts on the environment and downstream water users.

b. downstream landholders

181. During discharge events DERM maintains contact with potentially impacted downstream landholders and where necessary other potentially affected stakeholders (for example traditional owners and local authorities) to advise of the release.
182. When negotiating TEPs that may impact on downstream landholders, DERM ensures these potentially affected landholders and downstream water users are contacted as part of the process by either DERM or the mining operator.
183. Where any incidents, un-authorised releases or release of contaminants occur that may impact on downstream water users, DERM ensures all potentially affected parties are contacted and made aware of the situation and the measures being taken to control the issue.
184. The broader community is kept informed of mine discharges and other related issues through various media and key stakeholder groups as required.

c. emergency management personnel at both the State and local level

185. DERM staff liaise with emergency management personnel as required where an event or incident has occurred that has resulted in the activation of local or state disaster management arrangements.

d. other government agencies including the Department of Employment, Economic Development and Innovation, the Great Barrier Reef Marine Park Authority and the Queensland Parks and Wildlife Service.

186. DERM notifies and liaises with other key government agencies as circumstances require. For example, Queensland Health is notified in circumstances where drinking water or public health may be impacted, DEEDI is notified where there may be impacts to livestock and issues relating to abandoned mines, and QPW would be notified where there may be impacts on protected areas.

187. During discharge events DERM maintains contact with these government agencies to provide advice on the release so that any appropriate management measures can be implemented if required.

188. Extensive liaison and consultation has occurred with DEEDI on the impacts of the 2010/2011 wet season on coal mines and the effects that stored water may be having on operational capacity.

I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the *Oaths Act 1867*.

Signed



Michael Francis Brennan

Taken and declared before me, at Brisbane this 5th day of September 2011



.....
Solicitor/Barrister/Justice of the
Peace/Commissioner for Declarations

Our ref: Doc 1683651

29 August 2011

Mr Michael Birchley
Assistant Director-General
Regional Service Delivery
Department of Environment and Resource Management
GPO Box 2454
BRISBANE QLD 4001

REQUIREMENT TO PROVIDE STATEMENT TO COMMISSION OF INQUIRY

I, Justice Catherine E Holmes, Commissioner of Inquiry, pursuant to section 5(1)(d) of the *Commissions of Inquiry Act 1950* (Qld), require Mr Michael Birchley to provide a written statement, under oath or affirmation, to the Queensland Floods Commission of Inquiry, in which the said Mr Birchley:

- provides all information in his possession and identifies the source or sources of that information;
- makes commentary and provides opinions he is qualified to give as to the appropriateness of particular actions or decisions and the basis of that commentary or opinion;

in respect of the following:

1. a brief overview of the role and responsibilities of the Department of Environment and Resource Management (DERM) as to the regulation of mining operations in Queensland, including mining dams
2. the involvement of DERM in granting environmental authorities to operators of mines under the *Environmental Protection Act 1994* (Qld)
3. the means by which DERM regulates compliance with environmental authorities granted to operators of mines
4. the role of DERM in granting transitional environmental programs to operators of mines
5. DERM's actions in response to the Hart Report on Fitzroy River Water Quality Issues recommendations numbers 1, 2, 3, 4, 5, 10, 11, 12 and 13

6. the process by which the Final Model Water Conditions for Coal Mines in the Fitzroy Basin were drafted, relevant parties were consulted, and the terms were negotiated, finalised and amended (all relevant meeting minutes, internal and external reports, briefing notes and memoranda should be attached to the statement)
7. a description of the activities DERM was involved in during the 2010/2011 wet season regarding the grant of transitional environmental programs to operators of mines
8. DERM's role, and an overview of activities undertaken between 1 October 2007 and 23 August 2011, with respect to any non-compliance with an environmental authority or transitional environmental program by an operator of a mine
9. how DERM gathers information about the effect of releases of water from mines (including from dams at a mine site)
10. DERM's role as to the assessment, regulation and communication of the effect of releases of water from mines (including from dams at a mine site)
11. DERM's role, and an overview of activities undertaken between 1 October 2010 and 23 August 2011, with respect to the effect of releases of water from mines (including from dams at a mine site) on:
 - a. drinking water quality downstream
 - b. the downstream environment and ecology (as far as, and including, the Great Barrier Reef Marine Park)
 - c. quality of water used for agricultural purposes
12. details of any of the following that DERM is aware of occurring during the period 1 October 2010 and 23 August 2011 related to the discharge of water from any mine site:
 - a. adverse effect on drinking water quality
 - b. adverse effect on any plant or animal species
 - c. adverse effect on any industry or agriculture
 - d. adverse effect on the environment
 - e. adverse effect on public health
13. DERM's role and activities regarding the flood preparedness of mines in Queensland:
 - a. generally, and
 - b. specific activities undertaken in advance of the 2010/2011 wet season
 - c. specific activities planned to occur in advance of the 2011/2012 wet season
14. the interaction during floods or times when mines are releasing water arising out of or related to floods between DERM and:
 - a. operators of mines
 - b. downstream landholders

- c. emergency management personnel at both the State and local level
- d. other government agencies including the Department of Employment, Economic Development and Innovation, the Great Barrier Reef Marine Park Authority and the Queensland Parks and Wildlife Service

For the purpose of this Requirement, "mine", "mines" and "mining" should be taken to include coal seam gas operations. All relevant government policies and procedures relevant to topics 2 to 14, above, should be attached to the statement.

Mr Birchley may also address other topics relevant to the Terms of Reference of the Commission in the statement, if he wishes.

The statement is to be provided to the Queensland Floods Commission of Inquiry by Monday 5 September 2011.

The statement can be provided by post, email or by arranging delivery to the Commission by emailing info@floodcommission.qld.gov.au.



Commissioner
Justice C E Holmes

Environmental impact statements (EIS)

What is the purpose of an environmental impact statement (EIS)?

The purpose of an EIS is to:

- assess the potential adverse and beneficial environmental, economic, and social impacts of the project;
- provide information to the public about the project and its impacts;
- obtain input from the community and stakeholders about the project, its impacts and management;
- assess management, monitoring, planning and other measures proposed to minimise any adverse environmental impacts of the project;
- consider feasible alternative ways to carry out the project;
- assist the administering authority¹ to decide an environmental authority application;
- give information to other State and Commonwealth authorities to help them make informed decisions; and
- propose an environmental management document for the project such as an environmental management plan (e.g. an environmental management plan (exploration permit or mineral development licence) as applicable for mining projects).

When do I need to prepare an EIS?

A proponent will be required to prepare an EIS under the *Environmental Protection Act 1994* (EP Act) if the administering authority or the Minister for the Department that administers the EP Act decides an EIS is appropriate for a mining project, based on criteria in the guideline 'Deciding the level of impact assessment for the mining industry'.

If the project is determined to be of state or national significance then the proponent may be required to prepare an EIS under either the *State Development and Public Works Organisation Act 1971* or the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).

Note: If the proponent of a project considers that their project might require an EIS, they may apply to the administering authority to prepare a voluntary EIS along with payment of the prescribed fee. For further information refer to the [information sheet](#) 'Voluntary Preparation of an EIS' and [application form](#) 'Application to prepare a voluntary environmental impact statement' on the administering authority website www.derm.qld.gov.au about voluntary preparation of an EIS.

An EIS process is initiated when the proponent submits a draft terms of reference and pays the EIS assessment fee.

¹ The Department of Environment and Resource Management is the administering authority under the *Environmental Protection Act 1994*.

What is the role of the project proponent?

The proponent:

- prepares draft terms of reference, including proposing who are the affected and interested persons and how they will be consulted
- makes payment of the prescribed fee
- notifies affected persons and interested parties of the draft terms of reference
- summarises comments, prepares written response to comments and redrafts terms of reference and provides these to the administering authority
- undertakes relevant studies and prepares an EIS in accordance with the terms of reference decided by the administering authority
- develops the environmental management document for the project
- publishes an EIS notice advising submissions on the EIS will be accepted by the administering authority
- reviews and responds to public submissions on the EIS.

What is the role of the public?

The public's role is to critically analyse and provide advice on the proposed terms of reference and EIS to ensure an open and transparent EIS process.

The terms of reference proposed by the proponent and decided by the administering authority will include appropriate mechanisms for informing and consulting the affected and interested parties and the community.

The public can play a significant role by providing comments on the draft terms of reference and EIS to assist in determining an application for an environmental authority for a mining project and deciding conditions.

What is the role of the administering authority?

The administering authority:

- reviews the draft terms of reference prepared by the proponent
- places advertisements inviting comments on the draft terms of reference
- receives comments on draft terms of reference and provides copies to the proponent
- decides and publishes final terms of reference for the EIS
- determines if the submitted EIS meets requirements of the terms of reference
- accepts all submissions on the EIS and provides copies to the proponent
- prepares an EIS assessment report
- reviews the environmental management document prepared by the proponent
- coordinates input from other government agencies for an EIS process under the *Environmental Protection Act 1994*.

When is an EIS process complete?

The EIS process is completed when the administering authority gives the EIS assessment report to the proponent. The EIS assessment report will:

- assess the adequacy of the EIS in meeting the requirements of the terms of reference
- assess the adequacy of any environmental management document prepared in association with the EIS
- make recommendations on the suitability of the project
- recommend any conditions on which any approval required for the project may be given.

The administering authority may accept an EIS prepared under another Act (for example the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*) as an EIS for the purposes of the *Environmental Protection Act 1994*.

Further information

For further information refer to the guideline 'Terms of reference and preparation of an environmental impact statement'.

Advice and support are available:

- through a state-wide network of regional offices of the administering authority;
- on the administering authority website at www.derm.qld.gov.au; and
- by contacting Permit and Licence Management on 1300 130 372.

Disclaimer

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved by:

Jon Womersley
Regulatory Support and Practice Branch
Department of Environment and Resource Management

Enquires:

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Date: 21 January, 2011

The environmental impact statement (EIS) process for level 1 mining projects

This guideline provides information on when an EIS is required as part of an application for an environmental authority, and the process of developing an EIS within the general framework provided by the Environmental Protection Act 1994.

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1 Introduction

Chapter 3 of the *Environmental Protection Act 1994 (EP Act)* prescribes an environmental impact statement (EIS) process. This EIS process applies in the following circumstances (s. 37 of EP Act):

- 1) an EIS requirement is in force in relation to an application for an environmental authority (mining activities) and a relevant mining activity for the application is, or is part of, the project; or
- 2) an EIS has been required for the project under an Act as follows for which it has, under the Act, been decided or required that this part applies to the preparation of the EIS—
 - (i) the *Environment Protection and Biodiversity Conservation Act*,
 - (ii) the *State Development and Public Works Organisation Act 1971*;
 - (iii) another State Act or another Commonwealth Act; or
- 3) the voluntary preparation of an EIS for the project has been approved by the chief executive¹ under part 2 of the EP Act; or
- 4) the project is of a type prescribed under a regulation for which approval by a Commonwealth or State authority is required.

A proponent may apply to the chief executive to voluntarily prepare an EIS for a project (s. 70 of EP Act). However, an application to voluntarily prepare an EIS can not be made for a project if:

- an EIS requirement is in force for an application under the EP Act relating to the project; or
- the *Environment Protection and Biodiversity Conservation Act* requires the project to be assessed under that Act and the EIS process has not been decided as an accredited process under the *Environment Protection and Biodiversity Conservation Act*; or
- an EIS or similar statement, however called, must be prepared for the project under another State Act and that Act does not allow the EIS or statement to be prepared under the EIS process.

2 Definition of affected persons and interested persons

A person is an 'affected person' for a project (s. 38 of EP Act) if the person is:

- 1) any of the following under the *Native Title Act 1993* (Commonwealth) for the operational land or for an area that includes any of the land:
 - a) a registered native title body corporate;
 - b) a registered native title claimant;
 - c) a representative Aboriginal/Torres Strait Islander body; or
- 2) a relevant local government for the operational land; or
- 3) a person mentioned below for the operational land or any land joining it:
 - a) a registered proprietor - for freehold land;
 - b) a person recorded in the register as the registered holder of the interest - for land that is held from the State for an estate or interest less than fee simple and for which the interest is recorded in a register mentioned in the *Land Act 1994* (Land Act), s. 276;
 - c) a holder of, or an applicant for, the tenement - for land subject to a mining claim, mineral development licence or mining lease;

¹ The Department of Environment and Resource Management is the chief executive under the *Environmental Protection Act 1994*.

The EIS process for level 1 mining projects

- d) a holder of the resource authority – for land subject to a relevant resource authority for an environmental authority (chapter 5A activities);
- e) a trustee of the land - for land under the Land Act or the *Nature Conservation Act 1992* (NC Act) for which there are trustees;
- f) a grantee of the land - for Aboriginal land under the *Aboriginal Land Act 1991* (AL Act) that is taken to be a reserve because of s. 87(2) or 87(4)(b) of that Act;
- g) a trustee for the land - for DOGIT land under the ALA or the *Torres Strait Islander Land Act 1991*;
- h) a relevant local government - for land held under a lease under the *Local Government (Aboriginal Lands) Act 1978*, s. 3;
- i) a grantee of the land – for Torres Strait Islander land under the *Torres Strait Islander Land Act 1991* that is taken to be a reserve because of s. 84(2) or 84(4)(b) of that Act;
- j) a trustee of the land - for land under a lease from the State under the *Aborigines and Torres Strait Islanders (Land Holding) Act 1985* that has been excised from land granted in trust for Aboriginal or Torres Strait Islander purposes under the Land Act;
- k) the State - for land that is any of the following:
 - unallocated State land;
 - a reserve under the Land Act for which there is no trustee;
 - a national park, national park (Aboriginal land), national park (scientific), national park (Torres Strait Islander land), national park (recovery) or forest reserve under the NC Act;
 - a conservation park under the NC Act for which there are no trustees;
 - a State forest or timber reserve under the *Forestry Act 1959*;
 - a State controlled road under the *Transport Infrastructure Act 1994*;
 - a fish habitat area under the *Fisheries Act 1994*;
- l) another person prescribed under a regulation.

At the beginning of the EIS process, the proponent may nominate those persons with an interest in the project (interested persons). Interested persons may include a local community progress association, a local/state/national environmental action group, or affected land users other than landholders. The interested persons should be identified on a 'project by project' basis and will vary for each project. It is important that the proponent follows a thorough and systematic process to identify any person who might have a substantial interest in the project or its impact.

Representatives of both interested and affected persons should participate in the community reference group or stakeholder panel set up for the community consultation program for the project. Further information on community consultation and its role in issue identification is contained in the guideline 'Issue identification and community consultation.'

3 Purpose of the EIS

The purpose of an EIS is to (s. 40 of EP Act):

- assess the potential adverse and beneficial environmental, economic and social impacts of the project;
- assess the management, monitoring, planning and any other measures proposed to minimise any adverse environmental impacts of the project;
- consider feasible alternative ways to carry out the project;
- give enough information about the identified impacts and management measures to the proponent, Commonwealth and State authorities and the public;

The EIS process for level 1 mining projects

- prepare or propose an environmental management plan for the project;
- help the administering authority² decide an environmental authority application for which the EIS is required;
- give information to other Commonwealth and State authorities to help them make informed decisions;
- meet any assessment requirements under the *Environment Protection and Biodiversity Conservation Act* for a project that is, or includes, a controlled action under that Act; or a bilateral agreement;
- allow the State to meet its obligations under a bilateral agreement.

4 Description of the EIS process

4.1 Voluntary preparation of an EIS

A proponent may apply to voluntarily prepare an EIS for a project (s. 70 of EP Act). In that case the application must be on the approved form, be accompanied by the prescribed fee³ and be supported by enough information to allow the chief executive to decide whether an EIS is appropriate for the project. That is, the application must contain the following:

- (a) a description of the project including proposed ancillary activities such as accommodation for workers, transport of product, and power supply and proposed methods for waste management (e.g. tailings dam requirements);
- (b) a description of the operational land;
- (c) a list stating the name and address of each person the proponent proposes as an interested person for the project;
- (d) a list of the names and addresses of the affected persons for the project;
- (e) a statement of how the proponent proposes to consult with the affected and interested persons;
- (f) a list (if any) of environmental relevant activities for which an aggregate environmental score is stated;
- (g) the proposed source of water for the project; and
- (h) proposed post mining land use including any non-beneficial land capability that will remain.

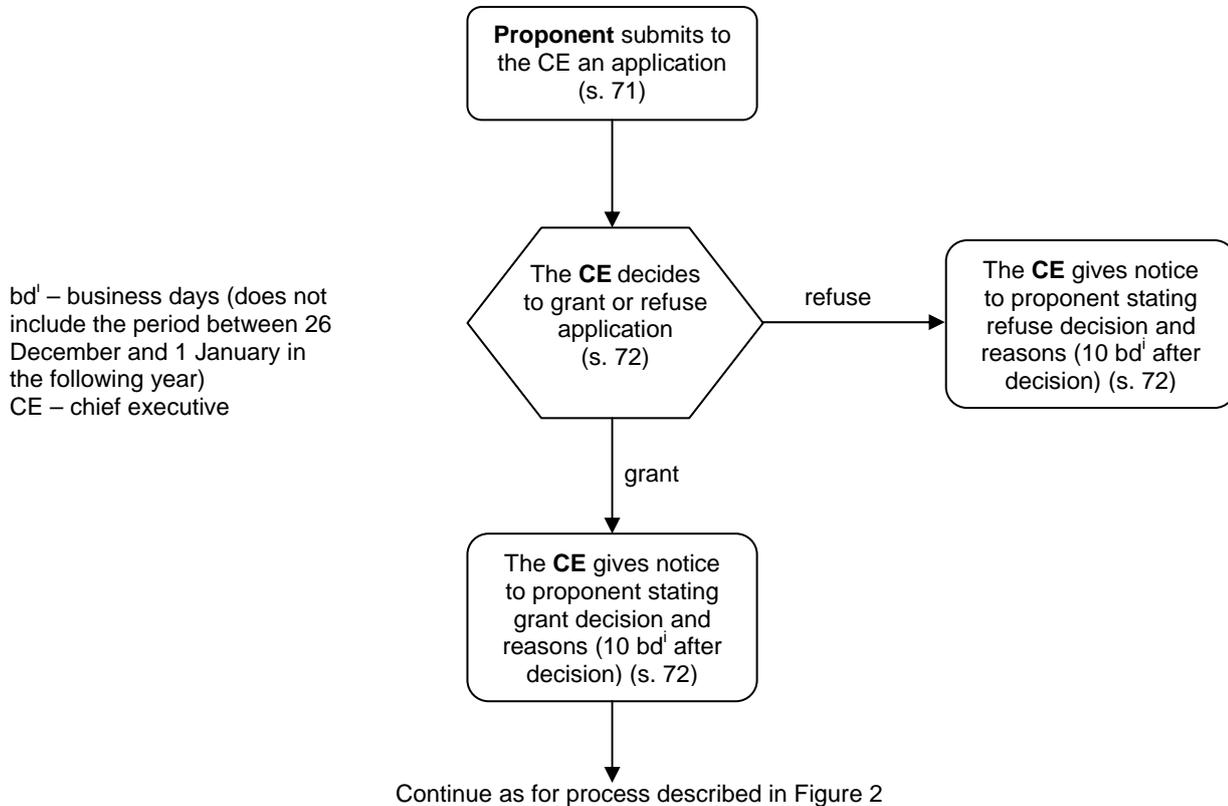
If available, the chief executive encourages submission of a draft or outline environmental management plan (EM Plan) at this stage, or any existing feasibility studies. Also, the proponent must show that they have authority to enter the land to which the project relates, to carry out the necessary studies for the EIS.

Figure 1 (see next page) shows the process for applying to voluntarily prepare an EIS. If the application is approved by the chief executive, the general EIS process prescribed in the EP Act and discussed in the sections following should then be followed.

² The Department of Environment and Resource Management is the administering authority under the EP Act.

³ An application fee must be paid at the time of submitting the voluntary EIS application. The fee as of 1 January 2011 is \$500 which may be adjusted for inflation in August each year. For the latest fee please check the chief executive website on <www.derm.qld.gov.au> or call 1300 130 372.

Figure 1 - Application to voluntarily prepare an EIS



4.2 The terms of reference stage

Figure 2 is a flow chart detailing the EIS process prescribed in the EP Act. The entity required to carry out each step is identified in bold.

The EIS process commences when the proponent submits draft terms of reference (TOR) to the chief executive. The draft TOR must be submitted in an approved form and be accompanied by the prescribed fee⁴. If an application to voluntarily prepare an EIS has not previously been made for the project, the following information should accompany the draft TOR (s. 41 of EP Act):

- a written description of the project and the operational land;
- a list stating the name and address of each person the proponent proposes as an interested person for the project;
- a statement of how the proponent proposes to consult with the interested persons; and
- a list of the names and addresses of the affected persons for the project.

⁴ An EIS assessment fee of \$120 000 must be paid at the time of submitting the draft TOR. The fee is current as of 1 January 2011 and may be adjusted for inflation in August each year. For the latest fee please check the chief executive website on <www.derm.qld.gov.au> or call 1300 130 372.

The EIS process for level 1 mining projects

The guideline 'Generic terms of reference for environmental impact statements' provides more detail and an example of a generic 'terms of reference' for a mining project. The chief executive prepares and publishes a terms of reference notice for public notification of the draft terms of reference. The notice states the following information (s. 42 of EP Act):

- a description of the project and the operational land;
- that the proponent has prepared draft terms of reference for the EIS;
- where or how the draft may be obtained;
- that anyone may make written comments to the chief executive about the draft terms of reference;
- the comment period during which comments may be made;
- another matter prescribed under the Environmental Protection Regulation 2008.

The comment period is decided by the chief executive and must be at least 30 business days.

The proponent must give all identified affected and interested persons a copy of the terms of reference notice.

Anyone can make comments on the draft terms of reference to the chief executive. Within 10 business days after the comment period ends, the chief executive must give the proponent a copy of all comments received.

The proponent must then prepare the following:

- a written summary of the comments;
- a response to the comments;
- proposed amendments to the terms of reference as a result of the comments received.

It is suggested that the summary and response to comments is presented in a tabular form for easy reference. The proponent must provide the above information to the chief executive within 20 business days of receiving copies of the comments. However a longer period of time can be agreed between the proponent and the chief executive. The chief executive then prepares and publishes the final terms of reference based on the response from the proponent and gives to the proponent a copy within 20 business days.

It should be noted that the finalised terms of reference cease to have effect if an EIS is not submitted by the proponent within two years of the terms of reference being published.

4.3 The EIS submission stage

The proponent gives the completed EIS to the chief executive. It is intended that the assessment of the environmental management document (environmental management plan (EM Plan) as relevant to the application for an environmental authority), be assessed in parallel to the EIS. Therefore, submission of the environmental management document as part of the EIS is required (part of the terms of reference).

At this stage, the chief executive must decide whether to allow the EIS to proceed to the public notification stage (s. 49 of EP Act). For the EIS to be allowed to proceed, it must adequately address the published terms of reference. It should be noted that the proponent may apply to the Minister for a review in the event that the chief executive refuses to allow the EIS to proceed.

The proponent will be advised on a 'project by project' basis of the number of copies of the EIS required by the chief executive. Additional copies will be needed to make available for the public to purchase upon request. Multiple copies are required by the chief executive to distribute to staff and advisory bodies involved in the assessment process. The chief executive may provide copies directly to affected parties (e.g. landholders) who would otherwise have to pay for copies. Also, the chief executive will make copies available for inspection at the chief executive head office in Brisbane and relevant regional offices.

It is recommended that the proponent make copies of the EIS available free to interested/affected parties.

The EIS process for level 1 mining projects

Once the proponent is notified by the chief executive that the EIS can proceed, the proponent must publish an EIS notice and give a copy of the EIS notice to each affected and interested person. The EIS notice must be in the approved format and state the following (s. 52 of EP Act):

- a description of the project and the operational land;
- where the submitted EIS may be inspected;
- where copies of, or extracts from, the submitted EIS may be obtained;
- that anyone may make a submission to the chief executive about the submitted EIS;
- the submission period during which submissions may be made;
- how to make a properly made submission;
- another matter prescribed under the Environmental Protection Regulation 2008.

The submission period will be set by the chief executive and must be at least 20 business days.

It is recommended that all material relating to the EIS is posted on the proponent's web site. The chief executive web site may also link to this site. The chief executive will accept all properly made submissions if they comply with the following criteria (s. 55 of EP Act):

- are written;
- are signed by for each person who made the submission;
- states the name and address of each signatory;
- are made to the chief executive; and
- are received on or before the last day of the submission period.

4.4 The EIS assessment stage

The chief executive provides the proponent with a copy of all the submissions received on the EIS within 10 business days after the submission period ends. The proponent must then consider the submissions, prepare a response to the submissions, and make any necessary amendments to the submitted EIS. It is suggested that a summary of submissions and the response is provided in tabular form for easy reference.

Section 56 of the EP Act requires that the proponent provide the above information to the chief executive within 20 business days of receiving copies of the submissions. However a different period of time can be agreed between the proponent and the chief executive (s. 56(3)(a) of the EP Act).

At this stage the chief executive must decide whether to allow the submitted EIS to proceed (s. 56A of EP Act). The chief executive may allow the submitted EIS to proceed if they consider the proponent's response to the submission is adequate and the proponent has made appropriate amendments to the submitted EIS because of the submission. Note that the proponent may apply to the Minister for a review in the event that the chief executive refuses to allow the EIS to proceed. The chief executive must prepare and give an EIS assessment report to the proponent. The chief executive will consider the final terms of reference for the EIS, the submitted EIS, all properly made submissions and any other submission accepted by the chief executive, the proponent's response, and the standard criteria and other matters as prescribed under a regulation in preparing the EIS assessment report. The EIS assessment report will (s. 59 of EP Act):

- describe how well the EIS has addressed the final terms of reference (and make any appropriate recommendations to repair deficiencies or supplement the information provided);
- determine the adequacy of the proposed environmental management plan for the project (and make any appropriate recommendations for improving the document);
- make recommendations about the suitability of the project;

The EIS process for level 1 mining projects

- recommend any conditions (not just conditions under the *Environmental Protection Act 1994*, but relevant conditions of any other type) that assessment of the EIS suggests should be applied to the project if it were to proceed; and
- contain another matter prescribed under a regulation.

5 Public notification and public access to terms of reference and the EIS

The terms of reference notice and EIS notice must be published at least once in a newspaper circulating in the locality of the operational land for the project. The chief executive may prescribe another way of advertising the notices, including for example posting on a web site.

On payment of the appropriate fee, any person may ask the proponent for a copy of the draft terms of reference or the submitted EIS. The appropriate fee for copies should be included in the terms of reference notice or EIS notice when published.

6 Use of advisory bodies

The legislation allows the chief executive to seek relevant advice, comment or information from any person during the EIS process (s. 62 of EP Act). For this purpose, an advisory body is defined as an individual or organisation providing advice to the chief executive within the extent of their expertise. As such, advisory bodies provide advice to the chief executive and do not have a decision making role in respect of the EIS process. However, they may have a decision making role in approvals under legislation which they administer.

The option to use advisory bodies is in line with the chief executive's aim to ensure the final terms of reference and the EIS assessment report are comprehensive, and reflect the interests and requirements of all key agencies and stakeholders. Members of the advisory body will be individuals with specific expertise and may be selected from the following on a project by project basis:

- departments of Commonwealth and State government;
- local government authorities;
- statutory authorities and academic institutions;
- private organisations, community groups (including environmental groups) and special interest groups (including recognised landowners organisations).

It is important that those agencies that may need to give approvals for the project are consulted so that the issues are adequately covered in the EIS and appropriate conditions are nominated in the EIS assessment report.

All consultation with any advisory body must be done within the time frames prescribed in legislation.

The EIS process for level 1 mining projects

Figure 2 - Environmental impact statement process

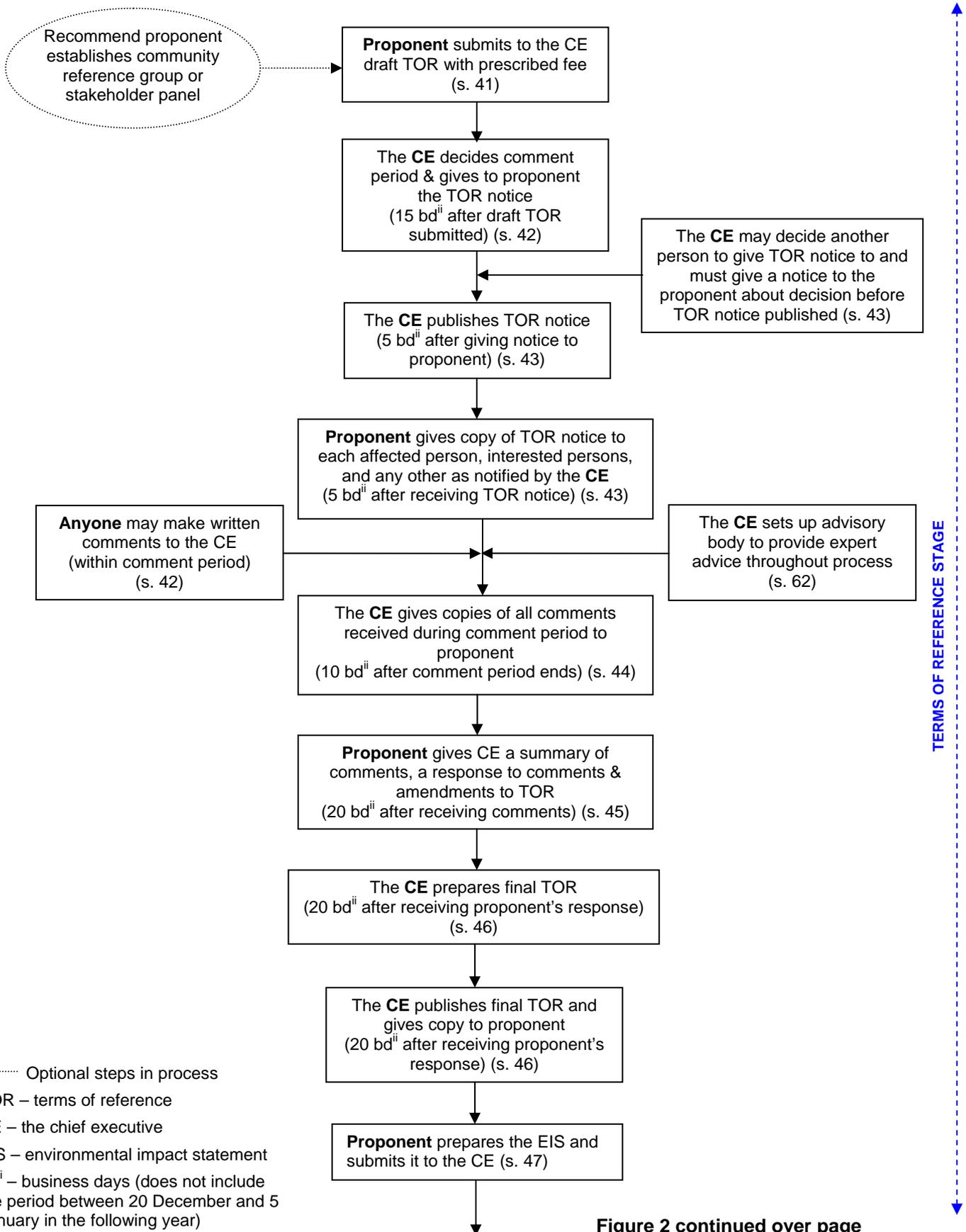


Figure 2 continued over page

..... Optional steps in process
 TOR – terms of reference
 CE – the chief executive
 EIS – environmental impact statement
 bdⁱⁱ – business days (does not include the period between 20 December and 5 January in the following year)

The EIS process for level 1 mining projects

Figure 2 continued

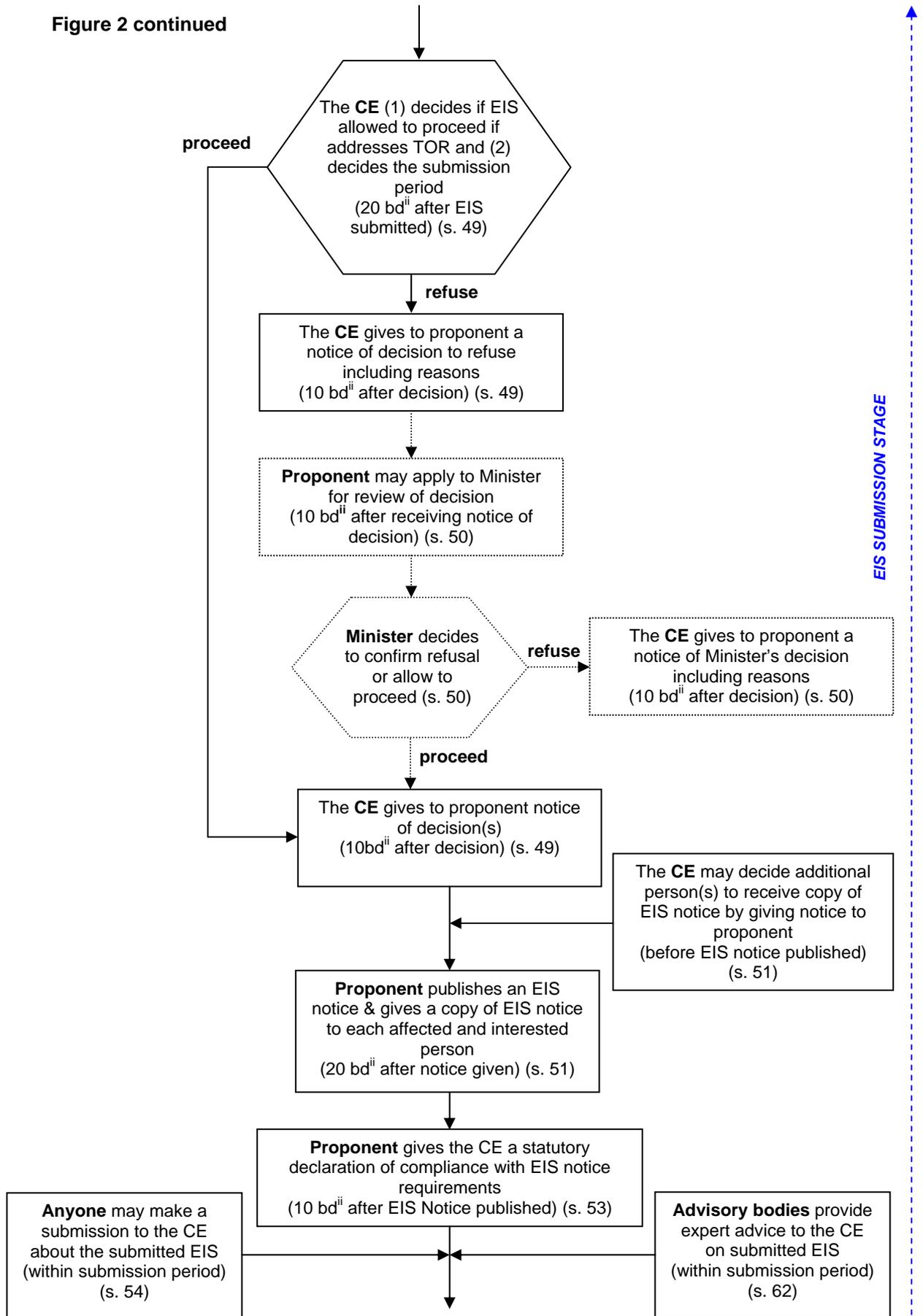
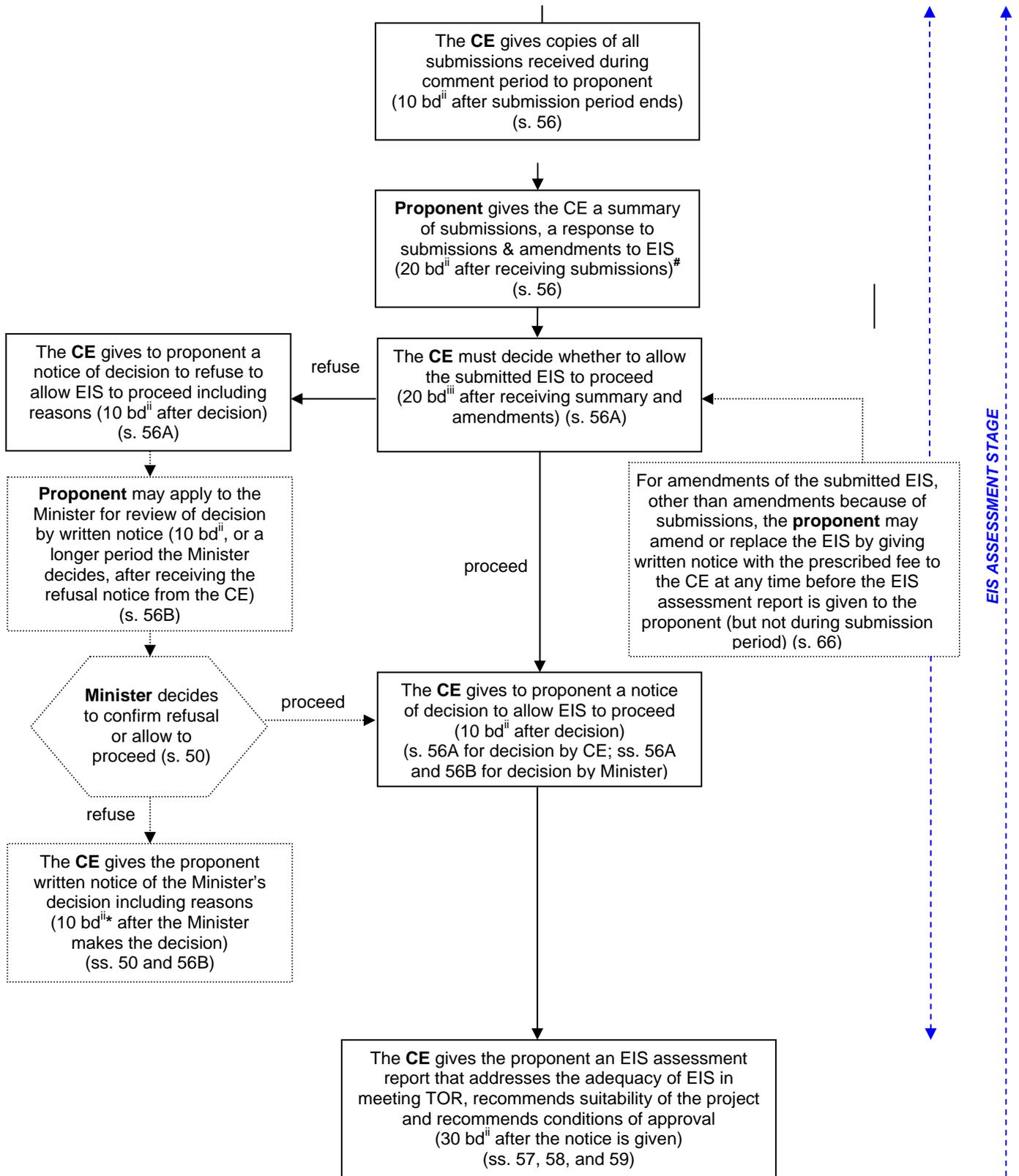


Figure 2 continued over page

The EIS process for level 1 mining projects

Figure 2 continued



20 business days or a different period agreed to by the CE and proponent within the 20 business days

7 Amendments to the EIS

The proponent may amend or replace the submitted EIS. For a mining project, the amendment can be made at any time until a draft environmental authority is given to the proponent. However, to avoid the submissions being made on aspects that have already been changed, no EIS may be amended during the period that public submissions are allowed.

The proponent must notify the chief executive of the amendment in writing and pay the prescribed fee⁵.

8 Related guidelines

This guideline outlines the EIS process prescribed in the EP Act. It should be read in conjunction with related guidelines including:

- [Mining industry regulatory framework](#)

describes the mining industry environmental management framework including the *Environmental Protection Act 1994*, *State Development and Public Works Organisation Act 1971*, and *Sustainable Planning Act 2009* and how these interrelate.

- [Level 1 mining and exploration projects](#)

describes the requirements for applying for an environmental authority for level 1 mining projects and the process for assessing and approving the application.

- [Issue identification and community consultation](#)

contains details on identifying issues and best practice consultation.

- [Generic terms of reference for the \[enter project name\] project environmental impact statement](#)

this template and guideline outlines the content and criteria for preparing the EIS and includes a generic terms of reference for mining activities.

9 Glossary

Advisory body	Individuals or organisations invited by the chief executive to provide advice or information during the EIS process.
Affected person	As defined in s. 38 of the <i>Environmental Protection Act 1994</i> .
Comment period	Time period during which comments on the draft terms of reference will be received by the chief executive.
Controlled action	An action, decided by the Commonwealth Minister for the Environment, which will have significant impact on a matter of national environmental significance. A controlled action requires approval from the Commonwealth under Part 3 of the <i>Environment Protection and Biodiversity Conservation Act 1999</i> . (see EPBC Act for definitions)
EIS assessment report	A report from the chief executive about the submitted EIS describing whether the EIS meets the terms of reference and making recommendations on the project.

⁵ An application fee must be paid at the time of submitting the EIS amendment application. The fee as of 1 January 2011 is \$10 000 and may be adjusted for inflation in August each year. For the latest fee please check the DERM website on www.derm.qld.gov.au or call 1300 130 372.

The EIS process for level 1 mining projects

EIS requirement	An EIS requirement for an application means that an EIS has been required under the <i>Environmental Protection Act 1994</i> for the application.
Environmental impact statement (EIS)	A document that assesses the potential adverse and beneficial impacts (environmental, economic and social) of the project, proposes measures to manage potential impacts, looks at alternatives to the project and provides information to decision-makers.
Environmental management document	Includes an environmental management plan.
Interested person	Person(s) nominated by the proponent that have an interest in the project.
Operational land	The land on which the project is to be carried out.
Proponent	The person who proposes the project.
Public notification	Notification through newspaper advertising of the terms of reference or EIS advising that submissions may be made.
Submission period	Time period during which submissions on the EIS will be received by the chief executive.
Terms of reference	Provides advice on the structure and scope of the environmental impact statement.

Disclaimer:

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved by:

Director
Regulatory Support and Practice
Department of Environment and Resource Management

Enquiries:

Permit and Licence Management
Ph: **1300 130 372**
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Email: palm@derm.qld.gov.au

Date: 31 March 2011

Information sheet

Voluntary Preparation of an EIS

This information sheet explains the process under Part 2, Chapter 3 of the Environmental Protection Act 1994 for applying to undertake a voluntary Environmental Impact Statement.

Overview

The *Environmental Protection Act 1994* (EP Act) allows a proponent to voluntarily prepare an Environmental Impact Statement (EIS) for a project if it is believed by the proponent to be appropriate to do so. However, an application to voluntarily prepare an EIS cannot be made for a project if:

- 1) an EIS requirement has already been made as part of the assessment level decision in relation to an application for an environmental authority (mining activities); or
- 2) the project has been designated a "controlled action" that must be assessed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* and the process described in the EP Act has not been accredited under the Commonwealth Act; or
- 3) an EIS (or similar document) for the project is required to be prepared under another State Act and that Act does not allow the EIS to be prepared under the EP Act.

If proposing to prepare a voluntary EIS for a project, the proponent needs to apply to the chief executive of the Environmental Protection Agency (EPA) for approval under s71 of the EP Act. Figure 1 shows the process for applying to voluntarily prepare an EIS. The general EIS process prescribed in the EP Act and discussed in the EPA Guideline "*Preparing terms of reference and environmental impact statements*, EPA 2003" should then be followed if the application is approved by the EPA.

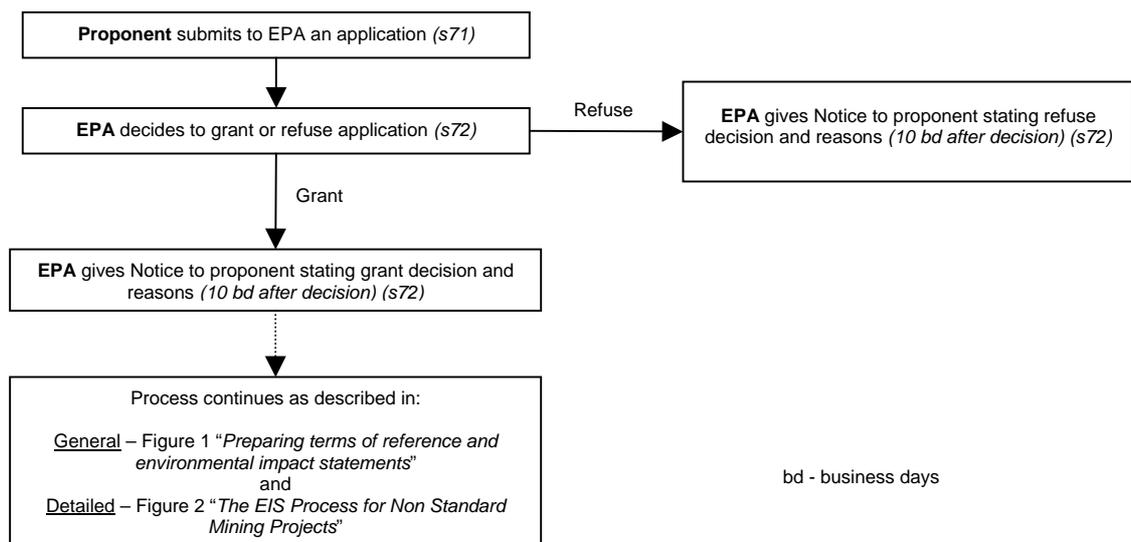


Figure 1 - Application to voluntarily prepare an EIS

Information to be provided with application

When applying to prepare a voluntary EIS under the EP Act, the proponent must make the application in the approved form, pay the prescribed fee and supply sufficient information to allow the EPA to decide whether an EIS is appropriate for the project. This information must include (but not be limited to):

- a description of the project including proposed ancillary activities such as accommodation for workers, transport of product, power supply and proposed methods for waste management (eg. vegetation destroyed, dredge spoil, tailings dam requirements); and
- a description of the operational land/waters; and
- a list stating the name and address of each person the proponent proposes as an interested person for the project; and
- a list of the names and addresses of the affected and interested persons (as defined in ss 38 and 39 of the EP Act respectively) for the project; and
- a statement of how the proponent proposes to consult with the affected and interested persons; and
- a list (if any) of environmental relevant activities to be carried out on site; and
- the proposed source of water/fill for the project; and
- information/documentation that shows that the proponent has authority to enter the land to which the project relates, to carry out the necessary studies for the EIS; and
- if for a mining activity, the proposed post mining land use including any non-beneficial land use that will remain.

As an application to voluntarily prepare an EIS can not be made for a project if the project has been designated a “controlled action”, it is requested that the proponent also provide either:

- written confirmation from the Commonwealth that the project is not a controlled action requiring assessment under Commonwealth Environment Act; or
- a written statement advising why the proponent believes that the project need not be referred to the Federal Environment Minister for a decision on whether approval is required under the Commonwealth Environment Act (with reference to the EPBC Administrative Guidelines on Significance). In doing so, the proponent accepts that if the project is subsequently declared a controlled action requiring assessment under the Commonwealth Environment Act, the voluntary EIS process will cease and the proponent will be responsible for fees and charges to start and progress any other assessment process.

The EPA also encourages submission of a preliminary terms of reference (TOR) and draft or outline Environmental Management Plan (or Environmental Management Plan Overview Strategy if a mining project) with the application to voluntarily prepare an EIS (or any existing feasibility studies that have been completed) to assist in the assessment of the application. The submission of the preliminary TOR are for discussion purposes and would not initiate the EIS process under s41 of the EP Act.

Application forms

The following applicable application forms are available from the EPA's website www.epa.qld.gov.au.

All activities

Application forms

- Part A – General details for all applications
- Part B – Approval to prepare a voluntary Environmental Impact Statement (EIS)

Reference materials

The following list of EPA Guidelines (and their updates as they become available) provides general background information that may assist your understanding of the regulatory framework regarding environmental impact assessment via an EIS and are available from the EPA's website www.epa.qld.gov.au.

All Activities	Publication Date
• A guide to environmental impact assessment	Jun 2003
• Preparing terms of reference and environmental impact statements	Jun 2003
• Attachment 1 — Example generic terms of reference for environmental impact statements	Mar 2003
• Preparing environmental management plans	Nov 2002
• National and State initiatives in environmental impact assessment	Jun 2003
• Role of the Environmental Protection Agency in environmental impact assessment	Jun 2003
• Introduction to environmental economic valuation and its relationship to environmental impact assessment	Jun 2003
• Techniques for environmental economic valuation	Jun 2003
 Mining Specific	
• Introduction to Policies and Guidelines for Impact Assessment	Dec 2000
• Mining Industry Regulatory Framework	Dec 2003
• Deciding the level of Impact Assessment for the Mining Industry	Dec 2000
• Impact Assessment Process for Standard Mining and Exploration Activities	Dec 2003
• Non Standard Mining and Exploration Activities	Dec 2003

- Issue Identification and Community Consultation Dec 2003
- Preparation of an Environmental Management Overview Strategy (EMOS) for Non Standard mining projects Mar 2003
- Preparation of a Plan of Operations and Audit Statement for Non Standard Mining Projects Mar 2003
- Preparation of an Environmental Management Plan for Non Standard Exploration Permit or Mineral Development Licence Mar 2003
- Terms of Reference and Preparation of an Environmental Impact Statement (EIS) May 2001
- The EIS Process for Non Standard Mining Projects Dec 2003
- Final Rehabilitation Report and Environmental Audit Statement for Non standard Exploration and Mineral Development Projects Oct 2003
- Final Rehabilitation Report and Environmental Audit Statement for Non Standard Mining Lease Projects Jan 2001
- Financial Assurances for Mining Activities Mar 2003

Further information

For more information, contact the Development Assessment Unit on telephone 3227 7904 or fax 3227 7677.

Terms of Reference for the <Enter project name> Project Environmental Impact Statement (EIS)

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Background

<Insert background information about the project here (approximately one page or less). Provide basic facts and avoid subjective terms. Dot points can be included for clarity.>

THIS PAGE PROVIDES SUPPORTING INFORMATION ONLY AND IS NOT PART OF THE GENERIC TERMS OF REFERENCE, WHICH START ON THE NEXT PAGE.

(DELETE THIS PAGE FROM YOUR PROJECT'S DRAFT TOR)

Introduction

This document provides generic terms of reference (TOR) for an environmental impact statement (EIS) in the approved form that must be used for the submission of draft TOR under section 41 of the *Environmental Protection Act 1994* (EP Act). It has been written for direct use by mining projects. However, it can be readily adapted to most petroleum projects and their associated activities.

This document is intended to help proponents and consultants understand the scope of information required for dissemination to the public and by regulatory agencies when assessing a proposal.

The version of the generic TOR on the Department of Environment and Resource Management's (DERM) website is reviewed and updated periodically to incorporate improvements in best environmental management practice. Before using the version on the website, proponents should contact the Environmental Impact Assessments Branch of DERM to see whether a new version is being prepared.

This document has been released in a format that proponents can edit. **However, proponents should only edit the content. To be in the approved form, the draft TOR submitted by a proponent for an EP Act EIS must use the fonts, heading styles and spacing of this document.** Not all issues will apply to all proposals. It is intended that proponents will compare the document against their intentions, and delete those parts that are irrelevant and make appropriate changes to those parts that are relevant in order to develop TOR that are project and site specific.

This document does not represent government policy, nor is it intended to establish mandatory requirements for government and industry. This document includes issues that are not restricted to DERM's jurisdiction with the aim of providing an all-encompassing set of issues likely to be raised when preparing an EIS. Therefore, it is recommended that proponents and consultants contact relevant Queensland Government agencies at an early stage for additional information on project-specific issues not administered by DERM.

Related guidelines

Other DERM guidelines are available on the DERM website <www.derm.qld.gov.au>.

Important note:

While every attempt has been made to ensure that this generic TOR addresses all of the major issues associated with resource proposals and associated processing of materials, it may not be exhaustive. It should not be interpreted as excluding from consideration matters deemed to be significant but not incorporated in them, or matters currently unforeseen, that emerge as important or significant from environmental studies, or otherwise, during the course of preparation of an EIS.

Contacts

Further information about this document is available by contacting the Environmental Impact Assessments Branch of the Environment and Natural Resource Regulation Division in DERM's Brisbane office on telephone 1300 130 372.

It is strongly recommended that the environmental impact statement (EIS) follows the heading structure of these terms of reference to facilitate cross-referencing. Through experience, this structure has been found to be the best option.

CONTENT OF THE ENVIRONMENTAL IMPACT STATEMENT (EIS)

Executive summary

The executive summary conveys the project's most important aspects and options to the reader in a concise and readable form. Use plain English and avoid the use of jargon and obscure terms. The structure of the executive summary should follow that of the EIS, and focus strongly on the key issues and conclusions.

Glossary of terms

Provide a glossary of technical terms, acronyms and abbreviations before the main text of the EIS.

1. Introduction

Explain why the EIS has been prepared and what it sets out to achieve—in particular, the level of detail required to satisfy assessment of the approvals being sought. Define the audience of the EIS.

1.1 Project proponent

Provide details of the project proponents, including details of any joint venture partners.

1.2 Project description

Provide and illustrate a brief description of the key elements of the project. Summarise any major associated infrastructure requirements. Detailed descriptions of the project should follow in section 3.

1.3 Project objectives and scope

State the objectives that have led to the development of the project and briefly outline the events leading up to the project's formulation, including alternatives, envisaged time scale for implementation and project life, anticipated establishment costs and actions already undertaken within the project area.

Describe the current status of the project and outline the relationship of the project to other developments or actions that may relate, whether or not they have been approved. The consequences of not proceeding with the project will also be discussed.

1.4 The EIS process

The purpose of this section is to clarify methodology and objectives of the EIS under the relevant legislation.

1.4.1 Methodology of the EIS

Describe the EIS process steps, timing and decisions to be made for relevant stages of the project. Provide a brief description of studies or surveys that have been undertaken to help develop the project and prepare the EIS. Describe any baseline studies or investigations used in the EIS that were undertaken before the EIS process started. Outline how the consultation process (which will be described in detail in section 1.5) integrated with the other components of the impact assessment, including the stages, timing and mechanisms for public input and participation.

The information in this section is required to ensure:

- relevant legislation is addressed
- readers are informed of the process to be followed
- stakeholders are aware of any opportunities for input and participation.

1.4.2 Objectives of the EIS

Having described the methodology of the EIS, make a succinct statement of the EIS objectives. The EIS's structure can then be outlined as an explanation of how the EIS will meet its objectives. The reader should be able to distinguish the EIS as the key environmental document providing advice to decision-makers considering approvals for the project.

While the terms of reference guide the scope of the EIS studies, they should not be seen as exhaustive or limiting. It is important for proponents and their consultants to recognise that there cannot be complete knowledge in advance of undertaking an EIS of what the EIS studies may find.

If it transpires while preparing the EIS that previously unforeseen matters not addressed in the terms of reference are found to be relevant to assessing potential impacts of the project, those matters will be included in the EIS.

Also, it is essential that the main text of the EIS addresses all relevant matters concerning environmental values, impacts on those values and proposed mitigation measures. No relevant matter will be raised for the first time in an appendix or the draft environmental management plan (EM plan).

The EIS assessment's depth and scope will be proportional to the values impacted and the scale of the impacts. When considering whether an impact is or is not significant, the proponent will take account of both the intensity of the impact and the context in which it would occur.

The EIS is a public document. Its purpose is not only to provide information to regulatory agencies, but also to inform the public about the project's scope, impacts and mitigation measures. As such, the main text will be written in plain English avoiding jargon as much as possible. Additional technical detail may be provided in appendices. The main text will not assume that a reader would have prior knowledge of the project site and it will not be necessary for the reader to have visited the site to understand the issues involved in the project.

In brief, the EIS objectives are to provide public information on the need for and likely effects of the project, to set out acceptable standards and levels of impacts (both beneficial and adverse) on environmental values, and demonstrate how environmental impacts can be managed through protecting and enhancing environmental values. A key aspect of the EIS is discussing options and alternatives and their likely relative environmental management outcomes.

The role of the EIS in providing the project's draft EM plan will also be discussed, with particular reference to the EM plan's role in providing management measures that can be carried over into conditions that would attach to any approvals, environmental authorities and permits for the project.

1.4.3 Submissions

The reader will be informed about how and when public submissions on the draft EIS can be made, and how they will be addressed and taken into account in the decision-making process.

1.5 Public consultation process

An appropriate public consultation program is essential to the impact assessment. This section will outline the methodology that will be adopted to identify and mitigate social and economic impacts of the project. Provide information about consultation that has already taken place and its results.

Submitting a list of affected persons and interested persons, as well as a statement of how the proponent proposes to consult with those persons, is a statutory requirement of the EIS process under section 41 of the *Environmental Protection Act 1994*. Similar requirements, though non-statutory, are usually applied to EIS processes under other Queensland legislation.

The public consultation program should provide opportunities to educate and involve the community. It may include interviews with individuals, public meetings, interest group meetings, producing regular summary information and updates, and other means to encourage and facilitate active public consultation.

The public consultation process should identify broad issues of concern to local community and interest groups and should continue from project planning through commissioning, project operations and final decommissioning. Refer to the DERM guideline Issue Identification and Community Consultation.

1.6 Project approvals

1.6.1 Relevant legislation and policy requirements

Explain the legislation and policies controlling the approvals process. Make reference to the Queensland *Environmental Protection Act 1994*, *Sustainable Planning Act 2009* and other potentially relevant Queensland laws. Include any requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Identify all environmentally relevant activities that would be undertaken at the project site, including those that would otherwise require a development approval if the project was not covered by an environmental authority for a mining or petroleum activity.

If any potentially relevant legislation (such as the *Water Act 2000* for taking water, the *Nature Conservation Act 1992* for protected wildlife, or the *Vegetation Management Act 1999* for land clearing) is not applicable, this section of the EIS will explain why.

Describe local government planning controls, local laws and policies applying to the development, and provide a list of the approvals required for the project and the expected program for approval of applications. The description should include any requirements for workers' camps or villages.

This information is required to assess how the legislation applies to the proposal, which agencies have jurisdiction, and whether the proposed impact assessment process is appropriate.

1.6.2 Planning processes and standards

Discuss the project's consistency with existing land uses or long-term policy framework for the area (for instance, as reflected in local and regional plans), and with legislation, standards, codes or guidelines available to monitor and control operations on site. Refer to all relevant state and regional planning policies. This information is required to demonstrate how the proposal conforms to state, regional and local plans for the area.

1.7 Accredited process for controlled actions under Commonwealth legislation

Projects that are undergoing an EIS under a State statutory process may also be controlled actions under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In which case, the Commonwealth may accredit Queensland's EIS process for the purposes of the Commonwealth's assessment under Part 8 of the EPBC Act. When a state EIS process has been accredited, it will be necessary for the TOR to address potential impacts on the matters of national environmental significance identified in the 'controlling provisions' when the project was declared a controlled action.

The matters to be addressed in the EIS are set out in Schedule 4 of the Commonwealth's Environment Protection and Biodiversity Conservation Regulations 2000. Provide a stand-alone report as a separate chapter of the EIS that fully addresses the matters relevant to the controlling provisions.

2. Project need and alternatives

2.1 Project justification

Describe the justification for the project, with particular reference to the economic and social benefits, including employment and spin-off business development that the project may provide. Discuss the status of the project in a regional, state and national context.

2.2 Alternatives to the project

Describe feasible alternatives, including conceptual, technological and locality alternatives to the project, and discuss the consequences of not proceeding with the project. Summarise the comparative environmental, social and economic impacts of each alternative, with particular regard to the principles of ecologically sustainable development (ESD). Discuss alternatives in sufficient detail to enable an understanding of the reasons for preferring certain options and courses of action and rejecting others.

Explain the interdependencies of the project's components, particularly how each of any industrial developments, or various combinations of industrial developments, and any infrastructure requirements relate to the viability of the proposal. Should water supply, power, transport and/or storage infrastructure be included as part of the project, describe and provide a rationale for such infrastructure.

This information is required to assess how the scope of the project was derived, and to ensure that the ESD principles and sustainable development aspects have been considered and incorporated during the scoping and planning of the project.

3. Description of the project

Describe the project through its various stages, such as construction, operation and decommissioning. This information is required to allow complete assessment of a project from planning to its end-of-life. It also allows identification of approvals that may be required and how they may be managed through the life of the project. Maps or figures showing the position of features or boundaries will use latitudes and longitudes on the GDA94 datum. These latitudes and longitudes will also be used in the text to describe the locations of any features (such as discharge points) or boundaries that may be relevant to subsequent approvals.

3.1 Location

3.1.1 Regional context

Describe the regional context of the project and illustrate it on maps at suitable scales.

3.1.2 Local context

Describe the local context of the project and include real property descriptions of the project site and adjacent properties. Provide maps at suitable scales that show the precise location of the project area, and in particular:

- the location and boundaries of land tenures, in place or proposed, to which the project area is or will be subject
- the location and boundaries of the project footprint showing all key aspects including excavations, stockpiles, areas of fill, watercourses, plant locations, water storages, power and water supply lines, buildings, roads, railways, bridges, weirs, culverts, hardstands, car parks, etc
- the location of any proposed buffers surrounding the working areas.

Include a rectified aerial photo enlargement (preferably A3 size) to illustrate components of the project in relation to the land and mining tenures, and natural and built features of the area.

3.2 Construction

Describe the extent and nature of the project's construction phase. Describe the type and methods of construction, the construction equipment to be used and the items of plant to be transported onto the construction site. Describe any staging of the project and illustrate site boundaries, development sequencing and timeframes.

3.3 Operations

Describe the location and nature of the project's operational phase, and illustrate the description as required with maps, diagrams and artist's impressions. Operational issues to be addressed will include, but not necessarily be limited to:

- a description of plant and equipment to be employed
- the capacity of plant and equipment
- chemical and physical processes
- chemicals to be used.

Provide concept and layout plans highlighting proposed buildings, structures, plant and equipment associated with the processing operation. Describe the nature, sources, location and quantities of all materials to be handled, including the storage and stockpiling of raw materials.

Provide indicative process flow-sheets showing material balances for the processing plant, and the anticipated rates of inputs, along with similar data on products, wastes and recycle streams.

[Note: sections 3.3.1 to 3.3.5 have been developed with particular applicability to mining projects. For proposals related to other industries they may be adapted or omitted as appropriate.]

3.3.1 Tenements and tenures

Describe and illustrate any existing mining tenements, petroleum, geothermal and greenhouse gas tenures and licences overlying and adjacent to the project site, and any proposed applications required for this project.

3.3.2 Resource base and mine life

Summarise the results of studies and surveys undertaken to identify the mineral and natural resources required to implement the proposal (further detail will be provided in section 4.2.1.2 Geology). Describe the required location, volume, tonnage and quality of natural resources (such as land, water, timber, energy, etc). Provide specific details of the following:

- the proposed mine life and an outline of the coal/mineral resource base, including the total thickness of seams or extent of the ore body
- the planned recovery of resources
- locations of any resources that would be sterilised by the planned activities
- the quantity of coal/mineral to be mined annually, including any proposed ramping of production or staging of development.

3.3.3 Mining methods and equipment

Provide specific details of the following:

- the mining type and methods to be used, including the major equipment to be used in the various components of the operation
- the use of different techniques in areas of different topographic or geo-technical character
- chemicals to be used, including hydraulic fluids used and released in underground operations.

The description will refer to, and be complemented by, the figures previously presented in section 3.3.1 showing the locations of key aspects of the project. Additional figures will be provided if required.

3.3.4 Mine sequencing

Provide specific details of the following:

- the proposed sequence and timing of mining of each seam/ore body within the mining lease;
- the physical extent of excavations, location of stockpiles of overburden and/or coal/mineral reject to be handled during the project's operation or left after mining ceases, including the rate of throughput of stockpiles of product, reject and overburden
- typical cross sections of the mine workings showing voids, surface profiles and geological strata
- the proposed progressive backfilling of excavations
- the area disturbed at each major stage of the project.

3.3.5 Workforce

Outline the workforce numbers to be employed by the project during its various phases, such as construction, commissioning, operation and decommissioning. Make comment on the anticipated basis of employment, such as permanent, contract, etc. A detailed profile of the workforce will be provided in the society section of the EIS.

3.3.6 Workforce accommodation

Describe where personnel will be accommodated. In particular, describe and illustrate the number, size, locations and management of any workers camps or villages. The consequent impacts of constructing new or expanded accommodation will be addressed in the appropriate sections of the EIS even if the accommodation will be operated by a contractor.

3.3.7 Processing and products

Describe the quantities and characteristics of the products that would be produced on an annual basis. Provide indicative process flow-sheets showing material balances for the processing plant, and the anticipated rates of inputs, along with similar data on products, wastes and recycle streams.

3.3.8 Ongoing evaluation and exploration activities

Describe the extent and nature of any proposed ongoing exploration or geological or geo technical evaluation within the project area that may be required over the life of the project.

3.4 Product handling

Describe and show on plans at an appropriate scale the proposed methods and facilities to be used for product storage and for transferring product from the processing plant to the storage facilities and from the storage facilities to the transport facilities. Discuss any environmental design features of these facilities including bunding of storage facilities.

3.5 Infrastructure requirements

Describe with concept and layout plans, requirements for constructing, upgrading or relocating all infrastructure associated with the project. Show the locations of any necessary infrastructure easements on the plans, including infrastructure such as roads, rail (and the rail corridor), level crossings, conveyors, bridges, jetties, ferries, tracks and pathways, dams and weirs, bore fields, power lines and other cables, wireless technology (such as microwave telecommunications), and pipelines for any services, whether underground or above.

3.5.1 Transport—road/rail/air/ship

Provide an overview of the arrangements for the transportation, importation or exportation of plant, equipment, materials, products, wastes and personnel during both the construction and operational phases of the project. Describe the use of existing facilities, including common user transport infrastructure, and all requirements for the construction, upgrading or relocation of any transport-related infrastructure.

3.5.2 Energy

Describe all energy requirements, including electricity, natural gas, and/or solid and liquid fuel requirements for the construction and operation of the project. Show the locations of any easements on the infrastructure plan. Energy conservation will be briefly described in the context of any Commonwealth, Queensland and local government policies.

3.5.3 Water supply and storage

Provide information on proposed water usage and storage by the project, including the quality and quantity of all water supplied to, or captured at, the site. In particular, describe the proposed and optional sources of water supply such as mine dewatering, capture of overland flow, taking from a watercourse, bores, coal seam gas water and associated pipelines, and any surface storages such as dams and weirs, municipal water supply pipelines.

Estimate the average and maximum rates of supply from each source for each phase of the project's life. Any proposed water conservation and management measures should be described.

Describe any approvals and water allocations the project may need under the *Water Act 2000* for water supply and storage.

Estimate potable water demand for the project, including the temporary demands during the construction period. Provide details of any existing water supply, including town water, which would meet the requirements. If water storage and treatment is proposed on site for use by the site workforce, describe the method of treatment and storage. Describe any waste streams from water treatment, and assess the potential impacts of disposal in the appropriate sections of the EIS.

3.5.4 Stormwater drainage

Provide a description of the proposed stormwater drainage system and the proposed disposal arrangements, including any off-site services. Illustrate the description with figures with contours at suitable intervals (one metre contours in areas of low relief) showing drainage pathways and the locations and discharge points of sediment detention basins, and any other stormwater quality improvement devices.

3.5.5 Sewerage

Describe, in general terms, the sewerage infrastructure required by the project. If it is intended that industrial effluent or relatively large amounts of domestic effluent are to be discharged into an existing sewerage system, provide in section 4.4 Waste an assessment of the capacity of the existing system to accept the effluent. For industrial effluent, this should detail the physical and chemical characteristics of the effluent.

3.5.6 Telecommunications

Describe any impacts on existing telecommunications infrastructure, such as optical cables and microwave towers, and identify the owners of that infrastructure.

3.5.7 Accommodation and other infrastructure

Describe any other developments directly related to the project not described in other sections, such as:

- camps, townships or residential developments
- fuel storage areas
- equipment hardstand and maintenance areas
- technical workshops and laboratories.

3.6 Waste management

Provide an inventory of all wastes to be generated by the project during the construction, operational and decommissioning phases of the project. In addition to the expected total volumes of each waste produced, include an inventory of the following per-unit volume of product produced:

- the tonnage of raw materials processed
- the amount of resulting process wastes
- the volume and tonnage of any re-usable by-products.

Provide schematic diagrams, which for the operational phase may be simplified versions of those provided in section 3.3, for each distinct stage of the project. These should indicate the processes to be used and highlight their associated waste streams. This applies to all waste outputs—solid, liquid and gaseous—including recycling efforts such as stockpiling and reusing topsoil. The schematic diagrams, or an associated table, will cross-reference the relevant sections of the EIS where the potential impacts and mitigation measures associated with each waste stream are described. Describe the physical and chemical characteristics, and the variability of composition and generation rates of each waste material.

Each subsection on waste management will assess how the proposed methods for waste management at each stage of the project achieve the highest possible level on the waste management hierarchy with regard to the principles in the Environmental Protection (Waste Management) Policy 2000.

Describe how the project would achieve natural resource use efficiency (such as minimum use of energy and water, and minimum footprint on used land), integrated processing design, co-generation of power and by-product reuse as shown in a material/energy flow analysis. This information is required to enable the resource management agencies and other stakeholders to assess the efficiency of resource use, and allocation issues.

3.6.1 Air emissions

Describe in detail the quantity and quality of all air emissions (including particulates, fumes and odours) from the project during construction and operation. Particulate emissions include those that would be produced by any industrial process or disturbance by wind action on stockpiles and conveyors, or by transportation equipment such as trucks or trains, either by entrainment from the load or by travel on unsealed roads.

3.6.2 Excavated waste

Describe the materials to be excavated as waste. Also, describe and illustrate the location, design and methods for constructing dumps for waste rock and any subsoil that will not be replaced in rehabilitation.

Estimate the tonnage and volume of waste rock and subsoil to be excavated during the various stages of operation. Estimates will be made for each separate rock and soil type. Describe the expected proportion and source of waste rock that is mineralised but currently uneconomical for processing.

Describe the chemical and physical properties of the waste rock and subsoil, and assess the properties that affect their erosion and leaching potential. Undertake the characterisation of the waste in accordance with the Assessment and Management of Acid Drainage guideline of the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland series (DME, 1995), and any other applicable best practice guidelines. The characterisation of waste rock and subsoil will include, but not necessarily be limited to: sulfides; metals; pH, conductivity and chloride of slurry samples; the Net Acid Producing Potential (NAPP), and Net Acid Generation (NAG) potential of the mined waste.

Discuss the potential for acid, neutral or alkaline drainage from waste dumps. Characterise the potential quality of leachate from the mined waste under field conditions, including contaminants such as sulfate, pH, chloride, iron, major cations and anions, and any chemical species in sufficient quantity that is likely to cause environmental harm including nuisance. Provide cross-references in this section to those sections of the EIS that assess in detail the potential impacts of any direct or indirect discharge of leachate on downstream sensitive environments or users of receiving waters.

Use the estimated amounts and characteristics of excavated waste to develop appropriate measures for dealing with that waste, including designs for waste dumps, and alternatives for excavated waste disposal such as in-filling of voids, off-site options and treatment of contaminated soil. Assess the likely performance of the proposed waste disposal options with particular regard to:

- segregating and encapsulating sub-economic but mineralised rock and/or potentially acid-forming rock
- managing surface drainage and sub-surface leachate both during operations at the mine and after mining ceases (note: avoid placing dumps across drainage lines that would pond water behind the dump and cause infiltration)

- slope profiles and the stability and erosion potential of waste dumps
- the intended land use after mining ceases, and the land management and maintenance requirements for the subsequent landholder.

Illustrate the location and cross-sections of the proposed dumps on maps, drawings and diagrams relative to topography and other natural features of the area.

3.6.3 Tailings or fine rejects

Describe the methods and materials that would be used to produce tailings waste (tailings should be understood to include any fine reject material). State whether the methods to be used to produce and treat tailings would be novel or established. For novel methods, describe the testing undertaken to determine if the method would be suitable for the proposed use. For established methods, provide examples of where the method has been, or is being, used and assess the equivalence of those examples to the proposed use.

Estimate the annual production of tailings waste at the various stages of the project.

Describe how the methods used to produce and treat tailings would be in accordance with the waste management hierarchy and the tailings management principles in the Tailings Management Guideline of the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland series, (DME, 1995).

Describe in detail the likely physical and chemical characteristics of the tailings waste and the likely chemical characteristics of waste water from the pressing plant, the decant water from any tailings storage facility (TSF), and the pore water and leachate from any dump containing tailings.

Describe and illustrate the proposed locations of any pits, dams, bunds or dumps that would be used for the disposal of tailings.

Describe and illustrate the proposed design of any TSF, including any cells for non-flowable tailings within waste rock dumps (note: a shear strength of greater than 1000 pascals would generally be required of pastes suitable for dry tailings stacking, while pastes with lower shear strength must be contained in a regulated dam. However, the slumping and plastic properties of any tailings considered for disposal by dry stacking will be derived from tests on representative samples and reported in the EIS). Describe the source, and assess the suitability, of the materials to be used to construct containment systems. Describe any proposed staging of the construction for any TSF or disposal cells and demonstrate that the design has been produced by a suitably qualified and experienced engineer.

Conduct, and report on, a risk assessment and describe how it has been used to derive the design storage allowance for any regulated dams. Assess whether the proposed design and methods of disposal would minimise the potential hazards and risks, particularly in relation to the potential impacts of failure caused by mass release from structural failure or contaminant release from overflow. Also, assess whether the proposed design maximises site efficiency, such as by minimising the footprint.

If some form of co-disposal of fine and coarse rejects is proposed, describe the range of proportions, size fractions and mixing method that would produce a stable deposit.

Describe the proposed discharge locations and conditions for any TSF. Describe the flow path any discharge would take, illustrated on contour maps, and provide an overview of the potentially affected receiving environment with particular regard to downstream sensitive ecosystems or users of receiving waters. Discharge should be taken to mean any planned or unplanned overflow or release, any leachate, or any potentially contaminated runoff leaving a TSF. Assess in detail the potential impacts of any discharge on downstream sensitive environments or users of receiving waters in the appropriate sections of the EIS and cross-reference to them in this section.

Describe the proposed monitoring network and regime that would be used to detect any leak from the TSF.

Describe the proposed measures to be used to decommission any TSF or dump used for the disposal of tailings. Assess any legacy issues for the subsequent landholder.

3.6.4 Solid waste disposal

Describe the quantity and quality of solid wastes (other than waste rock, subsoil and tailings addressed in other sections) and the proposed methods of their disposal. Describe the proposed location, capacity and suitability of any landfill that would receive solid waste from the project. Describe and illustrate any proposed on-site landfill, including its dimensions, volume and method of construction.

3.6.5 Liquid waste

Describe the origin, quality and quantity of wastewater and any immiscible liquid waste that would be produced by the project other than that addressed in previous sections. Give particular attention to the capacity of wastes to generate acid, and saline or sodic wastewater. A water balance for the project and processing plant is required to

account for the estimated usage of water.

The EIS will consider the following effects:

- groundwater from excavations
- rainfall directly onto disturbed surface areas
- run-off from roads, plant and industrial areas, chemical storage areas
- drainage (run-off plus any seepage or leakage)
- seepage from other waste storages
- water usage for:
 - process use
 - dust suppression
 - irrigation
 - domestic purposes
- evaporation
- domestic sewage treatment – disposal of liquid effluent and sludge
- water supply treatment plant – disposal of wastes.

3.7 Rehabilitation and decommissioning

Describe the options, strategic approaches and methods for progressive and final rehabilitation of the environment disturbed by the project. Develop a preferred rehabilitation strategy that would minimise the amount of land disturbed at any one time, and minimise the residual loss of land with ecological or productive value. Show the final topography of any excavations, waste areas and dam sites on suitably scaled maps.

Evaluate the compliance of the strategies and methods for progressive and final rehabilitation of disturbed areas with the objectives of the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (DME, 1995) and DERM's guideline Rehabilitation Requirements for Mining Projects. In particular, the strategies and methods will have the following objectives:

- Mining and rehabilitation should aim to create a landform with the same or similar land use capabilities and/or suitability it had prior to the disturbance, unless other beneficial land uses are pre-determined and agreed.
- Mine wastes and disturbed land should be rehabilitated so that it is self-sustaining or to a condition where the maintenance requirements are consistent with an agreed post-mining land use.
- Surface and ground waters that leave the lease should not be degraded compared to their condition prior to the commencement of mining operations. Current and future water quality should be maintained at levels that are acceptable for users downstream of the site.

Describe the means of decommissioning the project by removing or reusing plant, equipment, structures, buildings, concrete footings and foundations, hardstand areas, storage tanks and wharfage. Describe the proposed methods for stabilising the affected sites. Discuss options and methods for the disposal of wastes from the demolition of plant and buildings in sufficient detail for their feasibility and suitability to be assessed.

Describe any proposals to divert creeks during operations and, if applicable, the reinstatement of the creeks after operations have ceased. Rehabilitation will involve the re-establishment of vegetation communities along watercourses similar to the pre-cleared regional ecosystems in those areas. Where dams are to be constructed, describe proposals for the management of these structures after the completion of the project. Also, describe the final drainage and seepage control systems and long-term monitoring plans. Describe and illustrate where final voids and uncompacted overburden and workings at the end of mining would lie in relation to flood levels up to and including the 'probable maximum flood level' based on the Bureau of Meteorology's 'probable maximum precipitation' forecast for the locality.

The description of topsoil management will address minimising topsoil storage times (to reduce fertility degradation) and the transportation, storage and replacement of topsoil to disturbed areas.

Detail of the impacts of the preferred rehabilitation strategy will be discussed in the appropriate subsections of section 4 (Environmental values and management of impacts) particularly with regard to issues such as final landform stability (section 4.2.2), rehabilitation of plants (section 4.9.2) and the long-term quality of water in any final voids (section 4.5.2). Implications for the long-term use and fate of the site will also be addressed, particularly

with regard to the on-site disposal of waste and the site's inclusion on the Environmental Management Register or the Contaminated Land Register.

4. Environmental values and management of impacts

The functions of this section are to:

- Describe the existing environmental values of the area that may be affected by the project. Environmental values are defined in section 9 of the *Environmental Protection Act 1994*, environmental protection policies and other documents such as the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC & ARMCANZ, 2000). Environmental values may also be derived following recognised procedures, such as described in the ANZECC & ARMCANZ 2000 guidelines. Environmental values will be described referring to background information and studies, which will be included as appendices to the EIS.
- Describe the potential adverse and beneficial impacts of the project on the identified environmental values.
- Describe any cumulative impacts on environmental values caused by the project, either in isolation or by combination with other known existing or planned development or sources of contamination.
- Propose environmental protection objectives and commitments. All environmental protection commitments must be measurable and auditable.
- Examine viable alternative strategies for managing impacts. These alternatives will be presented and compared in view of the stated objectives and standards to be achieved. Discuss available techniques, including best practice, to control and manage impacts to the nominated objectives. This section will detail the environmental protection measures to be used in the planning, construction, operations, rehabilitation and decommissioning stages of the project and any associated works. Measures will prevent, or where prevention is not possible, minimise environmental harm and maximise social, economic and environmental benefits of the project. Preferred measures will be identified and described in more detail than other alternatives.
- Describe any computational model used to make predictions of impacts and/or outcomes of mitigation measures. The description will address the inputs, assumptions, limitations, sensitivities, accuracy and precision of the model.

Any maps or figures showing the position of features or boundaries will use latitudes and longitudes on the GDA94 datum. Latitudes and longitudes on the GDA94 datum will also be used in the text to describe the locations of any features (such as discharge points) or boundaries that may be relevant to subsequent approvals.

Environmental protection objectives may be derived from legislative and planning requirements that apply to the proposal including Commonwealth strategies, state planning policies, local authority strategic plans, environmental protection policies under the *Environmental Protection Act 1994*, and any catchment management plans prepared by local water boards or land care groups. Special attention will be given to those mitigation strategies designed to protect the values of any sensitive areas and any identified ecosystems of high conservation value within the area of possible proposal impact.

This section will address all elements of the environment, (such as land, water, coast, air, waste, noise, nature conservation, cultural heritage, social and community, health and safety, economy, hazards and risk) in a way that is comprehensive and clear. To achieve this, the following issues will be considered for each environmental value relevant to the project:

- Environmental values affected: describe the existing environmental values of the area to be affected including values and areas that may be affected by any cumulative impacts (refer to background studies in appendices – note: such studies may be required over several seasons). Explain how the environmental values were derived, such as by citing published documents or by following a recognised procedure to derive the values.
- Impact on environmental values: describe quantitatively the likely impact of the project on the identified environmental values of the area. The cumulative impacts of the project must be considered over time or in combination with other (all) impacts in the dimensions of scale, intensity, duration or frequency of the impacts. In particular, address any requirements and recommendations of the Great Barrier Reef Marine Park Authority, relevant state planning policies, environmental protection policies, national environmental protection measures and integrated catchment management plans.
- Cumulative impacts on the environmental values of land, air and water and cumulative impacts on public health and the health of terrestrial, aquatic and marine ecosystems must be discussed in the relevant sections. This assessment may include air and watersheds affected by the project and other proposals competing for use of the local air and water sheds.
- Where impacts from the project will not be felt in isolation to other sources of impact, it is recommended that the proponent develop consultative arrangements with other industries in the project's area to undertake cooperative monitoring and/or management of environmental parameters. Describe such arrangements in the EIS.

- Environmental protection objectives: describe qualitatively and quantitatively the proposed objectives for enhancing or protecting each environmental value. Include proposed indicators to be monitored to demonstrate the extent of achievement of the objective as well as the numerical standard that defines the achievement of the objective (this standard must be auditable). The measurable indicators and standards can be determined from legislation, support policies and government policies as well as the expected performance of control strategies. Include objectives for progressive and final rehabilitation and managing contaminated land.
- Control strategies to achieve the objectives: describe the control principals, proposed actions and technologies to be implemented that are likely to achieve the environmental protection objectives; include designs, relevant performance specifications of plant. Details are required to show that the expected performance is achievable and realistic.
- Environmental offsets: Information is required to show that measures have been taken to avoid and minimise potential adverse impacts of the project. Environmental offsets may be proposed to counterbalance any remaining loss of environmental values, consistent with the specific-issue offset policies under the framework of the Queensland Government Environmental Offset Policy 2008 and the draft *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) offsets policy.
- Monitoring programs: describe the monitoring parameters, monitoring points, frequency, data interpretation and reporting proposals.
- Auditing programs: describe how progress towards achieving the objectives will be measured, reported and whether external auditors will be employed. Include scope, methods and frequency of auditing proposed.
- Management strategies: describe the strategies to be used to ensure the environmental protection objectives are achieved and control strategies implemented, such as by a continuous improvement framework, including details of corrective action options, reporting (including any public reporting), monitoring, staff training, management responsibility pathway, and any environmental management systems and how they are relevant to each element of the environment.
- Information quality: information given under each element will also state the sources of the information, how recent the information is, how any background studies were undertaken (e.g. intensity of field work sampling), how the reliability of the information was tested, and what uncertainties (if any) are in the information.

It is recommended that the final TOR and the EIS follow the heading structure shown below. The mitigation measures, monitoring programs, etc identified in this section of the EIS will be used to develop the environmental monitoring program for the project (see section 5).

4.1 Climate

Describe the rainfall patterns (including magnitude and seasonal variability of rainfall), air temperatures, humidity, wind (direction and speed) and any other special factors (e.g. temperature inversions) that may affect management of the project including air quality within the region of the project. Discuss extremes of climate (droughts, floods, cyclones, etc) with particular reference to water management at the project site. Address the vulnerability of the area to natural or induced hazards, such as floods and bushfires. Consider the relative frequency and magnitude of these events together with the risk they pose to management of the project.

The potential impacts due to climatic factors will be addressed in the relevant sections of the EIS. The impacts of rainfall on soil erosion will be addressed in section 4.2. The impacts of storm events on the capacity of waste containment systems, such as site bunding, stormwater management and tailings dams, will be addressed in section 4.5 with regard to contamination of waterways and in section 4.4 with regard to the design of the waste containment systems. The impacts of winds, rain, humidity, and temperature inversions on air quality will be addressed in section 4.7.

4.1.1 Climate change adaptation

Climate change, through alterations to weather patterns and rising sea level, has the potential for long-term impacts on developments. Most developments involve the transfer to, or use by, a proponent of a community resource in one form or another, such as granting a non-renewable resource or the approval to discharge contaminants to air, water or land. Therefore, it is important that the project design be adaptive to climate change so that community resources are not depreciated by projects that would be abandoned or require costly modification before their potential to provide a full return to the community is realised. Consequently, the EIS will assess the project's vulnerabilities to climate change and describe possible adaptation strategies for the activity including:

- a risk assessment of how changing patterns of rainfall and hydrology, temperature, extreme weather and sea level (where appropriate) may affect the viability and environmental management of the project
- the preferred and alternative adaptation strategies to be implemented

- a commitment to undertake, where practicable, a cooperative approach with government, other industry and sectors to address adaptation to climate change.

DERM recognises that predictions of climate change and its effects have inherent uncertainties, and that a balance must be found between the costs of preparing for climate change and the uncertainty of outcomes. Nevertheless, proponents will use their best efforts to incorporate adaptation to climate change in their EIS and project design.

4.2 Land

4.2.1 Description of environmental values

Describe the existing environment values of the land area that may be affected by the project. Define and describe the objectives and practical measures for protecting or enhancing land-based environmental values, describe how nominated quantitative standards and indicators may be achieved, and how achieving the objectives will be monitored, audited and managed.

4.2.1.1 Topography

Describe and illustrate the topography of the project site and the surrounding area, and highlight any significant features shown on the maps. Such features would include any locations subsequently referred to in the EIS (such as noise sensitive locations) that are not included on other maps in section 4.2. Maps will have contours at suitable increments (at least every metre in areas of low relief), shown with respect to Australian Height Datum (AHD) and drafted to the GDA 94 datum.

4.2.1.2 Land use

Describe and illustrate land uses in and around the project area in relation to current land tenures, show the location of existing dwellings, and make particular mention of any land with special attributes. Include any surrounding land or marine areas that could be affected by the project. Show the location of any native title applications or determinations. Describe and illustrate the zoning of land in and around the project area according to any existing town or strategic plan.

4.2.1.3 Geology and geomorphology

Provide a description, map and a series of cross-sections of the geology of the project area. Describe the geomorphology of the project site and the surrounding area. Make particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures that could have an influence on, or be influenced by, the project's activities. Describe geological properties that may influence ground stability (including seismic activity, if relevant), occupational health and safety, rehabilitation programs, or the quality of wastewater leaving any area disturbed by the project. Describe known sites of palaeontologic significance and address the potential for significant fossil finds in locations where the age and type of geology is such that significant specimens may be uncovered during construction or operations. Describe any sites of geomorphological significance, such as lava tubes or karst.

4.2.1.4 Mineral resources and ore reserves

[note: section 4.2.1.3, Mineral resources and ore reserves, is specifically for mining projects. It should be omitted for proposals related to other industries.]

Provide a summary of the results of studies and surveys undertaken to identify and delineate the mineral resources and ore reserves within the project area (including any areas underlying related infrastructure).

Report the mineral resources (measured, indicated or inferred) and ore reserves (proved or probable) in accordance with the Australasian Code for Reporting of Mineral Resources and Ore Reserves (the JORC Code – available at <www.jorc.org/main.php>) and the principles outlined in the Australian Guidelines for the Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves (available at <www.jorc.org/pdf/coalguidelines.pdf>) and include the modifying factors and assumptions made in arriving at the estimates. Describe in detail the location, tonnage and quality of the mineral resources and ore reserves within the project area. For coal projects, the description it should be presented on a 'seam by seam' basis.

In addition, provide appropriately-scaled maps showing the general location of the project area, and in particular:

- the location and areal extent of the mineral resources to be developed or mined
- the location and boundaries of mining tenures, granted or proposed, to which the project area is, or will be subject
- the location of the proposed mine excavation(s)
- the location and boundaries of any project sites
- the location and boundaries of any other features that will result from the proposed mining, including waste/spoil

dumps, water storage facilities and other infrastructure

- the location of any proposed buffers, surrounding the working areas
- any part of the resource not intended to be mined and any part of the resource that may be sterilised by the proposed mining operations or infrastructure.

4.2.1.5 Soils

Conduct a soil survey of the area that would be affected by the project in accordance with section 6.1 Compilation of Land Resources Inventory (LRI) – Pre Mining Studies, of the Land Suitability Assessment Techniques in the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (DME, 1995). Undertake soil tests and laboratory analyses of representative samples down the soil profile, with particular reference to the physical and chemical properties of the materials that will influence erosion potential, storm water run-off quality, rehabilitation and agricultural productivity of the land. For pipeline routes, undertake the analysis and classification at least to the depth of excavation. Provide geotechnical information on the soils' stability and suitability for construction of project facilities.

Describe, map and illustrate soil types and profiles according to the Australian Soil and Land Survey Field Handbook (National Committee on Soil and Terrain, 2009), Guidelines for Survey Soil and Land Resources (McKenzie et al, 2nd Ed., 2008) and Australian Soil Classification (Isbell, 2002).

For land where acid sulfate soils (ASS) may be present, undertake an investigation in accordance with the guidelines and methods published by the Queensland Acid Sulfate Soils Investigation Team (QASSIT) and the Queensland Acid Sulfate Soils Management Advisory Committee (QASSMAC). The management of ASS will address the State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils.

4.2.1.6 Land suitabilities

Provide an Agricultural Land Class map of the project site and the surrounding area according to the Planning Guideline: the Identification of Good Quality Agricultural Land (DPI/DHLGP, 1993). Highlight any good cropping land.

Describe and map the land use suitabilities, and their classes, of the potentially affected area in accordance with the Land Suitability Assessment Techniques in the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (DME, 1995).

Show the location of any cropping land in the vicinity of the site, highlighting any strategic cropping land, and describe the crops commonly grown on the land, including any rotations.

4.2.1.7 Contaminated land

Describe and illustrate the nature and extent of any areas listed on the Environmental Management Register (EMR) or the Contaminated Land Register (CLR) under the *Environmental Protection Act 1994*, and any existing potentially contaminated sites that are not on the registers but the history of the site suggests may be present.

Conduct a preliminary site investigation consistent with DERM's Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland. If the results of the preliminary site investigation indicate potential or actual contamination, conduct a detailed site investigation progressively managed in accordance with the stages outlined in Appendix 5 of the Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland. The results of the site investigations should be summarised in the EIS and provided in detail in an appendix.

4.2.1.8 Infrastructure

Describe and show on suitably-scaled maps the location and owners or custodians of all infrastructure and easements on the potentially affected land, including roads and road reserves, railways and rail reserves, stock routes, and power lines. Indicate the locations of any buried gas or water pipelines, power lines, or telecommunication cables. Describe the environmental values affected by the existing infrastructure.

4.2.1.9 Environmentally sensitive areas

Describe and show on suitably-scaled maps the proximity of the project to any category A or B environmentally sensitive areas under the Environmental Protection Regulation 2008. In particular, indicate if the land affected by the project is, or is likely, to become part of the protected area estate, or is subject to any treaty.

4.2.1.10 Landscape character

Describe in general terms the existing character of the landscape that will be affected by the project. Comment on any changes that have already been made to the natural landscape since European settlement. This section should 'set the scene' for the description of particular scenic values in the following section on visual amenity, the difference being that this section describes the general impression of the landscape that would be obtained while

travelling through and around it, while the visual amenity section addresses particular panoramas and views (e.g. from constructed lookouts, designated scenic routes, etc) that have amenity value.

4.2.1.11 Visual amenity

Describe existing landscape features, panoramas and views that have, or could be expected to have, value to the community whether of local, regional, state-wide, national or international significance. Information in the form of maps, sections, elevations and photographs is to be used, particularly where addressing the following issues:

- identifying elements within the proposal and surrounding area that contribute to their image of the town/city as discussed in the any local government strategic plan - city image and townscape objectives and associated maps
- major views, view sheds, existing viewing outlooks, ridgelines and other features contributing to the amenity of the area, including assessment from private residences in the affected area along the route
- focal points, landmarks (built form or topography), gateways associated with project site and immediate surrounding areas, waterways, and other features contributing to the visual quality of the area and the project site
- character of the local and surrounding areas including character of built form (scale, form, materials and colours) and vegetation (natural and cultural vegetation) directional signage and land use
- identification of the areas of the project that have the capacity to absorb land use changes without detriment to the existing visual quality and landscape character
- the value of existing vegetation as a visual screen.

4.2.2 Potential impacts and mitigation measures

Define and describe the objectives and practical measures for protecting or enhancing the land-based environmental values identified through the studies outlined in the previous section. Describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

4.2.2.1 Resource utilisation **[MINING PROJECTS ONLY]**

With regard to resource stewardship, analyse the effectiveness of the mining proposal in achieving the optimum utilisation of the mineral resources within the project area and consider its impacts on other resources. Demonstrate that the mining proposal will 'best develop' the mineral resources within the project area, minimise resource wastage and avoid any unnecessary sterilisation of these or any other of the state's coal, mineral, and petroleum (including gas and coal seam methane) resources that may be impacted upon or sterilised by the mining activities or related infrastructure.

Describe how the company plans to manage low grade or currently uneconomic deposits or excavated material to ensure that this potential future resource is not sterilised. Also describe measures to ensure the minimal dilution of mineralised but currently sub-economic waste rock by non-mineralised waste rock. Provide details and maps of expected residual or remnant resources within the project area including any low grade stockpiles, tailings and currently uneconomic material.

4.2.2.2 Land use and suitability

Assess the potential for the project's construction and operation to change existing and potential land uses of the project site and adjacent areas. Detail the proposed land use options after mining ceases, including the suitability of the area to be used for primary production, industry, or nature conservation. Assess the factors favouring or limiting the establishment of those options compared to land use and suitability prior to construction of the project and assess the potential liabilities for long-term management.

Assess the potential environmental harm caused by the project on the adjacent areas currently used for agriculture, urban development, recreation, tourism, other business. Assess the implications of the project for future developments in the impact area, including constraints on surrounding land uses. Propose mitigation measures for any potentially adverse impacts on stock route operations during the construction and operational phases of the development. If the development adjoins or potentially impacts on good quality agricultural land, assess the potential for land use conflict. Investigations will follow the procedures set out in the planning guideline The Identification of Good Quality Agricultural Land (DPI & DHLGP, 1993), which supports State Planning Policy 1/92: Development and the Conservation of Agricultural Land.

Assess incompatible land uses, whether existing or potential, adjacent to all aspects of the project, including essential and proposed ancillary developments or activities and areas directly or indirectly affected by the construction and operation of these activities. Propose measures to avoid or mitigate adverse impacts.

4.2.2.3 Subsidence **[UNDERGROUND MINING ONLY]**

Provide comprehensive surface subsidence predictions taking into account factors such as topographic variations and geological complexities, with a full description of the methodology and including an assessment of the accuracy and precision of the predictions. Show the results of the predictions on maps with one metre contour increments and a scale appropriate for assessment of surface subsidence impacts. Propose detailed mitigation measures for any significant impacts that would result from subsidence.

4.2.2.4 Land disturbance

Develop and detail a strategy that will minimise the amount of land disturbed at any one time. The strategy will address progressive rehabilitation and final decommissioning with particular regard to the impacts in the short, medium and long-term timeframes. Describe the methods to be used for managing disturbed land, including backfilling, covering, re-contouring, topsoil handling and revegetation. However, a description of erosion and sediment control could be deferred to section 4.2.2.6. Any proposals to disturb land that would impede or divert overland flow or waterways, and any subsequent reinstatement, during construction or operations will be first described in this section. However, the potential impacts of interfering with flow on the quantity and quality of water resources, the final drainage and seepage control systems, and any long-term monitoring plans will be assessed and described in section 4.5.

In addition to assessing the operational phase of land disturbance, address the ultimate changes following implementation of the decommissioning and rehabilitation plan described in section 3.7. Detail the proposed long-term changes that will occur to the land after mining ceases compared to the situation before mining commences. Those changes will be illustrated on suitably scaled maps with contours at intervals sufficient to assess the likely drainage pattern for ground and surface waters (however, the assessment of the impacts on drainage and water quality will be provided in the water resources section of the EIS). Assess the proposed mitigation measures for land disturbance to be used on decommissioning the site in sufficient detail to decide their feasibility. In particular, address the long-term stability of final voids and spoil dumps, safety of access to the site after surrender of the lease, and the residual risks that will be transferred to the subsequent landholder.

Rehabilitation success criteria for land disturbance will be proposed in this section while rehabilitation success criteria for revegetation will be proposed in the section on ecology.

If geological conditions are conducive, the proponent should consider the possibility that significant fossil specimens may be uncovered during construction or operations and propose strategies to protect the specimens and alert the Queensland Museum to the find.

4.2.2.5 Land degradation or contamination

Assess the possible degradation or contamination of land that could result from any aspects of the project. The assessment should not be limited to activities that would result in the land being entered on the EMR or the CLR. Rather, it should include any activity that could have a detrimental impact on land. Matters to be considered include:

- the long-term use for dust-suppression of water with sufficient dissolved salts to affect soil condition
- disposal to land of any waste water
- waste rock disposal;
- tailings disposal
- disturbance of acid sulfate soils
- spills at chemical and fuel storage areas.

Propose measures that would prevent or remediate any degradation or contamination of land due to the proposed activities. Also, propose any measures required for the management and possible remediation of any existing contamination on the site.

For activities that may disturb acid sulfate soils, also propose management measures that would prevent the contamination of groundwater or surface water. The proposed management measures will be in accordance with the State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils and the guidelines published by the Queensland Acid Sulfate Soils Investigation Team (QASSIT) and the Queensland Acid Sulfate Soils Management Advisory Committee (QASSMAC).

Assess any activities or proposed contamination that would result in the land being newly entered on the EMR or the CLR. Also assess the consequences, particularly for the subsequent landholder, of any intention to leave the site on either register when mining ceases. Prepare a site management plan for any land remaining on the EMR or the CLR, and describe when, how and by whom it will be implemented.

4.2.2.6 Erosion and stability

For all permanent and temporary landforms, possible erosion rates and management techniques should be described. For each waste rock and soil type identified, erosion potential (wind and water) and erosion management techniques will be outlined. An erosion-monitoring program, including rehabilitation measures for erosion problems identified during monitoring, will also be outlined. Develop and describe mitigation strategies that would achieve acceptable soil loss rates, levels of sediment in rainfall runoff and wind-generated dust concentrations.

The report will include an assessment of likely erosion and stability effects for all disturbed areas such as:

- areas cleared of vegetation
- waste dumps
- stockpiles
- dams, banks and creek crossings
- the plant site, including buildings
- access roads or other transport corridors
- water supply pipeline and electricity transmission corridors.

Methods proposed to prevent or control erosion will be specified and will be developed with regard to (a) the long-term stability of waste dumps and voids; (b) preventing soil loss in order to maintain land capability/suitability, and (c) preventing significant degradation of local waterways by suspended solids. The mitigation measures will address the selective handling of waste rock and capping material to maximise long-term stability of final landforms in regard to slumping and erosion both on and below the surface. Erosion control measures will be developed into an erosion and sediment control plan for inclusion in the EM plan.

4.2.2.7 Landscape character

Describe the potential impacts of the project on the landscape character of the site and the surrounding area. Make particular mention of any changes to the broad-scale topography and vegetation character of the area, such as due to spoil dumps, excavated voids and broad-scale clearing.

Provide details of measures to be undertaken to mitigate or avoid the identified impacts.

4.2.2.8 Visual amenity

Assess and discuss the visual impact of the project on particular panoramas and outlooks. Assess the extent and significance of the changed skyline including views from places of residence, work, and recreation, from road, cycle and walkways, from the air and other known vantage points day and night, and during all stages of the project. Illustrate the visual impacts of the project structures and associated infrastructure using appropriate simulation. Use sketches, diagrams, computer imaging and photos to portray the near views and far views of the completed structures and their surroundings from visually sensitive locations.

Provide detail of how impacts on visual amenity would be mitigated or avoided.

4.2.2.9 Lighting

Assess the potential impacts of lighting during all stages of the project particularly regarding:

- the effects of night operations, maintenance or increased vehicular traffic on residents
- changed habitat conditions for nocturnal animals
- the attraction of animals to lights at night.

Propose measures to mitigate or avoid all potential impacts due to lighting.

4.3 Transport

The transport section of the EIS will have separate subsections describing infrastructure associated with the various modes of transport, such as road, rail, pipeline, conveyor, air and sea.

4.3.1 Description of existing infrastructure and values

Provide details of the proposed use of existing infrastructure to transport materials, products or wastes to and from the project site. Provide details of any assets within the jurisdiction of any transport authority that could be impacted by the project. Also provide details, either in the transport section of the EIS or by cross-reference to other sections, of the environmental values that would be affected by the altered use of existing transport infrastructure or the

construction of new or altered infrastructure.

For road, rail or conveyor transport, separately describe in detail and illustrate the existing networks that would be used by the project. Describe and illustrate any stock routes potentially affected by the project.

In relation to air transport, describe the existing air fields and associated infrastructure that would be used by the project.

In relation to importing or exporting materials and products, identify any port that would be used by the project. Provide details of those ports, including: the berths to be used; the size and types of vessels that the berths can accommodate; the typical turnaround time for vessels; and the associated infrastructure that moves and stores material between the ships and the rail and/or road networks.

4.3.2 Potential impacts and mitigation measures

For each mode of transport and each phase of the project, the EIS will describe the:

- proposed construction, realignment, structural alteration, or changed use of any access and haul roads, conveyor easements, rail loops and load-out facilities, and rail crossings (over or under the track) used by any transport associated with the project
- expected volumes and weights of materials, products, hazardous goods or wastes
- types of vehicles, rolling stock, vessels and craft to be used
- likely number and timing of trips.

Provide sufficient information to make an independent assessment of how transport infrastructure will be affected by each phase of the project at a local and regional level. Similarly, provide sufficient information to make an independent assessment of how transport used by the project will impact on environmental values. In both cases, the impacts along the whole length of each affected route will be discussed and measures proposed to avoid or mitigate the impacts.

Details will be provided of the:

- results of any modelling of transport impacts
- assessment methodology used, including a summary of consultation undertaken with transport authorities regarding the scope of the impact assessment and methodology to be used
- base data assumptions, including an assessment of the current condition of the affected network and its performance
- possible interruptions to transport operations
- risks of spills of products or hazardous materials during transport, prevention measures to be used, and the requirements for dealing with any spills.

Assess any impacts on stock routes due to the project's activities. Propose mitigation measures for any disruptions to movement of travelling stock on stock routes. Outline, and cross-reference to more detailed descriptions with the EIS, the impacts of transport associated with the project on amenity, human health and ecological values as a result of dust, noise, vibration, and any other environmental effects.

The assessment of road impacts will be in accordance with the latest version of the Department of Transport and Main Road's Guidelines for Assessment of Road Impacts of Development, available from the website: <www.mainroads.qld.gov.au>. Provide details of any heavy or oversized loads, including the number and type of vehicles, with a description of the likely timing and routes of those loads highlighting any vulnerable bridges or other structures along the proposed routes. Also provide details of the likely traffic to be generated by workforce personnel and service providers.

In relation to road impacts, the EIS will include an assessment of impacts on:

- the safety, efficiency and condition of road operations and assets, including driver fatigue
- any existing or proposed pedestrian cycle networks
- any existing public transport networks (assets and services)
- watercourses and overland flows, and their interaction with the current and future road network (note: impacts on water values due to transport infrastructure will be outlined in the transport section of the EIS and cross-referenced to a detailed assessment in the water resources section).

The assessment of impacts on the rail network itself, or on environmental values affected by changes in rail traffic,

such as due to dust, noise or vibration, will also consider the following matters:

- the likely size of trains and the number of train paths needed to move materials, products or wastes to or from the project site
- new or altered rail transport infrastructure to meet demand from the project
- impacts on rail freight and other transport services (e.g. variability on existing train path availability)
- impacts on passenger transport and services
- impacts at interface points with other private and public transport pathways such as roadway level crossings or occupational crossings (i.e. those crossings which form part of private access pathways to and from residential or business sites)
- the requirements for any approvals needed for rail crossings by roads or other infrastructure.

Assess the impacts of the construction and operation of any conveyors. The direct impacts on any other transport infrastructure, such as those due to road or rail crossings, will be addressed in the transport section of the EIS, while the impacts on other matters (such as ecology, noise, etc) will be addressed in the appropriate sections of the EIS, but cross-referenced in the transport section.

In relation to the importation or export of materials and products, identify any aspects of the project that will increase the shipment of materials through any port. Provide details of the likely size and number of additional vessels that would use the port.

Assess any impacts on any port due to the import or export of materials or products, including the need for:

- new coastal works, such as berth construction or alteration, land reclamation, etc
- any dredging for shipping channels and swing basins
- new or altered stockpile areas
- new, altered, or increased use of existing, infrastructure to handle materials between ships and road or rail transport.

Also assess any impacts on nearby areas due to the handling or storage of materials at ports, including dust, noise or lighting.

Assess any potential impacts of the project on water traffic in rivers and dams.

In relation to air transport, describe the new, and/or altered air fields and associated infrastructure that would be needed for the project. Describe the likely additional number of flights, frequency, timing (particularly any increase in night arrivals or take-offs), and size of aircraft. Describe any features of the project that could impact on air transport, such as the placement of waste dumps, stacks or flares beneath flight paths.

Assess any impacts on environmental values due to the need to redevelop or construct new airfields; and any impacts on amenity due to increased air traffic. The proposal and assessment should have regard to State Planning Policy 1/02: Development in the Vicinity of Certain Airports and Aviation Facilities. Assess any potential impacts on air safety, including the raising of landforms or the construction of stacks, flares or lighting within flight paths.

If the works that could result in impacts, or the associated mitigation works for identified impacts, are the responsibility of the proponent then the EIS will fully assess those impacts, detail the mitigation works and carry the environmental protection commitments forward into the project's EM plan.

If the proponent will not be responsible for the works associated with the impacts (for example, dredging at a port), the EIS will clearly identify the entity that will be responsible and what approvals would be needed. Nevertheless, in this case, the EIS will provide enough assessment of the likely impacts of all associated activities for the regulatory authorities to have confidence that approval of the project, subject to this EIS process, would not have unacceptable flow-on impacts due to necessary works farther down the transport chain.

Describe detailed measures to avoid or mitigate impacts on each transport mode. The mitigation measures will ensure the safety, efficiency and condition of each mode is maintained. These mitigation measures are to be prepared by the proponent in close consultation with the relevant transport authorities. Any residual impacts that cannot be avoided will be identified and quantified.

Mitigation strategies must include:

- consideration of any transport authority's works program and forward planning
- proposed construction plans of all required transport infrastructure works in accordance with relevant and

accepted authority standards and practices

- the responsible parties for any works
- estimates of costs
- details on the timing of the works
- a summary of relevant approvals and legislative requirements needed to implement mitigation strategies and transport infrastructure works required by the project.

Also consider public transport requirements and links to, or development of pedestrian and cycle networks.

4.4 Waste

This section will complement other sections of part 4 of the EIS by providing technical details of waste treatment and minimisation, with proposed emission, discharge and disposal criteria, while other sections describe how those emissions, discharges and disposals would impact on the relevant environmental values. The purpose of this format is to concentrate the technical information on waste management into one section in order to facilitate its transfer into the EM plan.

4.4.1 Description of environmental values

Briefly describe the existing environment values that may be affected by the project's wastes. Refer to each of the waste streams described in section 3.6 and provide references to more detailed descriptions of the relevant environmental values in other sections of part 4 of the EIS.

4.4.2 Potential impacts and mitigation measures

The purpose of this section is to bring together a description of the preferred methods (and discuss any alternatives) to be used to deal with waste streams and outline their impacts. The full description of the magnitude and nature of impacts on particular environmental values due to managing waste will be provided in the relevant sections of part 4 of the EIS.

Define and describe the objectives and practical measures for protecting or enhancing environmental values from impacts by wastes. Assess the management measures against the waste hierarchy, describe how nominated quantitative standards and indicators may be achieved for waste management, and how the achievement of the objectives will be monitored, audited and managed.

As part of the description, and except where issues related to waste have been addressed in section 3.6 (in which case reference will be made to the appropriate subsection), provide details of each waste with regard to:

- operational handling, storage, treatment, disposal and fate of all wastes
- any methods and locations to be used to transport and dispose of wastes off the project site
- hazards associated with the handling and storage of wastes
- the potential level of impact on environmental values
- proposed discharge/disposal criteria for liquid and solid wastes
- measures to ensure stability of the dumps and impoundments
- methods to prevent seepage and contamination of surface water or groundwater from stockpiles and/or dumps
- design criteria to be used to ensure that waste containment and/or storage facilities perform satisfactorily
- market demand for recyclable waste
- waste minimisation processes
- measures to ensure wastes does not attract or propagate pests, disease vectors or vermin, and do not impact on public health
- decommissioning of the site.

Consider the physical, geo-mechanical and chemical properties of waste rock in both fresh and weathered forms when determining their suitability for constructing stable slopes and developing measures to avoid acid generation from waste rock dumps and backfilling operations. Provide a detailed description of tailings disposal facilities stability, capping and rehabilitation, including hydraulic performance of the tailings disposal facilities during operation and post-decommissioning.

[This paragraph for gold mineral processing only] Describe options for removing or reducing cyanide from the

waste streams entering tailings storage, and develop a preferred option. Provide predictions of the concentrations of cyanide, in total and in relevant chemical species, resulting from the preferred option for all components of the waste streams, including settled solids and supernatant effluent in tailings storage facilities.

Having regard to the Environmental Protection (Waste Management) Policy 2000 (EPP(Waste)), indicate the results of investigating the feasibility of using waste minimisation and cleaner technology options during all phases of the project. Apply waste minimisation and treatment, and cleaner production techniques, to gaseous wastes, particularly methane, nitrogen oxides, sulfur oxides, particulates and carbon dioxide. Pay particular attention to measures that will maximise energy efficiency and minimise internal energy consumption in the project.

Detail cleaner production waste management planning especially how these concepts have been applied to prevent or minimise environmental impacts at each stage of the project. Provide details on natural resource use efficiency (such as energy and water), integrated processing design, and any co-generation of power and by-product reuse as shown in a material/energy flow analysis.

4.5 Water

4.5.1 Description of environmental values

Describe the existing resources and environmental values of water that may be affected by the project. Environmental values will be defined according to the *Environmental Protection Act 1994*, Environmental Protection (Water) Policy 2009 (EPP(Water)), the Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC & ARMCANZ, 2000), the Queensland Water Quality Guidelines 2009 (DERM, 2009) and the guideline Establishing Draft Environmental Values and Water Quality Objectives (EPA, 2002). Make reference to Queensland Wetland Mapping and any available Aquatic Conservation Assessments produced by DERM. Include estuarine and marine waters if they could be impacted by the project. The definition of waters in the EPP(Water) includes the bed and banks of waters, so this section will address benthic sediments as well as the water column.

Develop and describe suitable water quality and resource indicators for measuring environmental values, and objectives that would protect the identified values.

Describe and illustrate the surface watercourses, overland flow, palustrine and lacustrine wetlands, estuaries and marine waters. The description will include suitably scaled maps of catchments, watercourses, drainage pathways, wetlands, or sources of water supply (such as farm dams) potentially affected by the project, whether on or off the project site. Describe, with supporting photographs, the geomorphic condition of any watercourses likely to be affected by disturbance or stream diversion. The results of this description will form the basis for the planning and subsequent monitoring of rehabilitation of the watercourses during or after the operation of the project.

Describe the hydrology of watercourses and overland flow in the project area and any downstream locations potentially affected by the project.

Provide details of the likelihood and history of flooding, including the extent, levels and frequency of floods in and around the project site. Flood studies will include a range of annual exceedance probabilities for potentially affected waterways, based on observed data if available or use appropriate modelling techniques and conservative assumptions if there are no suitable observations. The flood modelling assessment will include local flooding due to short duration events from contributing catchments on site, as well as larger scale regional flooding including waterways downstream.

Describe present and potential users and uses of water in areas potentially affected by the project, including municipal, agricultural, industrial and recreational uses of water.

Describe the quality of surface waters in the area potentially affected by the project with an outline of the significance of these waters to the river catchment system in which they occur (note: impacts on coastal water quality will be discussed in section 4.6 (Coastal environment)). The description will be based on a monitoring program, with sampling stations located upstream at reference sites that would not be impacted and downstream of the project. Monitoring will include sites closest to the proposed discharge points and at downstream locations that would be below any mixing zone. Sites will include permanent and semi-permanent water holes, known aquatic habitat, weirs or reservoirs. Available complementary stream-flow data will also be obtained from historical records to help interpretation. Describe seasonal variations in water quality and variations with flow. Monitoring of ephemeral streams will primarily focus on all times of natural flow. Measure a range of physical, chemical and biological parameters relevant to the potential environmental harm on any affected creek or wetland system. This will include but not necessarily be limited to water quality indicators likely to be affected by the project such as electrical conductivity, dissolved metals, turbidity, suspended sediments and pH. Biological indicators will include macroinvertebrate surveys undertaken at appropriate locations according to best practice methods. All sampling will be performed in accordance with the Monitoring and Sampling Manual 2009 (DERM, 2009) or the most current edition.

Describe the quality, quantity and significance of groundwater in the project area and any surrounding area

potentially affected by the project's activities.

Describe the nature and hydrology of the aquifers of the potentially affected area, including:

- geology and stratigraphy
- aquifer type – such as confined, unconfined, karst or perched
- depth to, and thickness of, the aquifers
- the significance of the resource at a local and regional scale
- depth to water level and seasonal changes in levels
- groundwater flow directions (defined from water level contours)
- groundwater yield
- groundwater quality
- interaction with surface water
- interaction with saline water
- possible sources of recharge
- vulnerability to pollution.

The description will include a survey of existing groundwater supply facilities (bores, wells, or excavations) to the extent of any potential impacts. Include and analyse the following information:

- location of potentially affected bores or wells
- pumping parameters
- draw down and recharge at normal pumping rates
- seasonal variations (if records exist) of groundwater levels.

Develop and describe a network of observation points and a monitoring program that would satisfactorily monitor groundwater resources both before and after commencement of operations. The data obtained from the groundwater survey will be sufficient to enable specification of the major ionic species, pH, electrical conductivity, total dissolved solids and any potentially toxic or harmful substances.

4.5.2 Potential impacts and mitigation measures

For all phases of the project, this section of the EIS will:

- assess potential impacts on the water resource environmental values identified in the previous section
- define and describe the objectives and practical measures for protecting or enhancing water resource environmental values
- describe how the achievement of the objectives will be monitored, audited and managed.

Describe and illustrate with maps, plans and cross-sections any proposal to divert creeks or undertake other in-stream works. Assess the potential impacts of in-stream works on hydrology and water quality, and propose measures for avoiding or mitigating the impacts and stabilising and rehabilitating any works.

Assess the hydrological impacts of the project, particularly with regard to the various components of flow that may be impacted by the project. The EIS will address: changes to catchment size or characteristics; changes to the direction or quantity of runoff in the local catchment and to accumulated downstream flows; scouring and erosion; and the consequent impacts of any subsidence. Any consequential impacts of changes to water flow or groundwater recharge on ecosystems and wildlife will be addressed in the ecology section of the EIS. When flooding levels will be affected, model the afflux and illustrate the predictions with maps. Describe and illustrate how an operating pit would be protected from flooding, and address the flood protection level of any final void without the need to maintain levees.

Describe the options for supplying water to the project, and assess the consequential impacts in relation to any water resource plan, resource operations plan and wild river declaration that may apply. Water allocation and water sources will be established in consultation with DERM. Where a licence or permit will be required under the *Water Act 2000* to take water or interfere with the flow of water, provide sufficient information and assessment for the administering authority to consider the suitability of approving any necessary works under the *Water Act 2000*. Similarly, provide sufficient assessment to consider any approval for waterway barrier works under the *Fisheries Act 1994*.

Describe in detail the proposed water management controls, addressing surface and ground water quality and quantity, drainage patterns and sediment movements. Describe and illustrate: the locations, catchments, footprints, cross-sections and method of construction of any dams on the site; their flood immunity; the quality of water or waste water they would contain, and indicate their hazard category. Provide the design storage allowances for sediment dams and process or waste water dams, and demonstrate that the design has been produced by a suitably qualified and experienced engineer using current best practice. Propose measures to manage sediment dams and process or waste water dams and their discharge, and to decommission and rehabilitate the dams when their use ends.

Assess the potential impacts on local and downstream water quality due to any controlled discharges from the site. Describe the proposed quality, quantities and locations of waste water discharges. Use stream flow data in combination with proposed discharge rates to estimate in-stream dilution and water quality. Compare the predicted contaminant levels to the water quality objectives and provide an assessment of the assimilative capacity of the receiving waters. Assess options for controlled discharge under times of natural stream flow that would ensure that adequate flushing of waste water is achieved. Assess the acute and chronic potential impacts of discharges including the cumulative impacts with other discharges from other projects or industry.

Describe any proposed no-release water systems, assess the management and fate of contaminants, and propose mitigation measures for any potential impacts.

Describe and assess proposed measures to manage any leachate or seepage from tailings storages, either during operations or following decommissioning of the mine and its rehabilitation. Describe monitoring programs that will assess the effectiveness of management strategies for protecting water quality during the construction, operation and decommissioning of the project.

Conduct a risk assessment, based on conservative water quality estimates and hydrology, for uncontrolled emissions to water due to system or catastrophic failure, assess the potential impacts of such emissions on human health and natural ecosystems, and provide detailed measures to avoid or minimise impacts.

Assess the potential impacts on local groundwater resources and quality, and define the extent of the area where groundwater resources are likely to be affected by the proposed operations. Assess the potential impacts of the operations on groundwater draw-down, depletion or recharge, and propose management options to monitor and mitigate these effects. Assess the likely response of the groundwater resource after operation of the project, including the impacts of groundwater inflow to any residual void. Assess the potential impacts on the local ground water regime due to altered porosity and permeability from any land disturbance, such as subsidence. Assess the potential for project operations or residual effects to contaminate groundwater resources. Propose measures to avoid, mitigate and remediate any impacts on groundwater resources or quality.

4.6 Coastal environment

4.6.1 Description of environmental values

Describe the existing coastal environment that may be affected by the project in the context of coastal resources and values identified in the State Coastal Management Plan and any applicable Regional Coastal Management Plans. When necessary to avoid duplication, cross-reference other sections of the EIS where coastal values, such as ecology or scenic amenity, are addressed.

Provide an assessment of physical and chemical characteristics of sediments within the littoral and marine zone potentially affected by the project.

Describe the physical processes of the littoral and marine environment, including currents, tides, freshwater flows and their interaction in relation to coastal morphology and the assimilation and transport of contaminants entering marine waters from, or adjacent to, the project area.

Develop and describe suitable indicators for measuring coastal values, and objectives that would protect the coastal resources and values.

4.6.2 Potential impacts and mitigation measures

Identify actions associated with the project that are assessable development within the coastal zone and would require approval under the *Coastal Protection and Management Act 1995*.

Assess the potential impacts that may be caused by the project on coastal processes, resources and values.

Compare the magnitude of the potential impacts to the objectives, and develop management measures that would avoid or mitigate the impacts to meet the objectives. Describe how the mitigation measures are in accordance with applicable coastal management plans, state planning policies (such as State Planning Policy 2/02 – Planning and Managing Development Involving Acid Sulfate Soils), and the Department of Employment, Economic Development and Innovation's series of fisheries guidelines.

Detail a monitoring program that would audit the success of mitigation measures, and describe corrective actions to be used if monitoring shows that objectives are not being met.

4.7 Air

4.7.1 Description of environmental values

Describe the existing air environment and airshed that may be affected by the project. Discuss the background levels and sources of contaminants including suspended particulates, oxides of sulfur or nitrogen, greenhouse gases, odorous compounds and any other relevant constituent, whether major or minor, of the air environment that may be affected by the project.

Provide sufficient data on local meteorology and ambient levels of contaminants to establish a baseline for later studies and for the modelling of air quality environmental impacts within the airshed. Parameters will include air temperature, wind speed and direction, atmospheric stability, mixing depth and other parameters necessary for input to the models.

Describe and illustrate the locations of existing residences, places of work, schools, etc, agricultural or ecologically significant areas that could be impacted by emissions from the project.

Describe the environmental values, appropriate indicators and air quality objectives for the potentially affected air environment according to the Environmental Protection (Air) Policy 2008 (EPP(Air)). Assess whether any air quality objectives are needed in addition to those in the EPP(Air).

4.7.2 Potential impacts and mitigation measures

Describe all the project's potential sources of emissions to air and expected composition of the emissions. The description will include oxides of sulfur or nitrogen, volatile organic compounds, carbon monoxide and dioxide, particulates (including dust, PM10, and PM2.5), trace metals, odours and any toxic, persistent and/or hazardous substances that would be emitted by the project. Also, specify the oxygen content of the flue gases. Present the concentrations of all components of emissions at standard temperature and pressure, and provide the mass emission rate, exit velocity, volume flow rate and temperature at exit.

Provide a separate air emission inventory of any offsite activities directly associated with the project, including fugitive emissions such as from rail or road transport of product or waste.

Use a recognised atmospheric dispersion model to predict the fate of all significant emissions. Use estimates of emission rates based on actual measurements from samples taken from similar facilities, preferably full-scale facilities operating elsewhere or otherwise from experimental or demonstration-scale facilities. Where this is not possible, use published emission factors and/or data supplied by manufacturers of process and control equipment. State all input parameters, data sets and assumptions used in the modelling in the main text of the EIS or an appendix. The model inputs will be as detailed as possible, reflecting any variation of emissions with time and including at least a full year of representative hourly meteorological data. Provide stack parameters such as stack height, diameter, temperature, exit velocity and volume flow rate.

If there is no single atmospheric dispersion model that is able to handle the different atmospheric dispersion characteristics exhibited in the project area (such as sea breezes, strong convection, terrain features, temperature inversions and contaminant re-circulation), apply a combination of acceptable models.

Provide contour maps of predicted ground level concentrations and frequency contour plots for typical and maximum emissions under the expected range of meteorological conditions including the worst case. The averaging period for ground-level concentrations of contaminants modelled will be consistent with the relevant averaging periods for air quality indicators and goals in the Environmental Protection (Air) Policy 2008 and the National Environmental Protection (Ambient Air Quality) Measure. For example, the modelling of sulfur dioxide must be conducted for 1-hour, 24-hours and annual averaging periods.

Compare the predicted ground level concentrations to the air quality objectives, and best practice national and international source emission standards. Describe any situations where people, ecosystems or an agricultural use would experience concentrations above an objective. Assess the human health risk associated with emissions from the project for all contaminants whether or not they are covered by the National Environmental Protection Council (Ambient Air Quality) Measure or the Environmental Protection (Air) Policy 2008. Assess potential impacts of emissions on ecosystems or agricultural uses of the environment.

Assess the potential cumulative impacts or interaction between the emissions from the project and other emissions in the airshed. For example, it may be necessary to evaluate whether nitrogen oxides and volatile organic compounds emissions from the project and other sources within the region would contribute to the generation of photochemical smog, or whether sulfur dioxide emissions would acidify rain or dew.

Describe airshed management and the contribution of the project to airshed capacity in view of existing and future users of the airshed for assimilation and dispersion of emissions.

If odour could be an issue, conduct odour impact assessment according to the DERM guideline Odour Impact Assessment from Developments.

Identify worst case emissions that may occur at start-up, shut-down or during 'upset' operating conditions. If these emissions are significantly higher than those for normal operations, it will be necessary to evaluate the worst-case impact, as a separate exercise to determine whether any planned buffer between the project and neighbouring sensitive receptors will be adequate

Describe the pollution control equipment and pollution control processes to be employed on the premises and the features of the project designed to suppress or minimise emissions, including dusts and odours. Describe the backup measures to be incorporated that will act in the event of failure of primary measures to minimise the likelihood of plant upsets and adverse air impacts.

Assess how the proposed emission control processes accord with the management hierarchy for air emissions in the EPP(Air).

Describe how the air quality objectives would be achieved, monitored and audited, and how corrective action would be taken when needed.

4.7.2.1 Greenhouse gases

Provide an inventory of projected annual emissions for each relevant greenhouse gas, with total emissions expressed in 'CO₂ equivalent' terms. Estimate emissions from upstream activities associated with the proposed project, including the fossil fuel based electricity to be used. Briefly describe the methods used to make the estimates. The Australian Department of Climate Change's National Greenhouse Accounts (NGA) factors (2009) can be used as a reference source for emission estimates and supplemented by other sources where practicable and appropriate. Coal mining projects will include estimates of coal seam methane to be released as well as emissions resulting from such activities as transportation of products and consumables, and energy use by the project.

Assess the potential impacts of the project on the state and national greenhouse gas inventories and propose greenhouse gas abatement measures, including:

- a description of the proposed measures (alternatives and preferred) to avoid and/or minimise greenhouse gas emissions directly resulting from activities of the project, including such activities as transportation of products and consumables, and energy use by the project
- an assessment of how the preferred measures minimise emissions and achieve energy efficiency
- a comparison of the preferred measures for emission controls and energy consumption with best practice environmental management in the relevant sector of industry
- a description of any opportunities for further offsetting greenhouse gas emissions through indirect means.

Means of reducing greenhouse gas emissions could include such measures as:

- minimising clearing at the site (which also has imperatives besides reducing greenhouse gas emissions)
- using less carbon-emitting transport modes or fuels
- integrating transport for the project with other local industries such that greenhouse gas emissions from the construction and running of transport infrastructure are minimised
- maximising the use of renewable energy sources
- co-locating coal seam methane use for energy production with coal extraction
- carbon sequestration at nearby or remote locations.

Include a specific module to address greenhouse abatement in the draft environmental management plan. That module will include:

- commitments to the abatement of greenhouse gas emissions from the project with details of the intended objectives, measures and performance standards to avoid, minimise and control emissions
- periodic energy audits with a view to progressively improving energy efficiency
- a process for regularly reviewing new technologies to identify opportunities to reduce emissions and use energy efficiently, consistent with best practice environmental management
- any voluntary initiatives such as projects undertaken as a component of the national Greenhouse Challenge Plus program, or research into reducing the lifecycle and embodied energy carbon intensity of the project's processes or products

- opportunities for offsetting greenhouse emissions by renewable energy uses
- commitments to monitor, audit and report on greenhouse emissions from all relevant activities and the success of offset measures.

4.8 Noise and vibration

4.8.1 Description of environmental values

Describe the existing environmental values that may be affected by noise and vibration from the project. Environmental values and acoustic objectives for noise-sensitive receptors are defined in the Environmental Protection (Noise) Policy 2008 (EPP(Noise)).

If the proposed activity could adversely impact on the noise environment, undertake baseline monitoring at a selection of sensitive receptors potentially affected by the project. Sensitive receptors are defined in the EPP(Noise). Illustrate the locations of sensitive receptors on a suitably-scaled map. Describe the results of any baseline monitoring of noise and vibration in the proposed vicinity of the project, including long-term measured background noise levels that take into account seasonal variations.

Report the daily variation of background noise levels at nearby sensitive receptors, with particular regard to detailing variations at different periods of the night. Monitoring methods will adhere to accepted best practice methodologies, relevant DERM guidelines and Australian Standards, and any relevant requirements of the Environmental Protection Regulation 2008 and the Environmental Protection (Noise) Policy 2008.

Describe any current activities near the project area that may cause a background level of ground vibration (for example major roads, quarrying activities, etc).

Develop and describe suitable indicators for measuring noise, and objectives that would protect the environmental values from significant noise and vibration impacts.

4.8.2 Potential impacts and mitigation measures

Using a suitable acoustic model, predict the likely generation of noise for different times of day under a range of climatic conditions, including the expected worse case. Describe the predictions using suitable indicators, and illustrate the predicted noise contours on suitably-scaled maps showing the locations of noise sensitive receptors. Assess the potential impacts of noise and vibration at all potentially sensitive receptors in comparison to the objectives and standards to be achieved. Give particular consideration to emissions of low-frequency noise; that is, noise with components below 200Hz. The assessment of noise impacts will include matters raised in the document *The Health Effects of Environmental Noise – Other Than Hearing Loss* published by the enHealth Council, 2004 (or later editions), ISBN 0 642 82304 9. Assess the potential environmental impacts of noise and vibration on terrestrial and marine animals and birds, including migratory species. Assess potential noise impacts on any nearby protected areas addressing amenity as well as impacts on animals. Provide information on blasting that might cause ground vibration or fly rock on, or adjacent to, the site with particular attention given to places of work, residence, recreation, worship and general amenity. Discuss the magnitude, duration and frequency of any vibration and assess the potential impacts on sensitive receptors. Reference will be made to the DERM guideline: *Noise and Vibration from Blasting*.

Assess potential off-site noise and vibration impacts that could arise due to increased road or rail transportation directly resulting from the project.

Define and describe practical measures for protecting or enhancing environmental values from impacts by noise and vibration, including details and illustrations of any screening, lining, enclosing or bunding. Provide a discussion of timing schedules for construction and operations with respect to minimising environmental nuisance and harm from noise and vibration. Also, describe how the achievement of the objectives will be monitored, audited and corrective action taken when needed. Describe how any complaints about noise or vibration would be managed and reported.

4.9 Ecology

4.9.1 Description of environmental values

Describe the existing ecological values that may be affected by the project. Address those ecological values in terms of:

- terrestrial and aquatic ecosystems, and their interaction
- biological diversity
- the existing integrity of ecological processes, including habitats of threatened or near threatened species
- the integrity of landscapes and places, including wilderness and similar natural places.

The description of the ecological values of the areas likely to be affected by the project will be illustrated by maps, diagrams and photographs. The description will start by addressing the ecology of the regional area and progress to a detailed description of the project site and any localities that could be affected by project related activities, including downstream and down-wind areas that could be significantly impacted by emissions. The description of ecological values will account for seasonal changes.

For all locations that may be affected by any aspect of the project, provide suitably-scaled maps of terrestrial vegetation based primarily on field surveys with descriptions of the mapped ecosystems and any items of special interest. Map adjacent areas to illustrate interconnectivity, including any larger scale interconnections between areas of remnant or regrowth vegetation where the project site includes vegetation that facilitates animal movement between those other areas. Field surveys will use the Queensland Herbarium methodology and proformas in the latest version of the publication *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (EPA, 2005), and survey a minimum of three sites, each at least 50 m by 10 m, within each defined (standard system) vegetation community.

The vegetation description and mapping, produced from aerial photographs and field surveys, and having a minimum scale of 1:10 000, will cover at least the following matters:

- location and extent of vegetation types using DERM's regional ecosystem type descriptions in accordance with the Regional Ecosystem Description Database
- category A or B environmentally sensitive areas under the Environmental Protection Regulation 2008
- any areas of state, regional or local significance identified in an approved Biodiversity Planning Assessment produced by DERM
- critical habitat within the meaning of the *Nature Conservation Act 1992*
- vegetation mapped as essential habitat
- remnant or regrowth vegetation, particularly essential regrowth habitat, high value regrowth, or a regrowth watercourse
- sensitive or important vegetation types, including riparian vegetation and any marine littoral and subtidal zone
- in-land or coastal wetlands
- wildlife breeding or roosting areas
- sites in, or adjacent to, areas containing important resting, feeding or breeding sites, or flight paths for migratory species listed under the Convention of Migratory Species of Wild Animals, and/or bilateral agreements between Australia and Japan (JAMBA), Australia and China (CAMBA), or Australia and the Republic of Korea (ROKAMBA)
- sites adjacent to nesting beaches, feeding, resting or calving areas of species of special interest, such as marine turtles and cetaceans
- sites containing common species that represent a distributional limit and are of scientific value or contain feeding, breeding, resting areas for populations of echidna, koala, platypus and other species of special cultural significance
- sites containing high biodiversity that may be dependent for their long-term survival or function on connectivity with other nearby areas of habitat
- a site containing other special ecological values, for example, high habitat diversity and areas of high endemism
- bat roosting and breeding caves, including existing structures such as adits and shafts
- habitat of threatened or near threatened animals
- the condition of vegetation and its habitat value, particularly in relation to the conservation of any threatened and near threatened plant and animal species, assemblages or community types
- a complete list of species present at each site
- the relative abundance of plant species
- species of protected plants highlighting those listed as threatened or near threatened under the Nature Conservation (Wildlife) Regulation 2006
- any other plant communities or species of conservation, cultural, commercial or recreational significance
- areas that may have low resilience to environmental change

- location and abundance of any pest, weed or exotic species
- any areas that would be subject to the *Vegetation Management Act 1999*.

Plants that could not be identified during the survey will be submitted to the Queensland Herbarium for identification. Specimens of plant species of conservation significance, including those listed as protected plants under the Nature Conservation (Wildlife) Regulation 2006, other than common species, will be submitted to the Queensland Herbarium with sufficient information to enable their lodgement as voucher specimens.

The plant and animal surveys will address species structure, assemblage, diversity and abundance. Surveys will be sufficient to identify, or adequately extrapolate, the plant and animal values over the range of seasons, particularly during and following a wet season. In tropical areas, a major part of the survey effort will be undertaken between 1 February and 31 March, assuming the wet season follows a typical pattern. The survey will account for the ephemeral nature of watercourses traversing the project area, and seasonal variation in animal populations. Existing information on plants and animals may be used to supplement new survey work provided that the existing data are still current and have been derived from previous surveys at the site that were consistent with current best practice methodologies. Methodologies used for plant and animal surveys will be specified in the appendices to the EIS.

Undertake a comprehensive vertebrate animal survey of the project area at a sampling intensity that supports the scale of vegetation mapping (i.e. 1:10 000 or better). Surveys of terrestrial wildlife will be conducted in a manner that is sensitive to effects of seasonality and the different activity patterns and habitat use by species under different seasonal conditions.

Describe the terrestrial and riparian animals occurring in the areas affected by the project, noting the broad distribution patterns in relation to vegetation, topography and substrate. The description of the animals present or likely to be present in the area will address:

- a list of animal species, their diversity and abundance
- the existence of any threatened, near threatened or otherwise noteworthy species or communities in the study area, including discussion of range, habitat, breeding, recruitment, feeding and movement requirements, and current level of protection (such as any requirements of protected area management plans)
- any species that are poorly known but suspected of being threatened or near threatened
- habitat requirements and their sensitivity to changes
- movement corridors and barriers to movement
- the use of the area by migratory birds, nomadic birds, bats, and arboreal and ground-dwelling animals
- feral, pest or exotic animals.

In addition to the species found in the field survey, provide an indicative list of all other known or likely species within a 100 km area around the project site and the local bioregion, highlighting any threatened or near threatened species. Correlate the occurrence of animals of conservation significance to mapped vegetation units or habitats to facilitate the development of measures for their protection. Indicate how well any affected communities are represented and protected elsewhere in the province where the site of the project occurs.

Describe the aquatic plants and animals occurring in the areas affected by the project, noting the patterns and distribution in the waterways and any associated wetlands, lacustrine and marine environments. The description of the plants and animals present or likely to be present in the area will at least include:

- fish species, mammals, reptiles, amphibians, crustaceans and aquatic invertebrates occurring in the waterways within the affected area, and/or those in any associated lacustrine and marine environment
- any threatened or near threatened marine species and their habitat
- aquatic plants
- aquatic and benthic substrate
- habitat downstream of the project, or potentially impacted due to currents in associated lacustrine and marine environments.

Provide a description to order or family taxonomic rank of the presence and nature of any stygofauna occurring in groundwater likely to be affected by the project. Sampling and survey methods should follow best practice, such as that published by the Western Australian Environmental Protection Authority – Guidance for the Assessment of Environmental Factors no.54 (December 2003) and No. 54a (August 2007), or any more recent publication that supersedes that guideline.

Develop and describe suitable indicators for measuring ecological values, and objectives that would protect the environmental values from significant adverse impacts.

4.9.2 Potential impacts and mitigation measures

Assess the potential impacts on the ecological values of the area arising from the construction, operation and decommissioning of the project including clearing, salvaging or removal of vegetation. Cover terrestrial and aquatic (marine and freshwater) environments, including any potentially impacted benthic and inter-tidal communities, seagrass beds and mangroves. Assess the potentially significant environmental impacts on any plants and animals, whether on or off the project site, due to any alterations to the local surface and ground water environment.

Specifically assess any potential impacts on a category A or B environmentally sensitive area and propose measures to avoid impacts.

If available, provide electronic shapefiles in a format compatible with ArcGIS indicating the boundary of the project area and detailing the extent of proposed vegetation clearing in relation to surrounding vegetation both within the project area and in any off-site area to be used for project related infrastructure.

Assess the indirect impacts on remaining vegetation, such as those due to edge effects, reducing vegetation area below a viable size, or reductions in connectivity. Similarly, indirect impacts on animals should be assessed, such as the reduction of a habitat area below a viable size or increased predation due to reduced cover. Short-term and long-term effects should be considered with comment on whether the impacts are reversible or irreversible.

Describe the potential impacts on stygofauna of any changes in the quality, level or quantity of groundwater, and describe any mitigation measures that may be applied.

Assess the capacity of the environment to assimilate discharges or emissions. Assess the potential impacts due to chronic, low-level exposure to contaminants or the bio-accumulation of contaminants.

Assess the potential impacts on animals of wastes at the site, particularly those related to any form of cyanide or other toxicants in supernatant water of a tailings storage facility. Propose measures to prevent harm to wildlife.

Describe and assess the potential impacts of any actions of the project that require an authority under the *Nature Conservation Act 1992*, and/or would be assessable development for the purposes of the *Vegetation Management Act 1999*. The assessment and supporting information should be sufficient for the administering authority to decide whether an approval should be granted and developing recommended conditions.

Propose practical measures for protecting or enhancing ecological values, and assess how nominated quantitative standards and indicators may be achieved for nature conservation management. In particular, address measures to protect or preserve any threatened or near threatened species.

Describe measures that would adequately mitigate potential impacts on habitats that would inhibit animal movement, propagation or feeding patterns, or change food chains. Specifically address any obligations imposed by Queensland or Commonwealth legislation or policy or international treaty obligations, such as JAMBA, CAMBA or ROKAMBA. Assess the need for buffer zones and the retention, rehabilitation or planting of movement corridors, and propose measures that would avoid waterway barriers or mitigate their construction and operation. Assess works in a waterway considering Waterway Barrier Works Development Approvals, Queensland Primary Industries and Fisheries Fish Habitat Management Operational Policy FHMOP 008, 2009.

Identify and quantify any potential net loss of environmental values. Propose environmental offsets that would counterbalance the remaining loss of environmental values. Proposed environmental offsets will be consistent with the requirements set out in any applicable specific-issue offset policies under the framework of the Queensland Government's Environmental Offset Policy (2008). Specific-issue offset policies that will be considered are:

- Policy for Vegetation Management Offsets, DERM, 2009
- Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss: Departmental Procedures, Fish Habitat Management Operational Policy, Queensland Department of Primary Industries, FHMOP 005, 2002
- Offsets for Net Benefit to Koalas and Koala Habitat, EPA, 2006.

Propose detailed measures to remove and control the introduction or spread of weeds and feral or pest animals. This should include a risk assessment of high biosecurity risk species and their sites, and the development of threat mitigation plans for them, such as clean down and inspections at high risk sites. The biosecurity management strategies will include mitigation measures relevant to protecting any potentially affected primary production areas. When determining control strategies, reference will be made to the latest Biosecurity Queensland's Annual Pest Distribution Survey data, published biosecurity management strategies, local government pest management plans and any applicable model local laws dealing with locally declared pest plants

and animals. Develop management strategies to ensure no new marine pests are introduced as a result of the project's activities. Include all management measures for pest plants and animals in a biosecurity management plan, which will form part of the project's draft EM plan.

Propose measures for the progressive rehabilitation of disturbed areas, including rehabilitation success criteria that would be used to measure the progress. Describe how the achievement of the objectives would be monitored and audited, and how corrective actions would be managed. Proposals for the rehabilitation of disturbed areas will incorporate, where appropriate, provision of nest hollows and ground litter.

4.10 Cultural heritage

4.10.1 Description of environmental values

Describe the existing cultural heritage values that may be affected by the project. Unless an exemption applies under s86 of the *Aboriginal Cultural Heritage Act 2003*, an Indigenous cultural heritage study must be undertaken in accordance with the requirements of Part 6 of that Act.

An historical cultural heritage study will also be undertaken of the known and potential historical cultural heritage values of the affected area. The study will, as a minimum, include a desktop analysis and an archaeological investigation (such as a physical investigation) of the area potentially affected by the project.

The desktop component of the study will, as a minimum, review the following sources for information on historical cultural heritage values within the region of the project site:

- the Queensland Heritage Register, for places already protected under the *Queensland Heritage Act 1992*
- local government heritage registers, lists or inventories
- results of previous cultural heritage studies conducted within the region of the project.

The scope of the archaeological investigation will be based upon the results of the desktop analysis. The archaeological investigation is to be conducted by an appropriately qualified person, as required by the *Queensland Heritage Act 1992*, and will address all types of historical cultural heritage places located within the project area, including built, archaeological and cultural landscape values.

The discovery and protection of any previously unidentified archaeological artefacts or archaeological places during the course of the historical cultural heritage study must comply with Part 9 of the *Queensland Heritage Act 1992*.

4.10.2 Potential impacts and mitigation measures

Define and describe the objectives and practical measures for managing, protecting or enhancing cultural heritage values that may be affected by the project. Describes how practices may be implemented to appropriately manage those values, and how the achievement of the objectives will be monitored, audited and managed.

4.10.2.1 Indigenous cultural heritage

Unless an exemption applies under s86 of the *Aboriginal Cultural Heritage Act 2003*, the potential impacts on Indigenous cultural heritage values in the vicinity of the project must be managed under a cultural heritage management plan (CHMP) developed and approved under Part 7 of that Act. Development of the CHMP will follow the guidelines gazetted under section 85 of the *Aboriginal Cultural Heritage Act 2003*. DERM's EIS Coordinator must be made aware of the progress of the CHMP approval process and of any related issues that should be addressed in the EIS assessment report.

4.10.2.2 Non-Indigenous historical cultural heritage

The potential impacts on non-Indigenous historical cultural heritage values and their avoidance or mitigation will be addressed in a management plan. The historical heritage management plan will specifically address identified values and provide a process for managing yet undiscovered values should they become apparent during development of the project.

The development of a historical heritage management plan will be negotiated with DERM and any other relevant stakeholders.

The historical heritage management plan will as a minimum address the following issues:

- processes for mitigating, managing and protecting identified historical cultural heritage values during excavations of the construction, operational, rehabilitation and decommissioning phases of the project
- processes for reporting, as required by section 89 of the *Queensland Heritage Act 1992*, the discovery of any archaeological artefact not previously identified in the historical cultural heritage study
- procedures for collecting any artefact material, including appropriate storage and conservation

- historical cultural heritage awareness training or programs for project staff.

The training will be provided during the site induction, and will address the legislative requirements and practical measures for the recognition, reporting and preservation of cultural heritage material. A plain English manual summarising the training will be given to all site workers for their future reference.

The historical heritage management plan will be incorporated into the project's draft EM plan.

4.11 Social values

The description of social and cultural values potentially impacted by the project, and the assessment of the impacts on those values, will be conducted in consultation, through the EIS Coordinator, with the Social Impact Assessment Unit of the Department of Infrastructure and Planning. The proponent will engage at the earliest practical stage with stakeholders and potentially affected parties to discuss and explain the project, and to identify and respond to issues and concerns regarding social impacts. The stakeholder engagement processes will continue throughout the EIS and contribute to the identification of social and cultural values and to the assessment of impacts.

4.11.1 Description of existing social values

Define the social and cultural values within the project's area of influence, including the local, district, regional and state level as appropriate, taking into account the:

- potential for social and cultural impacts to occur
- location of other relevant proposals or projects
- location and types of physical and social infrastructure, settlement and land use patterns
- social values that might be affected by the project, including integrity of social conditions, liveability, social harmony and wellbeing, and sense of community
- Indigenous social and cultural characteristics, such as areas under native title rights or application.

Undertake a targeted baseline study of the people in the project's social and cultural area to identify social values that may be impacted by the project. The social baseline study will be based on qualitative, quantitative, and participatory methods supported by stakeholder engagement processes. It will reference relevant data contained in local and state government publications, reports, plans, guidelines and documentation, including regional plans and any available community plans.

The social baseline study should describe and analyse a range of demographic and social statistics determined relevant to the project's social and cultural area including:

- total enumerated population and the full time equivalent transient population
- existing or anticipated major population trends and changes irrespective of the project
- family structures
- age and gender distributions
- education, including schooling levels
- measures of community safety, health and wellbeing
- cultural and ethnic characteristics
- Indigenous population including age and gender
- personal and household income
- labour force by occupation and industry
- housing tenure type and landlord type for rental properties
- housing availability:
 - private ownership: number and percentage of houses for sale
 - rental market: size, vacancy rate and seasonal variations
 - availability of social housing
- housing costs:
 - private ownership: typical costs of houses for sale in project area and monthly housing repayments with percent of dwellings in each category published by the Australian Bureau of Statistics (ABS)

- rental: weekly rent with percent dwellings in each category published by the ABS
- housing affordability separately for private ownership and rent
- household and family type
- disability prevalence
- the social and economic index for areas, index of disadvantage—score and relative ranking
- types and prevalence of crime, including domestic violence
- any other indicators determined through the community engagement process as relevant.

The social baseline study should also take account of and address issues such as:

- the social infrastructure including community and civic facilities, services and networks (for definition see South East Queensland Plan 2005–2026 Implementation Guideline No.5, <www.dip.qld.gov.au/resources/guideline/Implementationguideline5.pdf>)
- settlement patterns including the names, locations, size, history and cultural aspects of settlement in the social and cultural area
- identity, values, lifestyles, vitality, characteristics and aspirations of communities in the social and cultural area, including Indigenous communities
- land use and land ownership patterns including:
 - the number of properties potentially directly or indirectly affected by the project
 - rural properties, farms, croplands and grazing areas including on-farm activities near the proposed activities
 - properties used for other primary, secondary or tertiary industries
 - residential acreage properties
 - townships or other relatively small block residential areas
- the number of families potentially directly or indirectly affected by the project including Indigenous traditional owners and their families, property owners, and families of workers either living on the property or workers where the property is their primary employment
- use of the social and cultural area for forestry, fishing, recreation or tourism
- Indigenous cultural use of plants and animals.

4.11.2 Potential impacts and mitigation measures

Describe the stakeholder engagement processes and summarise their outcomes, including the response of Indigenous and non-indigenous communities to the project.

Assess and describe the type, level and significance of the project's beneficial and adverse impacts on social and cultural values identified in the social baseline study and address issues raised in the stakeholder engagement processes. Assess the cumulative potential beneficial and adverse impacts of the project in relation to other major projects or known proposals in the social and cultural area. Discuss whether impacts would be felt at a local, regional or national level.

Assess the impacts in sufficient detail for local and state authorities to make informed decisions about the project's potential effect on their business and social infrastructure. If the project is likely to result in a significant increase in the population of the area, then the proponent should consult the relevant state authorities and summarise the results of the consultations in the EIS.

Provide separate profiles of the expected workforce for the construction, operational and decommissioning phases of the project that describe the:

- numbers and variations of personnel to be employed
- skills base of the required workforce
- likely sources of personnel, such as local, regional, national or overseas.

Provide an outline of the proponent's and contractors' recruitment schedules and their policies for recruitment of workers; describe initiatives for local employment business opportunities; and address the recruitment of Indigenous workers, people from culturally and linguistically diverse backgrounds and people with a disability. Outline training that would be provided to increase the skills levels of workers.

Assess the social and cultural impacts of recruiting and training the construction or operational workforces from within the host community and of bringing in workers from outside.

Estimate the population growth due to the proposal, directly, indirectly (such as due to service industry growth) and cumulatively with other projects, providing detail on gender, age and any other relevant cohorts. Assess the potential impacts on:

- demographic patterns
- local, regional and state labour markets for separate occupational groupings of the workforce, particularly highlighting any potential skill shortages
- disruptions to existing lifestyles
- health and social wellbeing of families and communities
- social dysfunction, including use of alcohol and drugs
- crime and violence.

Assess the potential impacts of the project on vulnerable groups including women, children and young people, the aged and people with a disability.

Describe the social impacts of changes in land use, the alienation of property and loss of connection with the land, including the impacts and stresses associated with relocations.

Assess the impacts of construction and operational workforces, their families, and associated contractors on land, housing and accommodation availability and affordability. Assess the capability of existing housing and rental accommodation, including public housing, to meet any additional demands created by the project including direct impacts on disadvantaged groups and Indigenous people.

Estimate how much service revenue and wages from the project would be likely to flow to the project's social and cultural area, and assess the beneficial and adverse impacts of that financial inflow.

Describe the transport operations that would be used to move staff between their residences, dormitory camps and work sites. Modes of transport should be described in section 4.3, but this description should address the mix of privately-owned, public or chartered transport operators. Assess the potential social impacts of transport operations on the local and regional communities, including any road safety issues.

Propose measures, developed in consultation with relevant local authorities, state government agencies and stakeholders that would avoid, mitigate or offset any short, medium or long-term adverse impacts, particularly those on:

- housing affordability and availability, including the rental market, in the social and cultural area
- demographic changes in the profile of the region
- the capacity of social infrastructure to meet community needs, particularly in the areas of health, welfare, early childhood education and care, other education and training, policing and emergency services
- provision of education, training and employment opportunities for women, people with a disability, and Indigenous peoples.

Describe consultation with local and state authorities and stakeholders about their acceptance of proposed mitigation strategies and how practical management and monitoring regimes are proposed to be implemented.

Provide a draft social impact management plan that promotes an active and ongoing role for impacted communities and local authorities through the project life cycle. The draft plan should cover:

- an overview of the project
- all proposed mitigation measures and benefit strategies
- action plans to implement mitigation measures and benefit strategies
- assignment of accountability and resources for mitigation measures and project benefits
- practical mechanisms to monitor and adjust mitigation measures and action plans
- ongoing updates to stakeholders on activities and commitments
- mechanisms to respond to public enquiries and complaints
- mechanisms to resolve disputes with stakeholders

- stakeholder engagement processes including periodic review mechanisms.

4.12 Health and safety

4.12.1 Description of values

Describe the existing community values for public health and safety that may be affected by the project. Provide maps showing the proximity of the project to any potentially affected places of human residence, work or recreation including, but not necessarily limited to, kindergartens, schools, hospitals, aged care facilities, office buildings, factories and workshops. Projects that could discharge contaminants, even accidentally, into water bodies should identify and describe any downstream extraction for potable use. For projects proposing air emissions, and/or those with the potential to emit odours, identify and describe nearby and other potentially affected populations. Pay particular attention to those sections of the population, such as children and the elderly who are especially sensitive to environmental health factors.

4.12.2 Potential impacts and mitigation measures

Assess the potential impacts on the community in terms of health, safety, and quality of life from project operations and emissions, including odour, dust and noise. Assess potential impacts on public health in the short and long term, and the cumulative impacts on public health either in isolation or by combination with other known existing or planned sources of contamination. The assessment should address the potential contamination not only of public water supplies but also of private water sources such as rainwater tanks with roof collection.

Assess the potential extent of contamination and public health risk should an extreme meteorological event, flood or catastrophic failure cause the release of toxic material from such infrastructure as tailings dams or chemical store. Describe strategies to notify relevant stakeholders during such an event.

Assess the project's potential for providing disease vectors. Propose measures to control mosquito and biting midge breeding, including measures to be used for any residual ponding after mining ceases, such as due to subsidence. Assess any proposed use of recycled water for its potential to cause infection by transmitting bacteria and/or viruses by contact, dispersion of aerosols, and ingestion (including via use on food crops). Similarly, the use of recycled water should be assessed for its potential to cause harm to human health via water supply or the food chain due to contaminants such as heavy metals and persistent organic chemicals.

Define and describe the objectives and practical measures for protecting or enhancing health and safety community values. Describe how nominated quantitative standards and indicators may be achieved, and how the achievement of the objectives will be monitored, audited and managed.

4.13 Economy

4.13.1 Description of potentially affected economies

Describe the existing local, regional or national economies that may be affected by the project, including:

- appropriate statistics of economic activity, such as gross regional product and aggregate regional income
- trends in relevant economic indicators
- industries and businesses that could be beneficially or adversely affected by the project, their current and historical contribution to local, regional or national economies, and their current input costs
- the economic value of existing resources that could be impacted or sterilised by the project
- local, regional and national governments' aspirations, objectives, strategies and policies for the economic and industrial sectors that may be affected
- economic viability
- historical descriptions of large-scale resource developments and their effects in the region.

The economic impact statement should include estimates of the opportunity cost of the project and the value of ecosystem services provided by natural or modified ecosystems that would be disturbed or removed during development.

4.13.2 Potential impacts and mitigation measures

Provide an assessment from national, state, regional and local perspectives of the direct and indirect economic benefits and impacts of the project. Describe the methods used, assumptions and sensitivity of the assessment.

At a level of detail appropriate to the scale of the project, the assessment will consider:

- the separate phases of the project, such as construction, operation and after ceasing operations

- the effects of this project on the local and regional economies, including goods and services supplied to, or received from, local or regional markets
- the long and short-term beneficial (such as job creation) and adverse impacts (such as increased labour costs, or competition with local small business) that are likely to result from the development
- impacts on the economic value of existing resources
- stimulus, catalytic or second-order effects
- cumulative effects of the project in relation to other economic development opportunities
- a benefit-impact table that disaggregates the benefits and impacts or costs
- the potential, if any, for direct equity investment in the project by local businesses or communities
- the cost to all levels of government of any additional regulatory function or infrastructure provision
- implications for future economic development in the locality (including constraints on surrounding land uses and existing industry)
- the potential economic impact of any major hazard identified in section 4.14
- the distributional effects of the project including proposals to mitigate any negative impact on disadvantaged groups
- the value of lost opportunities or gained opportunities for other economic activities anticipated in the future
- economic impacts on local property values.

The assessment must consider the Local Industry Policy – A Fair Go for Local Industry (Qld Gov., 2008).

Consider the impacts of the project in relation to energy self-sufficiency, security of supply and balance of payments benefits.

Define and describe the objectives and practical measures for avoiding or mitigating impacts or enhancing economic benefits. Describe how nominated quantitative standards and indicators may be achieved for economic management, and how the achievement of the objectives will be monitored, audited and managed.

4.14 Hazard and risk

Describe the potential hazards and risk to people and property that may be associated with the project as distinct from hazards and risk to the natural environment, which should be addressed in other sections of the TOR. When addressing natural hazards, particularly in regard to places where people work and live (such as a mine's accommodation camp), the EIS should consider the principles of natural hazard management in State Planning Policy 1/03 (SPP1/03), Mitigating the Adverse Impacts of Flood, Bushfire and Landslide, even if the development is exempt development under the Sustainable Planning Act 2009. SPP1/03 may not be applicable as a statutory instrument for exempt development, but it contains information that guides best practice for all development.

4.14.1 Description of values

Detail the values related to people and property that could be affected by any hazardous materials and actions associated with the project.

4.14.2 Potential impacts and mitigation measures

Describe the potential hazards and risk that may be associated with the project, including consideration of both natural and man-made hazards. The assessment of risk should be in accordance with relevant standards.

Provide an inventory for each class of substances listed in the Australian Dangerous Goods Codes to be held on-site. This information should be presented by classes and should contain:

- chemical name
- concentration in raw material chemicals
- concentration in operation storage tank
- U.N. number
- packaging group
- correct shipping name
- maximum inventory of each substance.

Details should be provided of:

- safeguards proposed on the transport, storage, use, handling and on-site movement of the materials to be stored on-site
- the capacity and standard of bunds to be provided around the storage tanks for classified dangerous goods and other goods likely to adversely impact upon the environment in the event of an accident
- the procedures to prevent spillages and the emergency plans to manage hazardous situations.

Assess the potential impacts and risks of both natural and induced emergency situations and counter disaster and rescue procedures as a result of the project on resources such as forests, water reserves, state and local government-controlled roads, places of residence and work, and recreational areas. The assessment should outline the implications for and the impact on the surrounding land uses, and should involve consultation with Department of Emergency Services, Queensland Fire and Rescue Authority, and Queensland Ambulance Service. Undertake a preliminary hazard analysis, conducted in accordance with appropriate guidelines for hazard analysis, and addressing:

- all relevant major hazards both technological and natural
- the possible frequency of potential hazards, accidents, spillages and abnormal events occurring
- indication of cumulative risk levels to surrounding land uses
- life of any identified hazards
- a list of all hazardous substances to be used, stored, processed, produced or transported
- the rate of usage
- description of processes, type of the machinery and equipment used
- potential wildlife hazards such as crocodiles, snakes and disease vectors
- public liability of the State for private infrastructure and visitors on public land.

Develop an integrated risk management plan for the whole of the life of the project including construction, operation and decommissioning phases. The integrated risk management plan should include the following components:

- operational hazard analysis
- regular hazard audits
- fire safety, emergency
- response plans
- qualitative risk assessment
- construction safety.

4.15 Cross-reference with the terms of reference

Provide a cross-reference of the findings of the relevant sections of the EIS, where the potential impacts and mitigation measures associated with the project are described, with the corresponding sections of the TOR.

5. Environmental management plan

Provide an environmental management plan (EM plan) that includes the mitigation measures detailed in section 4 of the EIS. Its purpose is to state the proponents' environmental protection commitments in a way that allows them to be measured and audited.

The EM plan is an integral part of the EIS, but will be capable of being read as a stand-alone document without reference to other parts of the EIS. For a mining project the EM plan must meet the content requirements of section 203 of the *Environmental Protection Act 1994*, whereas the EM plan for a petroleum project must meet the content requirements of section 310D of that Act.

The EM plan will be used by the administering authority to develop conditions to apply to project approvals. Therefore, the EM plan is a relevant document for project approvals, environmental authorities and permits, and may be referenced by them. The EM plan may suggest conditions that will form the basis for developing the draft environmental authority.

6. Commitments not included in the EM plan

Summarise any commitments made by the proponent that are not included in the EM plan (such as a commitments to assist a local community group). It should be clear how and when the commitments will be fulfilled.

7. References

All references consulted should be presented in the EIS in a recognised format.

8. Recommended appendices

A1. Final terms of reference for this EIS

Provide a copy of the final TOR bound with the main body of the EIS. Other appendices can be provided in separate volumes.

A2. Regulatory approvals

List the regulatory approvals required by the project.

A3. Study team

Describe the qualifications and experience of the study team, specialist sub-consultants and expert reviewers.

A4. The standard criteria

Provide a brief summary of the project's compatibility with the standard criteria as defined by the *Environmental Protection Act 1994*, which include the principles of ESD and other relevant policy instruments. With regard to the principles of ESD, as listed in the National Strategy for Ecologically Sustainable Development, published by the Australian Government in December 1992 (available from the Australian Government Publishing Service), discuss how the project conforms with each principle from inception to decommissioning.

A6. Specialist studies

Include all specialist study reports undertaken for the EIS as appendices.

A7. Research

Outline in an appendix any proposals for researching alternative environmental management strategies or for obtaining any further necessary information.

Code of environmental compliance

Mining lease projects

This code of environmental compliance (code) has been made under Schedule 3 of the Environmental Protection Regulation 2008. It contains the standard environmental conditions approved by the Minister, under section 549(2) of the Environmental Protection Act 1994, for carrying out the aspects of the environmentally relevant activity (ERA) specified in section 2 of this code.



**Queensland
Government**

- **Environmental
Protection Agency**
- **Department of
Mines and Energy**

CODE OF ENVIRONMENTAL COMPLIANCE
for
MINING LEASE PROJECTS

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1.0 INTRODUCTION

Note: The key terms and/or phrases used in this Code are *highlighted in italics* followed by an (*). They are defined in Section 4.

Low Impact Mining

Mining is authorised through mining leases granted by the Governor-in-Council under the *Mineral Resources Act 1989*. A mining lease allows the holder or any person working the lease as the holder's agent or employee to:

- mine the mineral or minerals specified in the Instrument of Lease;
- carry out activities associated with mining or promoting the activity of mining;
- enter and be within the land, and upon the surface area, comprised in the mining lease;
- do all things permitted or required under the lease by the *Mineral Resources Act 1989*; and
- utilise sand, gravel and rock occurring in or on the land comprised in the mining lease, subject to the conditions of the lease, payment of royalties and any other conditions governing the use or disposal of this material.

The regulation of environmental management of a mining lease is via an *Environmental Authority** issued under the *Environmental Protection Act 1994*. A mining project that is considered to present a low risk of causing *Serious Environmental Harm** under the *Environmental Protection Act 1994* will be assessed as a *Standard Mining Activity**. A standard mining activity is an *Environmentally Relevant Activity** under the *Environmental Protection Regulation 1998* and will therefore require an environmental authority.

This Code of Environmental Compliance has been developed for standard mining activities that include an *Opal**, *Alluvial**, *Hard Rock**, *Clay Pit**, *Shallow Pit** or *Dimension Stone** mining activity, to the satisfaction of the *Administrating Authority**, complies with all relevant criteria listed in schedule 1A of the *Environmental Protection Regulation 1998*.

About this Code

The Code of Environmental Compliance:

- provides the criteria used to determine the level of environmental management required for mining projects (see section 2);
- sets the environmental performance requirements as *Standard Environmental Conditions**, which will be the compliance requirements of an environmental authority issued for standard mining projects (see section 3);
- provides advisory notes on how to achieve compliance with the standard environmental conditions. These are not compliance requirements and are contained in the boxes associated with the relevant standard environmental condition; and
- provides definitions of terms used in this code (see section 4);
- provides references to Technical Guidelines for information on best practice environmental management (see section 5).

Additional Conditions

The holder of the environmental authority may apply for additional conditions at any time. The request must be made on the *Approved Form** and the applicant must supply enough information to allow the administering authority to decide whether or not to impose the additional condition/s.

The administering authority may set additional conditions on the environmental authority. The administering authority may only set additional conditions as long as the mining project remains a standard mining activity. In deciding whether to set an additional condition, the administering authority must comply with any relevant *Environmental Protection Policy** and consider the *Standard Criteria**.

If an application for an additional condition is granted, the additional condition will override the relevant criteria (see section 2) or standard environmental condition (see section 3) and the activity will remain a standard mining activity in accordance with section 151 of the *Environmental Protection Act 1994*.

Compliance Requirement

The compliance requirements of a standard environmental authority issued under the *Environmental Protection Act 1994* for a standard mining activity are the standard environmental conditions in this code, plus any additional conditions. Failure to comply with the standard environmental conditions, or any additional conditions, is a breach of the environmental authority and the holder is liable to various compliance enforcement actions under the *Environmental Protection Act 1994*. Refer to section 430 of the *Environmental Protection Act 1994* - 'offence to contravene condition of environmental authority'.

Note: Additional permits and/or licences for activities carried out on the mining lease may be required under other legislation (e.g. sale of gravel or sand). Seek advice from the administering authority before carrying out any additional activities.

Public Notification

Draft environmental authorities for standard mining activities will be publicly advertised as part of the application process. Any person may object to the conditions of the draft environmental authority and the objections will be heard through the Land and Resources Tribunal. The findings of the Land and Resources Tribunal will be considered by the Minister for Environment and Heritage, who may consult with the Minister for Mines and Energy in setting the final environmental conditions.

For More Information

Contact the District Manager at the Environmental Protection Agency or the Mining Registrar at the Department of Mines and Energy at the following locations.

Environmental Protection Agency

EPA Advisory Service - 1800 501087
Brisbane and Toowoomba - (07) 3224 6161
Maryborough and
Rockhampton - (07) 4936 0511
Mackay and Emerald - (07) 4982 4555
Townsville - (07) 4722 5350
Mt Isa - (07) 4744 7888
Cairns - (07) 4046 6730

Department of Mines And Energy

Brisbane (Spring Hill) - (07) 3227 1972
Quilpie – (07) 4656 1266
Emerald - (07) 4982 4011
Winton – (07) 4657 1727
Mt Isa – (07) 4747 2103
Mareeba – (07) 4092 4211
Charters Towers - (07) 4787 1266
Townsville – (07) 4760 7406
Georgetown – (07) 4062 1204
Rockhampton – (07) 4938 4440

2.0 CRITERIA FOR DETERMINING THE LEVEL OF ASSESSMENT

The following criteria found in schedule 1A of the *Environmental Protection Regulation 1998*, are used to determine the level of assessment required for an application for an environmental authority for a standard mining activity.

1. The mining activities do not or will not cause more than 10 ha of land to be *Significantly Disturbed** at any one time;
2. The mining activities do not or will not cause more than 5 ha of land to be significantly disturbed at any one time -
 - i. in a riverine area;
 - ii. because of mine workings;
3. The mining activities are not or will not be carried out in, or within 2 km of a category A *Environmentally Sensitive Area**;
4. The mining activities are not or will not be carried out in, or within 1 km of a category B environmentally sensitive area;
5. The mining activities do not include a level 1 environmentally relevant activity
6. No more than 20 persons are carrying out or will, at any one time, carry out the mining activities;
7. Only mining of a type as follows is permitted under a relevant mining lease –
 - i. Alluvial
 - ii. Clay Pit Mining
 - iii. Dimension stone mining
 - iv. Hard rock mining
 - v. Opal mining
 - vi. Shallow pit mining

If an application for an environmental authority does not meet above the assessment level criteria, it could be approved as a standard mining activity provided the environmental impact is no greater than the environmental impact of activities allowed under an environmental authority of the same type that does meet the criteria. For example, an application for a standard mining activity proposing a significant disturbance of greater than 10ha, could be granted a standard environmental authority as long as the applicant can demonstrate that the significant disturbance will have no greater environmental impact than a project that can operate within the 10ha limit.

3.0 STANDARD ENVIRONMENTAL CONDITIONS

3.1 GENERAL CONDITIONS

Plan of Operations

Condition 1

The holder of the *Environmental Authority must submit to the administering authority a *Plan of Operations** for the mining lease, at least 28 days prior to carrying out any activities on site, unless a shorter period is approved by the administering authority.**

Note 1 - For more detailed information refer to the following sections of the *Environmental Protection Act 1994*:

- (i) 233 Plan of operations required before acting under relevant mining lease;
- (ii) 234 Content requirements of a plan of operations.

Financial Assurance

Condition 2

The holder of a new environmental authority must submit the required amount of *Financial Assurance (ie. a security deposit) to the administering authority prior to carrying out any activities on the mining lease. If the holder of the environmental authority submits an application to amend the plan of operations or submits a new plan of operations, they must also submit an application to amend their financial assurance to the administering authority. If an application is lodged to transfer the environmental authority to another person or company, the proposed transferee must submit the required financial assurance prior to the transfer taking effect.**

Note 2 - A financial assurance must be calculated in accordance with Form 5 (Schedule of Rehabilitation Costs) and will be subject to a financial discount in accordance with the performance criteria in Appendix C (Schedule of Environmental Management Performance).

Note 3 - Section 364 of the *Environmental Protection Act 1994*, requires that the holder of the environmental authority gives the administering authority a financial assurance in a acceptable form (ie. either cash or a bank guarantee) and for the amount calculated in a manner decided by the administering authority. When necessary, the holder of the environmental authority must amend the financial assurance under section 366 of the *Environmental Protection Act 1994* (e.g. increasing the area of disturbance on the mining lease).

The holder of the environmental authority must lodge a single financial assurance with the Department of Mines and Energy. The financial assurance will consist of two components:

- (i) An amount to cover the potential costs of rehabilitation of areas disturbed by mining activities (ie. Environmental Protection Agency component); and
- (ii) An amount to cover the potential costs of restoring property improvements disturbed by mining activities and the failure of the tenure holder to pay rents and royalties (ie. Department of Mines and Energy component).

Land Disturbance

Condition 3

The holder of the environmental authority must ensure that the area and duration of disturbance to land and vegetation are minimised.

Note 4 - To minimise the area and duration of disturbance to land and vegetation the following measures or similar measures can be used:

- avoid disturbing large and/or mature trees;
- select specific trees to be cleared and avoid causing damage to the surrounding vegetation; and
- where practical, leave the rootstock of existing vegetation intact to promote regrowth.

Air Quality

Condition 4

The holder of the environmental authority must not cause an *Unreasonable Release of dust.**

Note 5 - To prevent the unreasonable release of dust, the following measures or similar measures can be used:

- installing pollution control equipment (e.g. fitting bag filters or a cyclone to dust generating equipment);
- altering work practices to avoid or minimise the generation of dust;
- scheduling activities for times when they will have least impact;
- spraying water on roads and tracks;
- revegetating disturbed areas as soon as practical; and
- leaving or creating wind breaks or screens.

Noise Emissions

Condition 5

The holder of the environmental authority must not cause *Unreasonable Noise at a *Noise Sensitive Place**.**

Note 6 - To prevent causing unreasonable noise at a noise sensitive place, the following measures or similar measures can be used:

- construct and maintain noise barriers and enclosures around noisy equipment or along the noise transmission path;
- implement noise reduction measures at noise sensitive places;
- provide and maintain low noise equipment;
- carry out routine maintenance on fans to minimise bearing noise;
- repair or replace defective mufflers of vehicles and plant equipment; and
- limit the hours of operation to between 7am to 6pm from Monday to Saturday.

Note 7 - If aircraft are used for mining related activities, operate them so as to minimise disturbance to livestock (e.g. helicopters).

Erosion and Sediment Control

Condition 6

The holder of the environmental authority must design, install and maintain adequate banks and/or diversion drains to minimise the potential for storm water runoff to enter areas disturbed by mining activities.

Condition 7

The holder of the environmental authority must design, install and maintain adequate erosion and sediment control structures wherever necessary to prevent or minimise erosion of disturbed areas and the sedimentation of any *Watercourse, *Waterway**, *Wetland** or *Lake**.**

Note 8 - For information on the design and construction of sediment ponds refer to the “Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland”, Part C, “Site Water Management”.

Note 9 – Regularly clean out sediment traps, ponds and drains and maintain them in effective working order, until erosion stability has been achieved in disturbed areas.

Note 10 – The capacity of sediment traps, ponds, drains and banks should not be reduced below 70% of their design capacity.

Topsoil and Overburden Management

Condition 8

The holder of the environmental authority must ensure that *Topsoil is removed and stockpiled prior to carrying out any mining activity. Prevent or minimise the mixing and erosion of topsoil and *Overburden** stockpiles.**

Note 11 – To separate topsoil and overburden and to prevent or minimise the erosion of these stockpiles the following measures or similar measures can be used:

- identify topsoil and overburden layers prior to mining;
- store topsoil and overburden in separate stockpiles install silt fences or bunding around the stockpiles
- establish and maintain a temporary cover crop on the topsoil stockpiles;
- limit the height of topsoil stockpiles to 2 m; and
- where practical reuse stockpiled topsoil within 12 months of storage.

Hazardous Contaminants

Condition 9

The holder of the environmental authority must plan and conduct activities on site to prevent any potential or actual release of a *Hazardous Contaminant.**

Note 12 - Section 442 of the *Environmental Protection Act 1994* makes it an offence to cause or allow a contaminant to be placed in a position where it could reasonably be expected to cause serious or material environmental harm or environmental nuisance.

Note 13 - Section 443 of the *Environmental Protection Act 1994* makes it an offence to release a prescribed contaminant. A prescribed contaminant is a contaminant prescribed by an Environmental Protection Policy.

Note 14 - To prevent or minimise any potential or actual release of a hazardous contaminant the following measures or similar measures can be used:

- maintain an inventory of hazardous contaminants stored on the mining lease;
- ensure that all hazardous contaminants are appropriately stored;
- confine the use of mercury to amalgamating ore concentrates in a spill-proof circuit within an impermeable bund;
- store mercury in sealed containers;
- carry out any retorting of amalgam in a vapour proof retort.

Condition 10

The holder of the environmental authority must ensure that spills of hazardous contaminants are cleaned up as quickly as practical. Do not clean up such spillage by hosing, sweeping or otherwise releasing such contaminants to any watercourse, waterway, groundwater, wetland or lake.

Note 16 - If a mining lease becomes *Significantly Disturbed** because it is contaminated, it ceases to be significantly disturbed if a *Suitability Statement** is issued for the land. Refer to section 384 of the *Environmental Protection Act 1994*.

Note 17 – A *Site Management Plan** approved under part 413 of the *Environmental Protection Act 1994*, may be required by the administering authority for sites recorded on the *Environmental Management Register** or the *Contaminated Land Register**. Such sites may include acid producing waste rock stockpiles or tailings dams containing acid producing wastes..

Condition 11

The holder of the environmental authority must, where practical, separate acid producing waste rock from the benign waste. Acid producing waste rock may be temporarily stockpiled in the catchment of the tailings dam, in a mine excavation or in an impermeable bunded area with a restricted catchment.

Condition 12

Where practical, the holder of the environmental authority must dispose of the acid producing waste rock in the tailings dam or mine excavation and backfill as soon as practical. Where not practical, bury acid producing waste rock in an excavation or pit and backfill as soon as practical. Backfill all mine excavations, other excavations and pits containing acid producing waste rock with benign, low permeability material and seal the mine excavation, other excavation or pit with a compacted capping layer at least 1m thick.

Note 18 – For detailed information on the management of acid mine waste material refer to the “Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland”, Part B, ‘Assessment and Management of Acid Drainage’ and the ‘Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland’.

Note 19 – The owner or occupier of a mining lease must notify the administering authority if they become aware that a *Notifiable Activity** listed in schedule 3 of the *Environmental Protection Act 1994*, is being carried out on the land within 30 days, by giving notice to the administering authority in the approved form. For example, a mining operation that generates waste materials that contain hazardous contaminants must notify the administering authority that this activity is being carried out. Refer to section 371 of the *Environmental Protection Act 1994*.

Nature Conservation

Condition 13

The holder of the environmental authority must prevent the spread of *Declared Plants by ensuring that all vehicles and machinery are adequately cleaned before taking the vehicles and machinery out of a *Declared Plant Area**.**

Note 20 - Section 35(a) of the *Mineral Resources Regulation 1990*, requires that every precaution must be taken to ensure there is no dispersal of Parthenium weed or the seed of any other declared plant within the meaning of the *Rural Lands Protection Act 1985*, as a result of mining or as a result of access to the area of the mining lease.

Note 21 – The Department of Natural Resources provide Pest Fact sheets for declared plants in Queensland as well as clean down procedures for motor vehicles and machinery. For advice on declared plant areas contact the Department of Mines and Energy, Department of Natural Resources or your Local Shire Council.

Condition 14

The holder of the environmental authority must not carry out activities:

- 1. in, or within 2 km of, a category A environmentally sensitive area; or**
- 2. in, or within 1 km of, a category B environmentally sensitive area.**

Prior to carrying out activities in a category C environmentally sensitive area, the holder of the environmental authority must consult with the relevant administering authority. If it is determined through consultation that additional conditions are necessary, the holder must comply with those conditions.

Note 22 – For information on environmentally sensitive areas refer to Appendix A - Environmentally Sensitive Areas.

Condition 15

The holder of the environmental authority must not carry out activities within 100m of an identified *Historical, *Archaeological** or *Ethnographic** site.**

Note 23 – With regard to cultural heritage issues, refer to the *Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987* and the *Queensland Heritage Act 1992*. Prior to carrying out any activities on the mining lease, the holder of the environmental authority should consult with the administering authority if a site has the potential to be designated as a historical, archaeological or ethnographic site.

Other Level 2 Environmentally Relevant Activities

Condition 16

The holder of the environmental authority must not carry out the following Level 2 *Environmentally Relevant Activities (ERA) on the mining lease:**

ERA (7) Chemical Storage – storage of chemicals (other than crude oil, natural gas and petroleum products) including ozone depleting substances, gases or dangerous goods under the dangerous goods code in containers with a design storage volume of more than 10m³ but less than 1000m³;

ERA (76) Incinerating Waste – operation of a waste incineration facility for incinerating:

- (a) vegetation;**
- (b) clean paper or cardboard;**

ERA (77) Battery Recycling – operation of a facility for receiving and recycling or reprocessing any kind of battery;

ERA (80) Tyre Recycling – operating a facility for receiving and commercially recycling or reprocessing tyres (other than retreading tyres).

3.2 ACTIVITY BASED CONDITIONS

Roads & Tracks

Condition 17

The holder of the environmental authority must consult with the *Landowner prior to establishing any new roads and tracks.**

Note 24 - When planning and constructing new roads and tracks refer to the Technical Guidelines.

Note 25 - Repair all damage to existing private roads and tracks resulting from mining activities, so that they are as trafficable as they were prior to any damage.

Condition 18

When constructing new roads and tracks, the holder of the environmental authority must ensure that the area and duration of disturbance to land, vegetation and watercourses is minimised.

Note 26 - When planning and constructing new roads and tracks the following measures or similar measures can be used to minimise the area and duration of disturbance to land, vegetation and watercourses:

- wherever possible use or upgrade existing roads and tracks;
- construct roads and tracks along natural grades;
- minimise the width of roads and tracks;
- minimise the number of crossings in riverine areas;
- construct crossings in riverine areas in a stable section of the bed;
- avoid constructing roads or tracks that run straight down the bank to the crossing;
- do not disadvantage other users of existing public roads & tracks;
- construct a bed level causeway, a culvert or a bridge where natural bed conditions within a watercourse will not carry the intended traffic load or where crossing of the bed will generate a significant increase in turbidity;
- minimise the number of cuts and fills in riverine areas;
- position cuts and fills in riverine areas to minimise risk of erosion from subsequent flood events;
- position crossings to prevent flow being directed towards the banks and provide erosion resistance to the bed and banks downstream of a crossing for a distance equal to the width of the normal flow channel;
- do not create any downstream or upstream drops at the lip of culverts or causeways;
- regularly clean out culverts, bridges and causeways to prevent flow being impeded or redirected; and
- construct in-stream crossings outside of main fish migration periods.

Campsites

Condition 19

The holder of the environmental authority must consult with the landowner prior to establishing any *Campsites.**

Condition 20

When establishing and maintaining a campsite, the holder of the environmental authority must ensure that the area and duration of disturbance to land, vegetation and watercourses is minimised.

Note 27- When establishing and maintaining a campsite the following measures or similar measures can be used to minimise the area and duration of disturbance to land, vegetation and watercourses:

- locate campsites at least 100 m from any riverine areas;
- only disturb an area necessary for the safe functioning of the campsite;
- install an appropriate human waste disposal facility (e.g. portable self contained toilets, pit toilets, septic tanks);
- use absorption trenches, transpiration beds or spray irrigation to dispose of grey water; and
- locate all disposal areas at least 100 m distance from any watercourse, waterway, groundwater recharge area, wetland or lake.

Note 28 – With regard to on site waste water management refer to the Environmental Protection (Water) Policy 1997.

Waste Management

Condition 21

The holder of the environmental authority must not directly or indirectly release waste from the project area to any watercourse, waterway, groundwater, wetland or lake.

Note 29 – When managing waste materials the following strategy should be adopted:

- avoid creating excess waste;
- reuse waste materials;
- recycle waste;
- create and utilise energy from waste;
- treat waste; and
- dispose of waste (e.g. provide rubbish containers on site).

Note 30 - Where practical take all *General Waste** to a *Licensed Waste Disposal Facility**.

Condition 22

The holder of an environmental authority must not dispose of more than 50 tonnes of *General Waste per year on the mining lease.**

Note 31 - Up to 50 tonnes of general waste may be buried on the mining lease per year. When burying general waste the following measures or similar measures should be used:

- locate the waste pit so as to ensure that the waste will not contaminate any watercourse, waterway, groundwater, wetland or lake;
- divert stormwater runoff from entering the pit;
- make the pit safe and protect it from scavengers;
- crush drums and other containers to reduce the volume of waste;
- backfill the pit when the level of rubbish in the pit is not less than 1m below the surface; and
- sufficiently overfill the pit to allow for settlement.

Note 32 - *Limited Regulated Waste** may be disposed of to a licensed general waste disposal facility provided the annual volume of limited regulated waste does not exceed 10% of the annual volume of general waste (e.g. tyres).

Dams

Condition 23

The holder of the environmental authority must operate, maintain and decommission all dams in accordance with the criteria outlined in Appendix B. The holder of the environmental authority must build all dams, other than dams commenced before 1 January 2001, in accordance with the design and construction criteria outlined in Appendix B.

Note 33 - Refer to Appendix B - Criteria for Dams.

Note 34 - *Referable Dams** require licensing by the Department of Natural Resources. Dams or weirs built on a watercourse require licensing by the Department of Natural Resources. Dams to be built in tidal waters require licensing by the Department of Primary Industries and the Environmental Protection Agency.

Note 35 - Provide safe access to water for livestock and native animals by:

- providing hard surfaces around water storage areas; and
- fencing off any soft areas around the edge of water storage areas.

Note 36 - Provide, install and maintain adequate warning devices to exclude people, livestock and native animals from dams containing hazardous contaminants (e.g. gas guns, signs, fences and bunds).

Mine and Process Plant

Note 37 - Provide, install and maintain adequate warning devices to exclude people, livestock and native animals from the processing plant, open mine excavations or underground workings (e.g. signs, fences or bunds).

Condition 24

The holder of the environmental authority must not directly or indirectly release waste water from the mine or process plant to any watercourse, waterway, groundwater, wetland or lake. This condition does not apply for alluvial miners operating mobile processing plants in flowing water. Alluvial miners operating mobile processing plants in flowing waters must discharge waste water into an in-stream settlement pond (refer to condition 39 for design requirements of in-stream settlement ponds).

Note 38 - To prevent the direct or indirect release of waste water from the mine or process plant to any watercourse, waterway, groundwater, wetland or lake the following measures or similar measures can be used:

- where practical recycle all waste water (e.g. use water from the mine or processing plant for drilling purposes, dust suppression along roads and tracks or in the process plant);
- discharge mine water onto benign overburden or waste rock heaps or to an evaporation pond for absorption and evaporation.

Note 39 - For more detailed information regarding site water management refer to the Environmental Protection (Water) Policy 1997.

Service, Maintenance and Storage Areas

Condition 25

The holder of the environmental authority must prevent the release fuels, oils, lubricants or other *Contaminants to any watercourse, waterway, groundwater, wetland or lake.**

Note 40 - To prevent the release of fuels, lubricants or other contaminants to any watercourse, waterway, groundwater, wetland or lake the following measures or similar measures can be used:

- maintain all refuelling equipment in good working order;
- use groundsheets or drip trays to capture spillage during maintenance of machinery and vehicles;
- locate all fuel storages within an impermeable bund;
- ensure all liquid containment, including fuel tank bunds and process water ponds, have a volume at least equal to the design volume plus an additional 10% of that volume;
- where practical, undertake all refuelling and routine maintenance of vehicles within designated service areas.

Condition 26

The holder of the environmental authority must ensure that all chemical, fuel and oil storage facilities less than 10 000L on a mining lease, must be designed and operated in accordance with Australian Standard 1940 – ‘The storage and handling of flammable and combustible liquids’, Section 2, Minor Storage.

Condition 27

The holder of the environmental authority must ensure that:

- (1) all chemical, fuel and oil storage facilities of more than 10 000 L on a mining lease, must be banded to contain at least one hundred percent of the volume of the largest container, plus twenty-five percent of the storage capacity of the largest container up to a maximum of 10, 000 L, together with ten percent of the storage capacity beyond 10, 000 L; and**
- (2) the facility must be operated and maintained in accordance with the Australian Standard 1940 – “The Storage and Handling of flammable and combustible liquids”.**

Monitoring, Reporting and Emergency Response Procedures

Condition 28

The holder of the environmental authority must record and notify the administering authority of any emergency or incident that demonstrates non-compliance to the standard environmental conditions.

Note 41 - A notification of any emergency or incident, which demonstrates non-compliance to the standard environmental conditions can not be used in evidence in any further action taken by the administering authority as a result of the notification.

Note 42 - To demonstrate ongoing compliance with the standard environmental conditions, complete Form 6, ‘Monitoring and Record Keeping Summary’. Establish programs to monitor project activities and maintain records for review by the administering authority.

Note 43 - To demonstrate compliance with the standard environmental conditions complete the ‘Emergency Response Table’ in Appendix E. Provide and maintain appropriate emergency response equipment and inform all operational personnel, contractors and visitors of emergency response procedures.

Note 44 - Observe the provisions and regulations under the *Fire and Rescue Authority Act 1990* and the *Mine Regulation Act 1985*.

Rehabilitation

Condition 29

In *Riverine Areas, the holder of the environmental authority must complete the rehabilitation processes on areas disturbed by mining activities, apart from those areas currently being utilised for mining activities, as soon as practical and prior to the onset of the following wet season.**

Note 45 - Condition 29 is to ensure that there is adequate erosion protection in riverine areas prior to the onset of the wet season. In Queensland the wet season is generally considered to be from November to April each year.

Condition 30

For all other areas, the holder of the environmental authority must complete the rehabilitation processes on areas disturbed by mining activities, apart from those areas currently being utilised for mining activities, as soon as practical and within six months of the completion of works in those areas.

Note 46 – Where practical undertake progressive rehabilitation of disturbed areas.

Condition 31

The holder of the environmental authority must backfill excavations less than 3m deep, with overburden and waste rock as soon as practical following the completion of mining activities.

Condition 32

Where it is impractical to return overburden and waste rock to excavations deeper than 3m, the holder of the environmental authority must construct overburden and waste rock stockpiles in accordance with Condition 34.

Condition 33

For excavations that are to remain at the completion of mining activities, by agreement with the land holder, and will be used as livestock water drinking supplies, the holder of the environmental authority must:

- (1) ensure that water quality in any remaining excavation complies with the acceptable water quality *Guidelines for Livestock Drinking Water** as detailed in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality; and**
- (2) provide safe access for livestock and native animals to the excavation.**

Note 47 – Prior to the surrender of a mining lease, all excavations that are to remain open after mining activities have ceased, need to be made safe (e.g. an open pit). Refer to the *Mines Regulation Act 1985* and the ‘Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland’, Part D, ‘Open Pit Rehabilitation’.

Condition 34

The holder of the environmental authority must rehabilitate areas disturbed by mining activities to a stable landform, similar to that of the surrounding undisturbed areas.

Note 48 - When rehabilitating disturbed areas refer to the 'Technical Guidelines for the Environmental Management of Mining and Exploration in Queensland', Part D, 'Geo-Technical Slope Stability'.

Condition 35

The holder of the environmental authority must spread seeds or plant species that will promote vegetation of a similar species and *Density of Cover to that of the surrounding undisturbed areas or vegetation that is appropriate for providing erosion control and stabilisation of the disturbed areas.**

Note 49 - To revegetate disturbed areas the following measures or similar measures can be used:

- for areas which have become compacted during the project, break up the soil surface to a depth that is suitable for establishing vegetation;
- spread stockpiled topsoil over disturbed areas to a depth that is suitable as a rooting medium for the revegetation process;
- provide suitable nutrient conditions for planting by using fertiliser if necessary; and
- collect and store native seeds to be used in rehabilitation.

Note 50 - When revegetating disturbed areas, the holder of the environmental authority should plant native species endemic to the area and location in the landscape (e.g. if clearing has occurred in a riverine area, revegetate the disturbed area using local riverine species).

Note 51 - Vegetation used to stabilise disturbed areas in the short term should be comprised of sterile, short-lived species (e.g. a cover crop). However, the long term aim of revegetating any disturbed area is to establish a stable vegetation community that is similar to that of the surrounding undisturbed landscape.

Note 52 - The holder of the environmental authority is not liable for rehabilitation of disturbed areas that existed prior to the grant of the tenure unless the holder undertakes activities within the previously disturbed areas during the term of the mining lease.

Note 53 - Where continuity of tenure makes the holder of the environmental authority liable for disturbances from previous operations, no further work will be necessary if the rehabilitation of the disturbed areas is to the satisfaction of the administering authority.

Note 54 - The rehabilitation of some disturbed areas may not be required if the workings have a recognised historic value. Consult with the administering authority regarding rehabilitation requirements for such sites.

Condition 36

For any *Mine Infrastructure to remain after all mining activities have ceased, the holder of the environmental authority must obtain the written agreement of the land owner stating they will take over responsibility for that infrastructure.**

Condition 37

For underground mine workings, the holder of the environmental authority must determine the need and design of bat gates by consulting the administering authority. If bat gates are required, install the appropriate structures. Where a bat gate is not required by the administering authority prevent access to underground workings.

Note 55 - Prior to the surrender of a mining lease, all underground mine workings are to be made safe. Refer to the *Mines Regulation Act 1985* and the 'Technical Guidelines for Environmental Management of Exploration and Mining in Queensland', Part D, 'Rehabilitation of Areas Containing Shafts, Boreholes or Adits'.

Condition 38

The holder of the environmental authority must complete the rehabilitation of areas disturbed by mining activities to the satisfaction of the administering authority.

Note 56 - Condition 38 is a requirement of the *Environmental Protection Act 1994*. The holder of the environmental authority must submit a *Final Rehabilitation Report** (FRR) and an *Environmental Audit Statement** (EAS), prior to the cancellation or expiry of the mining lease. The surrender of the environmental authority will not be granted until the administering authority has approved the FRR and the EAS.

3.3 CONDITIONS FOR SPECIFIC MINING TYPES

Hard Rock Mining

Note 57 - If explosives are used during the mining operation, the holder of the environmental authority must comply with the relevant Regulations, Policies and Procedures (e.g. Environmental Protection (Noise) Policy 1997, Environmental Protection (Air) Policy 1997 and any Material Safety Data Sheet (MSDS) for storing and handling explosives).

Alluvial Mining

Condition 39

When mining in a *Watercourse, the holder of the environmental authority must construct and use in-stream settlement ponds where necessary and ensure that:**

- **disturbances and/or erosion caused when constructing in-stream settlement ponds is minimised; and**
- **the in-stream settlement pond does not prevent water flow in the normal flow channel.**

Note 58 - Prior to working in riverine areas refer to the 'Technical Guidelines for Environmental Management of Exploration and Mining in Queensland', Part B, 'Exploration and Mining in Watercourses'.

Note 59 - To minimise disturbance when constructing in-stream settlement ponds, the following measures or similar measures can be used:

- do not divert the normal channel flow so as to cause erosion of the stream banks;
- do not compact the bund walls of the settlement ponds; and
- ensure the top of the bund wall is at least 300mm below the lower bank of the normal flow channel.

Condition 40

When mining in a watercourse, the holder of the environmental authority must ensure that the disturbance to the bed, *Banks and natural levees of the *Normal Flow Channel** and the *Flood Flow Channel** is minimised.**

Note 60 - To minimise the disturbance to the bed, banks and natural levees of the normal flow and flood flow channel of a watercourse the following measures or similar measures can be used:

- avoid clearing mature and/or woody vegetation;
- where practical avoid excavating directly underneath the canopy of the trees;
- avoid damaging the trunks of any remaining trees;
- do not stockpile material at the base of remaining trees; and
- provide erosion protection on exposed excavation faces to prevent flood damage to the root system (e.g. rock armouring the disturbed excavation face).

Condition 41

The holder of the environmental authority must not excavate or divert ponded water where there is evidence of biological activity.

Note 61 - Condition 41 is to provide protection for remnant aquatic life forms, particularly at end of the dry season.

Condition 42

When excavating the bed of a flowing watercourse, the holder of the environmental authority must construct a diversion channel within the bed of the watercourse to allow the stream flow to bypass the area being excavated.

Note 62- Waterholes and in-stream storages used by the landowner should not be disturbed, unless with the agreement of the landowner. The miner will need a water licence from Department of Natural Resources to interfere with the normal flow of water.

Condition 43

When mining in a watercourse within the natural levees of the normal flow channel or in areas of established woody vegetation, the holder of the environmental authority must leave an unmined section or buffer zone (e.g. a natural rock bar or an intact vegetation strip) between the mined sections and:

- ensure that the length of each mined section is no more than 40 times the width of the flood flow channel or 500m, whichever is the shorter;
- ensure that the length of each unmined section is at least 10 times the width of the flood flow channel, or 150m, whichever is the shorter;
- unmined sections which separate mined sections must not be mined until two years after rehabilitation processes have been completed on the previously mined section or when regrowth and erosion stability is established, whichever is the shorter;
- when commencing mining on a new section downstream of an unmined area, protect the cut face of the unmined area from erosion, by armouring or providing a smooth transition.

Condition 44

The holder of the environmental authority must not mine the *Banks on the *Outer Bends** of the flood flow channel of a watercourse, including the areas within:**

- 5 m from the toe of the bank or twice the height of the bank whichever is the shorter;
- 3 m from the top of the bank; and
- the top, toe and banks of a length of the straight immediately downstream of the outer bend, three times the width of the flood flow channel, or 100m, whichever is the shorter.

Note 63 – For representative diagrams that define the different land form elements that make up a water course refer to Figure 1 – ‘Cross Section Through a Watercourse’ and Figure 2 – ‘Plan View of a Watercourse’.

Condition 45

When mining in a watercourse and transporting excavated material to a fixed processing plant; the holder of the environmental authority must:

- where practical, leave rocks larger than 400mm in diameter in the watercourse; and
- return all excavated material to the watercourse from which it was mined, apart from material:
 - (i) less than 100 mm in diameter;
 - (ii) used in the construction of mine infrastructure (e.g. roads or dams); and
 - (iii) used for erosion protection.

Note 64- In addition to the rehabilitation conditions outlined in this Code, the administering authority will consider the following issues when determining the rehabilitation requirements for the *Scrub Lead** of the *Gem Miners' Common**:

- levelling, sloping or gradient treatment of the mined surface and backfilling of excavations shall not be required unless specifically directed by the administering authority;
- mine spoil heaps and waste rock stockpiles shall be eased to at least the minimum gradient required for safety;
- access roads and tracks used for mining activities may be left provided they are likely to remain safe for use by both fossickers and livestock.

Condition 46

After the completion of mining activities in the normal flow channel of a watercourse, the holder of the environmental authority must reinstate the normal flow channel in a similar location and with similar channel characteristics to that of the previous undisturbed section. Adequate erosion protection must be provided to the reinstated bed and banks, in particular to the banks on the outer bends of the normal flow channel.

Dimension Stone Mining

Condition 47

The holder of the environmental authority must prevent or minimise the release of fines from the processing plant.

Note 65 - If explosives are used during the mining operation the holder of the environmental authority must comply with the relevant Regulations, Policies and Procedures (e.g. Environmental Protection (Noise) Policy 1997, Environmental Protection (Air) Policy 1997 and any Material Safety Data Sheet (MSDS) for handling and storing explosives).

Opal Mining

Condition 48

The holder of the environmental authority should leave reshaped areas disturbed by opal mining activities in an *Uneven State, to facilitate natural revegetation through catching windblown seed and rainfall.**

Exploration Activities

Mineral exploration on mining leases is authorised by the administering authority under provisions of the *Environmental Protection Act 1994*. Exploration activities allows the holder of the environmental authority to take action to determine the existence, quality and quantity of minerals by:

- prospecting;
- using instruments, vehicles, vessels, machinery and equipment and techniques appropriate to determine the existence of any mineral;
- sampling and testing of material to determine its mineral bearing capacity or properties of mineralisation; and
- carrying out other operations the Minister approves.
- geological, geophysical and geochemical programs and other work reasonably necessary to evaluate the potential for development of any mineral occurrence that has possible economic potential;
- mining feasibility studies;
- metallurgical testing;
- environmental studies;
- marketing studies;
- engineering and design studies; and
- other activities the Minister considers appropriate.

Examples of exploration activities include drilling, excavating, sampling, establishing gridlines and conducting geophysical surveys.

The holder of the environmental authority wishing to carry out exploration activities on the mining lease must apply to the administering authority for additional conditions. The holder of the environmental authority will be required to comply with the relevant Standard Environmental Conditions as detailed in the Code of Compliance for Exploration and Mineral Development Projects. The request must be made on the *Approved Form** and the applicant must supply enough information to allow the *Administering Authority** to decide whether or not to impose the additional condition/s. The administering authority may set additional conditions on the environmental authority. The administering authority may only set additional conditions as long as the mining lease project remains a standard mining activity. In deciding whether to set an additional condition, the administering authority must comply with any relevant *Environmental Protection Policy** and consider the *Standard Criteria**.

4.0 DEFINITIONS

Administrating authority - Means -

- (a) for a matter, the administration and enforcement of which has been devolved to a local government under section 514 of the *Environmental Protection Act 1994*; or
- (b) for all other matters – the Chief Executive of the Environmental Protection Agency; or
- (c) another State Government Department, Authority, Storage Operator, Board or Trust, who's role is to administer provisions under other enacted legislation (e.g. Department of Natural Resources who licence referable dams under the Water Act 2000).

Alluvial mining - means excavating, in any way, unconsolidated or waterborne or weathered materials (whether or not it is in a watercourse) and processing it by chemical methods or gravity separation to extract minerals from the material.

Annual exceedence probability (AEP) - For a given rainfall event the AEP is the probability that the event will be exceeded within a one year period. The AEP is usually expressed as a one in 'n' (years) or a percentage.

Approved form - Means a form approved by the administrating authority.

Archaeological site - A site that has physical evidence of the past, which has the potential to increase our knowledge of earlier human occupation, activities and events.

Banks - The feature which confines major flows within a watercourse. They are steeper than a terrace and are generally of a slope greater than 1:1 on outer bends. Refer to Figure 1 – Cross Section through a Watercourse.

Bend of a watercourse - For the purposes of this Code, a bend is considered to be any change in the direction of the flood flow (ie. within the flood flow channel) in a watercourse that is greater than 30 degrees.

Bund - (a) An earth mound or similar structure (e.g. a concrete block wall), whether impervious or not, constructed to contain spilled material (e.g. petrol, diesel, oil etc) or (b) a structure to prevent or reduce soil erosion.

Campsite - The area encompassing any dwelling, amenities (e.g. toilet block, power generator), sewage or general waste disposal facility and includes the office area and vehicle parking areas associated with a temporary or permanent mining camp.

Clay pit mining - Means excavating waterborne or weathered material (whether or not it is in a watercourse) and processing it by a non-crushing method.

Contaminant - The *Environmental Protection Act 1994* defines, under Section 11, a contaminant as:

- (a) a gas, liquid or solid; or
- (b) an odour; or
- (c) an organism (whether alive or dead), including a virus; or
- (d) energy, including noise, heat, radioactivity and electromagnetic radiation; or
- (e) a combination of contaminants.

Contamination - Section 10 of the *Environmental Protection Act 1994* defines contamination of the environment as the release (whether by act or omission) of a contaminant into the environment.

Contaminated land - Schedule 3 of the *Environmental Protection Act 1994* defines contaminated land as land contaminated by a hazardous contaminant. (See below for a definition of hazardous contaminant.)

Contaminated land register - Means the register kept by the administering authority under section 541 of the *Environmental Protection Act 1994*.

Contour banks - Are mounds of earth constructed along the contours of the land to reduce the amount and velocity of run-off down the slope.

Culvert - A covered channel, or a pipe of large diameter conveying water below ground level. Also applies to a tunnel through which water is pumped or permitted to flow.

Declared plant area - Areas designated by the Department of Natural Resources or Local Government as areas infested with plants declared under section 69 of the *Rural Lands Protection Act 1985* (section 70 (3) lists the categories of declared plants).

Declared plant - A plant that has been declared under the *Rural Lands Protection Act 1985*.

Density of cover - In reference to trees and/or shrubs, it means the number of trees or shrubs in a specified area (e.g. 50 trees per square kilometre). With reference to understorey plant species (e.g. grasses and forbs), it means the percentage of surface area covered by a particular species.

Designated service area - Is a nominated site, selected and managed to minimise contamination of land or water, where the majority of services or maintenance of machinery or plant is to be conducted.

Dimension stone mining - Is the extraction of rock and the processing of this material by further cutting and shaping, mostly for use in building applications such as walls, floor tile, cladding and roofing (e.g. granite, marble, slate, sandstone and limestone).

Environment - Section 8 of the *Environmental Protection Act 1994* defines the environment as:

- (a) ecosystems and their constituent parts, including people and communities; and
- (b) all natural and physical resources; and
- (c) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and
- (d) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).

Environmental audit statement - Verifies the accuracy of the final rehabilitation report and identifies any residual financial assurance requirements.

Environmental authority - Means a licence or approval issued by the administering authority under the *Environmental Protection Act 1994*.

Environmental management register - Means the register kept by the administering authority under section 541 of the *Environmental Protection Act 1994*.

Environmental nuisance - Section 15 of the *Environmental Protection Act 1994* defines environmental nuisance as “unreasonable interference or likely interference with an environmental value” caused by:

- (a) noise, dust, odour, light; or
- (b) an unhealthy, offensive or unsightly condition because of contamination; or
- (c) another way prescribed by regulation. (e.g. unreasonable noise or dust emissions)”

Environmental protection policy - Means an environmental protection policy approved under chapter 2 of the *Environmental Protection Act 1994*.

Environmental relevant activity - Means an activity prescribed by regulation as an environmental relevant activity.

Environmentally sensitive areas - Refers to locations, however large or small, that have environmental values that contribute to maintaining biological diversity and integrity, have intrinsic or attributed scientific, historical or cultural heritage value, or are important in providing amenity, harmony or sense of community. Refer to Appendix A.

Environmental value - Section 9 of the *Environmental Protection Act 1994* defines an environmental value as:

- (a) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety; or
- (b) another quality of the environment identified and declared to be an environmental value under an Environmental Protection Policy or Regulation (e.g. water suitable for swimming in or drinking)

Ethnographic site - An archaeological site of particular importance to the study of a cultural group.

Exploration Activities - Are mining activities permitted under an environmental authority, that allows the holder to:

- (a) determine the existence, quality and quantity of minerals;
- (b) evaluate the potential for development of the mineral resource;
- (c) mining and engineering feasibility studies; and
- (d) other activities approved by the Minister

Final rehabilitation report - Means a final rehabilitation report prepared under chapter 5, part 10, division 2, subdivision 2 of the *Environmental Protection Act 1994*. The report assesses the extent to which the standard environmental conditions and any additional conditions of the environmental authority have been met.

Financial assurance - Means a security deposit, either cash or a bank guarantee, that is held by the administering authority to cover the potential:

- (a) costs to rehabilitate areas disturbed by mining activities; and
- (b) costs to restore property improvements disturbed by mining activities; and
- (c) failure of the tenure holder to pay rents and royalties.

Flood flow channel - For a representative drawing of a flood flow channel refer to Figure 1- 'Cross Section Through a Watercourse' and Figure 2 – 'Plan View of a Watercourse'.

General waste - Schedule 9 of the *Environmental Protection Regulation 1998* defines general waste as "means waste other than regulated waste". Waste rock, overburden and the contents of tailings dams are not included in the definition of general waste for the purposes of these conditions.

Hard rock mining - The extraction of ore from underground or open cut pits and the processing of this ore by crushing and or milling, and the use of gravity separation or chemical methods to extract minerals.

Hazardous contaminant - Schedule 3 of the *Environmental Protection Act 1994* defines a hazardous contaminant as "a contaminant that, if improperly treated, stored, disposed of or otherwise managed, is likely to cause serious or material environmental harm because of:

- (a) its quantity, concentration, acute or chronic toxic effects, carcinogenicity, teratogenicity, mutagenicity, corrosiveness, explosiveness, radioactivity, flammability; or
- (b) its physical, chemical or infectious characteristics. (eg: spills of mercury, cyanide, petrol, diesel or oil)".

Historical site - A site containing objects from the past that allows the study of the way people lived and worked at that place in the past.

Infrastructure - Project infrastructure includes roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, pipelines, powerlines, airstrips, helipads etc, which are constructed or installed specifically for the project.

Lake - A natural or artificial body of water, either permanent or intermittent.

Landowner - Schedule 3 of the *Environmental Protection Act 1994* defines the owner of the land as –

1. The “**owner**” of land is—

- (a) for freehold land—the person recorded in the freehold land register as the person entitled to the fee simple interest in the land; or
- (b) for land held under a lease, licence or permit under an Act—the person who holds the lease, licence or permit; or
- (c) for trust land under the *Land Act 1994*—the trustees of the land; or
- (d) for Aboriginal land under the *Aboriginal Land Act 1991*—the persons to whom the land has been transferred or granted; or
- (e) for Torres Strait Islander land under the *Torres Strait Islander Land Act 1991*—the persons to whom the land has been transferred or granted; or
- (f) for land for which there is a native title holder under the Commonwealth Native Title Act—each registered native title party in relation to the land.

2. Also, a mortgagee of land is the owner of the land if—

- (a) the mortgagee is acting as a mortgagee in possession of the land and has the exclusive management and control of the land; or
- (b) the mortgagee, or a person appointed by the mortgagee, is in possession of the land and has the exclusive management and control of the land.

Licensed general waste disposal facility - A site authorised by the administering authority to receive general waste or limited regulated waste (e.g. a rubbish dump).

Limited regulated waste - Schedule 9 of the *Environmental Protection Regulation 1998*, defines limited regulated waste. The only limited regulated wastes relevant to mining projects are asbestos and tyres.

Material environmental harm - Section 16 of the *Environmental Protection Act 1994* defines material environmental harm as:

- (1) material environmental harm is environmental harm (other than environmental nuisance)-
 - (a) that is not trivial or negligible in nature, extent or context; or
 - (b) that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount but less than the maximum amount; or
 - (c) that results in costs of more than the threshold amount but less than the maximum amount being incurred in taking appropriate action to -
 - i. prevent or minimise the harm; and
 - ii. rehabilitate or restore the environment to its condition before the harm.

In this section -

“**maximum amount**” means the threshold amount for serious environmental harm.

“**threshold amount**” means \$5 000 or, if a greater amount is prescribed by regulation, the greater amount.

Mine - Section 6A of the *Mineral Resources Act 1989*, defines mining as –

- (1) “**Mine**” means to carry on an operation with a view to, or for the purpose of -
 - (a) winning mineral from a place where it occurs; or
 - (b) extracting mineral from its natural state; or
 - (c) disposing of mineral in connection with, or waste substances resulting from, the winning or extraction.
- (2) For subsection (2), extracting includes the physical, chemical, electrical, magnetic or other way of separation of a mineral.
- (3) Extracting includes, for example, crushing, grinding, concentrating, screening, washing, jigging, tabling, electro winning, solvent extraction electro winning (SX-EW), heap leaching, flotation, fluidised bedding, carbon-in-leach (CIL) and carbon-in-pulp (CIP) processing.
- (4) However, extracting does not include -
 - (a) a process in a smelter, refinery or anywhere else by which mineral is changed to another substance; or
 - (b) testing or assaying small quantities of mineral in teaching institutions or laboratories, other than laboratories situated on a mining lease; or
 - (a) an activity, prescribed under a regulation, that is not directly associated with winning mineral from a place where it occurs.
- (5) For subsection (1)(c), includes the disposal of tailings and waste rock.
- (6) A regulation under subsection (4)(c) may prescribe an activity by reference to the quantities of minerals extracted or to any other specified circumstances.

Mine excavation - The void resulting from the removal of earth for the purpose of obtaining ore or materials (e.g. gravel for road construction) used for mining related activities.

Miner’s common - A sapphire mining area (3920 hectares) in the Emerald District, mined since the late 19th Century and set aside by the Queensland Government in September 1941 as the Miners’ Common.

Mining project - All activities permitted to be performed under mining leases (including excavation, transportation and processing of ore). A mining project may include more than one mining lease.

Native vegetation - Vegetation that occurs naturally in a certain area.

Noise sensitive place - Means any of the following places –

- (a) a dwelling;
- (b) a library, childcare centre, kindergarten, school, college, university or other educational institution;
- (c) a hospital, surgery or other medical institution;
- (d) a protected area or an area identified under a conservation plan as a critical habitat or an area of major interest, under the *Nature Conservation Act 1992*;
- (e) a marine park under the *Marine Parks Act 1982*; and
- (f) a park or garden that is open to the public (whether or not on payment of money) for use other than for sport or organised entertainment).

Normal flow channel - For a representative drawing of a normal flood flow channel of a water course refer to Figure 1– ‘Cross Section Through a Watercourse’ and Figure 2 - ‘Plan View of a Watercourse’.

Notifiable activity - Means an activity in schedule 2 of the *Environmental Protection Act 1994*.

Opal mining - Is the extraction of opal from underground or open cut pits and the processing of this ore by manual separation of opal rock or by using gravity separation methods to extract the opal.

Outer bends - For a representative drawing of an outer bend of a watercourse refer to Figure 1– “Cross Section Through a Watercourse” and Figure 2 – “Plan View of a Watercourse”.

Overburden - Material overlying a mineral ore deposit, up to but not including the topsoil.

Plan of operations - Is a planning document required under the *Environmental Protection Act 1994* for a standard mining project. The plan must be submitted to the administering authority prior to carrying out activities on the mining lease. The plan must contain an Action Program that will demonstrate how the holder of the environmental authority will meet the conditions of this Code.

Project area - The total area of the mining lease/s.

Referable dam - The *Water Resources Act 1989* defines referable dams as -

- (a) works or proposed works that include or would include a barrier whether permanent or temporary that does or could or would impound, divert or control water, which barrier-
 - (i) is more than 8 m in height and has a storage capacity of more than 500 ML;
or
 - (ii) is more than 8 m in height and has a storage capacity of more than 250 ML and a catchment area that is more than 3 times its maximum surface area or full supply level;
- (b) works -
 - (i) that consist of or include or would consist of or include a barrier whether permanent or temporary that does or could or would impound, divert or control water or hazardous waste, other than a barrier defined in paragraph (a);
 - (ii) other than a barrier whether permanent or temporary that does or could or would impound, contain, divert or control hazardous waste;

declared by the chief executive by notification published in the gazette to be a referable dam by reason of the danger to life or property that could or would eventuate upon the collapse or failure of or the escape of hazardous waste from those works; and includes the storage areas created by the works but does not include a tank constructed of steel or concrete or a combination of those materials.

The term does not include a weir, other than a weir that has a variable flow control structure on the crest of the weir.

Regulated waste - Schedule 9 of the *Environmental Protection Regulation 1998* defines regulated waste as non-domestic waste mentioned in schedule 7 (whether or not it has been treated or immobilised), and includes –

- (a) for an element - any chemical compound containing the element; and
- (b) anything that has contained the waste.

(e.g. Regulated waste commonly generated from mining projects include tyres, oils, cyanide, mercury and batteries)

Rehabilitation processes - The measures and actions taken to achieve rehabilitation outcomes, including any or all of the following:

- removing all unwanted infrastructure;
- backfilling mine excavations (e.g. pits) and capping drill holes;
- reshaping the land surface to a stable landform similar to that of surrounding undisturbed areas;
- spreading of topsoil;
- spreading seed or planting seedlings to promote revegetation;
- benching ridge cuts and removing any overhanging material.

Riverine area - Refers to the land adjoining and associated with watercourses, including the bed, banks, adjoining terraced land and riparian vegetation. Refer to Figure 1 – “Cross Section Through a Watercourse”.

Scrub lead - A Designated Fossicking Land (DFL) within the Miners’ Common. Machine mining on mining leases up to 20ha in area is permitted within Scrub Lead DFL.

Sediment pond - A bunded or excavated structure used to contain and settle waterborne sediment running off disturbed areas.

Sediment trap - A device used to filter waterborne sediment running off disturbed areas. May include silt fences, hay bales or grassed strips.

Serious environmental harm - Section 17 of the *Environmental Protection Act 1994* defines serious environmental harm as -

- (1) environmental harm (other than environmental nuisance)
 - (a) that causes actual or potential harm to environmental values that is irreversible, of a high impact or widespread; or
 - (b) that causes actual or potential harm to environmental values of an area of high conservation value or special significance; or
 - (c) that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount; or
 - (d) that results in costs of more than the threshold amount being incurred in taking appropriate action to—
 - (i) prevent or minimise the harm; and
 - (ii) rehabilitate or restore the environment to its condition before the harm.

In this section - “**Threshold amount**” means \$50 000 or, if a greater amount is prescribed by regulation, the greater amount.

Shallow pit mining - Means extracting and processing material from open cut pits no more than 5 m deep.

Significantly disturbed land - Land is significantly disturbed if –

- (a) it is contaminated land; or
- (b) it has been disturbed and human intervention is needed to rehabilitate it.

Significantly disturbed land includes:

- areas where soil has been compacted, removed, covered, exposed or stockpiled;
- areas where vegetation has been removed or destroyed to an extent where the land has been made susceptible to erosion; (vegetation & topsoil)
- areas where land use suitability or capability has been diminished;
- areas within a watercourse, waterway, wetland or lake where mining project activities occur;
- areas submerged by tailings or hazardous contaminant storage and dam walls in all cases;
- areas under temporary infrastructure. Temporary infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after mining has ceased; or
- areas where land has been contaminated.

However, the following areas are not included:

- areas off lease (e.g. roads or tracks which provide access to the mining lease);
- areas previously significantly disturbed which have achieved the rehabilitation outcomes;
- by agreement with the EPA, areas previously significantly disturbed which have not achieved the rehabilitation objectives due to circumstances beyond the control of the mine operator (such as climatic conditions);
- areas under permanent infrastructure. Permanent infrastructure includes any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be left by agreement with the landowner. The agreement to leave permanent infrastructure must be recorded in the Landowner Agreement and lodged with the EPA;
- disturbances that pre-existed the grant of the tenure unless those areas are disturbed during the term of the tenure.

Site management plan - Means a site management plan approved under chapter 7, part 8 of the *Environmental Protection Act 1994*.

Standard criteria - Are defined in schedule 3 of the *Environmental Protection Act 1994*. They are:

- (a) the principles of ecological sustainable development; and
- (b) any applicable environmental protection policy; and
- (c) any applicable Commonwealth, State or local government plans, standards, agreements or requirements; and
- (d) any applicable environmental impact study, assessment or report; and
- (e) the character, resilience and values of the receiving environment; and
- (f) all submissions made by the applicant and interested parties; and
- (g) best practice environmental management; and
- (h) financial implications; and
- (i) the public interest; and
- (j) any applicable site management plan; and
- (k) any other matter prescribed under a regulation.

Standard environmental conditions - For an environmental authority, means the standard environmental conditions approved for the authority under section 549 of the *Environmental Protection Act 1994*.

Guidelines for livestock drinking water - Recommended water quality guidelines for livestock drinking water. Refer to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 1992.

Standard mining activity - Means a mining activity decided to be a standard activity under section 151 of the *Environmental Protection Act 1994*.

Suitability statement - The *Environmental Protection Act 1994* defines a suitability statement as:
for land, means a statement about the uses and activities for which the land is suitable.

Tailings dams - A dam used to collect the solid residues resulting from mineral ore processing.

Technical guidelines - Guidelines that indicate best practice environmental management.

Topsoil - The surface layer of a soil profile, which is usually more fertile, darker in colour, better structured and supports greater biological activity than underlying layers. The surface layer may vary in depth depending on soil forming factors, including parent material, location and slope, but generally is not greater than about 300mm in depth from natural surface.

Turkey's nest dam - A dam constructed outside a watercourse, wetland or waterway by excavating a pit and constructing a wall around the pit with the excavated material. Natural surface flow is excluded from the dam.

Uneven state - In reference to ground, means ground that has not been compressed, made smooth or returned to a flat profile. The ground is left with small mounds and shallow pits of a small diameter to facilitate the catching of wind blown seed and the pooling of water after rain, to promote natural revegetation.

Unreasonable noise - Section 18 of the Environmental Protection (Noise) Policy 1997 defines unreasonable noise as - noise that

- (a) causes unlawful environmental harm; and
- (b) is unreasonable, having regard to the following matters:
 - (i) its characteristics;
 - (ii) its intrusiveness;
 - (iii) the time at which it is made;
 - (iv) where it can be heard;
 - (v) other noises ordinarily present at the place where it can be heard; and
- (c) is not declared to be reasonable in Schedule 2 of the Environmental Protection (Noise) Policy 1997 'Reasonable Noise Levels'.

Unreasonable release - of a contaminant to the air environment, means a release of odours, dust, smoke or other atmospheric contaminants, that:

- (a) cause unlawful environmental harm; and
- (b) is unreasonable having regard to the following matters:
 - (i) its characteristic;
 - (ii) its intrusiveness;
 - (iii) other releases of contaminants at the place affected by the release;
 - (iv) where the effect of the release of the contaminants can be noticed; or
 - (v) the order in which the person releasing the contaminant started to carry out the activity from which the release is made and persons affected by the release started to carry out other activities that may be affected by the release of the contaminant.

Watercourse - Means a river, creek or stream in which water flows permanently or intermittently in a visibly defined channel (natural, artificial or artificially improved) with clear bed and banks and evidence of biological dependence.

Waterway - A naturally occurring feature where surface water runoff normally collects, such as a clearly defined swale or gully, but only flows in response to a local rainfall event.

Wetland - Are areas of permanent or periodic/intermittent inundation, whether natural or artificial, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m. Wetlands typically include areas such as lakes, swamps, marshes, estuaries or mudflats.

5.0 TECHNICAL GUIDELINES

Australian Standard 1940 - The storage and handling of flammable and combustible liquids. Standards Australia (1993).

Australian Water Quality Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council (1992).

Commonwealth Best Practice Environmental Management in Mining Guidelines, Environment Australia.

Dredging, Extraction and Spoil Disposal, Fish Habitat Management Operational Policy: FHMOP 004, Department of Primary Industries (1998).

Farm Water Supplies Design Manual, Department of Primary Industries, (1992).

Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland, Department of Natural Resources (1998).

Soil Erosion and Sediment Control - Engineering Guidelines for Queensland Construction Sites, The Institution of Engineers, Australia, Queensland Division (1996).

Technical Guidelines for Environmental Management of Exploration and Mining, Department of Mines and Energy, Queensland, 1995.

The Conservation Status of Queensland's Bioregional Ecosystems, Environmental Protection Agency (1999).

6.0 RELEVANT LEGISLATION

State Legislation (published by Go Print, Queensland):

Aboriginal Lands Act 1991

Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987

Environmental Protection Act 1994

Environmental Protection Regulation 1998

Fire and Rescue Authority Act 1990

Fisheries Act 1994

Land and Resources Tribunal Act 1999

Land Act 1994

Mineral Resources Act 1989

Mineral Resources Regulation 1990

Mines Regulation Act 1985

Nature Conservation Act 1992

Queensland Heritage Act 1992

Torres Strait Islander Land Act 1991

Water Act 2000

Water Resources Act 1989

Commonwealth Legislation:

Native Title Act 1993

Environment Protection and Biodiversity Conservation Act 1999

APPENDIX A - ENVIRONMENTALLY SENSITIVE AREAS

Category A - Environmentally Sensitive Areas

LAND AREA CLASSIFICATION	ADMINISTERING LEGISLATION	ADMINISTRATING AUTHORITY
National Parks (Scientific); National Parks; National Parks (Aboriginal Land); National Parks (Torres Strait Islander Land); National Parks (Recovery); and Conservation Parks.	Nature Conservation Act 1992	Environmental Protection Agency
Wet Tropics	Wet Tropics World Heritage Protection and Management Act 1993	Wet Tropics Management Authority
Restricted Areas (includes Constructed Water Reservoirs)	Mineral Resources Act 1989	Department of Mines and Energy
Great Barrier Reef Marine Park Region	Great Barrier Reef Marine Park Act 1975 (Cwlth)	Great Barrier Reef Marine Park Authority
Marine Parks (other than general use zones)	Marine Parks Act 1982 (Qld)	Environmental Protection Agency

Category B - Environmentally Sensitive Areas

LAND AREA CLASSIFICATION	ADMINISTERING LEGISLATION	ADMINISTRATING AUTHORITY
<p>Coordinated Conservation Areas;</p> <p>Wilderness Areas;</p> <p>World Heritage Management Areas;</p> <p>International Agreement Areas;</p> <p>An area of Critical Habitat or Major Interest identified under a Conservation Plan;</p> <p>Areas subject to an Interim Conservation Order; and</p> <p>Forest Reserves</p>	<p>Nature Conservation Act 1992</p>	<p>Environmental Protection Agency</p>
<p>An area subject to following conventions:</p> <p>(a) Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 23 June 1979);</p> <p>(b) Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar, 2 February 1971); and</p> <p>(c) Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 16 November 1972)</p>	<p>International Conventions</p>	<p>Environmental Protection Agency</p>
<p>General Use Zones of a Marine Park</p>	<p>Marine Parks Act 1982</p>	<p>Environmental Protection Agency</p>
<p>An Area to the Seaward Side of the highest Astronomical Tide</p>	<p>Nil</p>	<p>Environmental Protection Agency</p>

Category B - Environmentally Sensitive Areas (continued)

LAND AREA CLASSIFICATION	ADMINISTERING LEGISLATION	ADMINISTRATING AUTHORITY
Place of Cultural Heritage Significance; Protected Areas; Registered Places; and Restricted Zones.	Queensland Heritage Act 1992 Queensland Heritage Act 1992	Environmental Protection Agency Environmental Protection Agency
Designated Landscape Area (other than the area known as the 'Stanbroke Pastoral Holding')	Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987	Environmental Protection Agency
Feature Protection Area, State Forest Park or a Scientific Area	Forestry Act 1959	Department of Natural Resources
Fish Habitat Area; and A place in which a Marine Plant is situated	Fisheries Act 1994	Department of Primary Industries
Endangered Regional Ecosystems; and An area of High Nature conservation Value	Nil	Environmental Protection Agency

Category C - Environmentally Sensitive Areas

LAND AREA CLASSIFICATION	ADMINISTERING LEGISLATION	ADMINISTRATING AUTHORITY
Nature Refuges; and Resource Reserves.	Nature Conservation Act 1992	Environmental Protection Agency
Declared Catchment areas; Declared Irrigation and Irrigation Project Areas; and Water Reservoirs and Drainage Areas.	Water Act 2000, various Water Board Acts	Department of Natural Resources and/or Relevant Storage Operator or Board
River Improvement Areas	River Improvement Trust Act 1940	Department of Natural Resources and the Relevant River Trust
Designated Landscape Area – Stanbroke	Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987	Environmental Protection Agency
Historic Mining Sites	Nil (Inter Departmental Notifications)	Environmental Protection Agency and the Department of Mines and Energy
State Forest or Timber Reserves	Forestry Act 1959	Department of Natural Resources
DPI Research Sites	Nil (Inter Departmental Agreement)	Department of Primary Industries
Critical Areas and Public Purpose Reserves	Land Act 1994	Department of Natural Resources
Areas under Coastal Management Plans and Control Districts	Coastal Protection and Management Act 1995	Environmental Protection Agency
An area subject to a State Planning Policy that the policy declares is in need of environmental protection.	Integrated Planning Act 1997	Environmental Protection Agency
Erosion Prone Areas and Coastal Management Control Districts	Beach Protection Act 1968	Environmental Protection Agency
Areas of land occupied by the Bureau of Sugar Experiment Stations to conduct research	Sugar Industry Act 1999	Department of Primary Industries

APPENDIX B - CRITERIA FOR DAMS

Dams built on mining leases are primarily used for raw water storage, recycling treatment liquors and for tailings disposal. The Department of Natural Resources has classified dams into three categories. They are:

- (1) Referable dams;
- (2) Hazardous waste dams; and
- (3) Non-referable, non-hazardous waste dams.

The following criteria are used for the assessment, design, construction, operation, maintenance and decommissioning of dams on mining leases.

ASSESSMENT CRITERIA

Referable Dams

The *Water Resources Act 1989* defines referable dams as -

- (a) works or proposed works that include or would include a barrier whether permanent or temporary that does or could or would impound, divert or control water, which barrier-
 - (i) is more than 8 m in height and has a storage capacity of more than 500 ML; or
 - (ii) is more than 8 m in height and has a storage capacity of more than 250 ML and a catchment area that is more than 3 times its maximum surface area or full supply level;
- (b) works -
 - (iii) that consist of or include or would consist of or include a barrier whether permanent or temporary that does or could or would impound, divert or control water or hazardous waste, other than a barrier defined in paragraph (a);
 - (iv) other than a barrier whether permanent or temporary that does or could or would impound, contain, divert or control hazardous waste;

declared by the chief executive by notification published in the gazette to be a referable dam by reason of the danger to life or property that could or would eventuate upon the collapse or failure of or the escape of hazardous waste from those works; and includes the storage areas created by the works but does not include a tank constructed of steel or concrete or a combination of those materials.

The term does not include a weir, other than a weir that has a variable flow control structure on the crest of the weir.

Hazardous Waste Dams

A dam is likely to be a hazardous waste dam if:

- (1) water quality impacts due to loss of the stored liquid (ie. in the event of an overflow or a failure of the structure to contain the stored liquid) may result in –
 - (a) contamination of a water supply for human consumption; or
 - (b) contamination of a stock water supply; or
 - (c) environmental damage.

The parameters used to measure water quality are:

- i. pH (less than 4 or greater than 8);
- ii. salinity (greater than 1500mg/L);
- iii. cyanide (greater than 0.1mg/L);
- iv. total arsenic (greater than 0.5mg/L); and
- v. total lead (greater than 0.1 mg/L).

Non-Referable and Non-Hazardous Materials Dams (3-8m high)

A dam is likely to be a non-referable, non-hazardous waste dam if:

- (1) water quality impacts due to loss of the stored liquid (ie. in the event of an overflow or a failure of the structure to contain the stored liquid) is unlikely to result in –
 - (a) contamination of a water supply for human consumption; or
 - (b) contamination of a stock water supply; or
 - (c) environmental damage.

The parameters used to measure water quality are:

- i. pH (between 4 and 8);
- ii. salinity (less than 1500mg/L);
- iii. cyanide (less than 0.1mg/L);
- iv. total arsenic (less than 0.5mg/L); and
- v. total lead (less than 0.1 mg/L).

- (2) loss due to dam break (ie. damage caused by the ensuing flooding and force of water) is such that:

- (a) no loss of human life (ie. there is a very low chance that any person will be living, working or visiting the area immediately downstream of the structure at the time of possible failure);
- (b) no economic loss to property and infrastructure that is owned by persons other than the miner; and
- (c) no person other than the miner is wholly dependent on the supply of water stored in the structure.

DESIGN, CONSTRUCTION, OPERATION AND MAINTENANCE CRITERIA

Referrable Dams

The Water Resources Act 1989 requires the Department of Natural Resources to licence referrable dams. All referable dams must be designed by a professional engineers. The plans and design specifications must be submitted to the Department of Natural Resources for approval.

Note: Non-referable dams greater than 8m in height must be designed by a professional engineer in accordance with the standard guidelines outlined by the Australian National Committee on Large Dams (ANCOLD). There are no minimum requirements for non-referable dams less than 3m high.

Hazardous Waste Dams

A professional engineer should design all hazardous waste dams. The dams should be designed and located to have the smallest practical catchment area. The following conditions apply to hazardous waste dams:

- (1) dams with a capacity up to 3000m³ are to be constructed as *Turkeys Nest** dams;
- (2) as far as practical minimise seepage;
- (3) the dam should be operated to maintain a minimum freeboard of 1m;
- (4) the spillway should be capable of passing the design flood, defined as the peak discharge from a critical duration storm with an annual exceedance probability of 1% (ie 1 in 100 yr event);
- (5) batters on earth embankments, shall be no steeper than those shown in the table, unless otherwise shown to be stable:

Embankment Soil Classification (Universal soil classification)	Upstream Batter	Downstream Batter
GC, SC	2.5:1	2 : 1
CL, ML	35:1	2.5:1
CH, MH	3.5:1	2.5:1
GW, GP, GM, SW, SP, SM	Not suitable	Not suitable

Note: The codes for the Universal Soil Classification (e.g. GC) are detailed in the Department of Primary Industries, “Farm Water Supplies Design Manual”, 1992.

- (6) where foundation material differs from the embankment fill material, the batters shall be chosen conservatively to be consistent with the weaker material classification;
- (7) provide adequate measures to control seepage through the dam wall and the transmission of contaminants through underlying soil layers or rock stratum;
- (8) maintain the erosion resistance of the downstream face of the dam to avoid surface scour, which may lead to failure of the wall; and
- (9) maintain the erosion resistance of the spillway to avoid scouring during the design flood.

Non-Referable, Non- Hazardous Materials Dams (3-8m high)

Non-referable, non-hazardous waste dams should be designed to a similar criteria as hazardous waste dams, but they may have permeable walls or under drains for material consolidation, recovery and recycling of process water. The following conditions apply to non-referable, non-material dams:

- (1) the spillway should be capable of passing the design flood, defined as the peak discharge from a critical duration storm with an annual exceedance probability of 1% (ie 1 in 100 yr event);
- (2) surfaces of the dam, including the spillway and areas disturbed by construction shall be stable with respect to erosion;
- (3) earth embankments to be compacted to a density of at least 95% of the standard dry density at a soil moisture content within a range of -1% to +3% of the optimum
- (4) batters on earth embankments, shall be no steeper then those shown in the table, unless otherwise shown to be stable:

Embankment Soil Classification (Universal soil classification)	Upstream Batter	Downstream Batter
GC, SC	2.5:1	2 : 1
CL, ML	3.5:1	2.5:1
CH, MH	3.5:1	2.5:1
GW, GP, GM, SW, SP, SM	Not suitable	Not suitable

Note: The codes for the Universal Soil Classification (e.g. GC) are detailed in the Department of Primary Industries, “Farm Water Supplies Design Manual”, 1992.

- (5) where foundation material differs from the embankment fill material, the batters shall be chosen conservatively to be consistent with the weaker material classification;
- (6) where necessary provide adequate measures to control seepage through the dam wall;
- (7) maintain the erosion resistance of the downstream face of the dam to avoid surface scour, which may lead to failure of the wall; and
- (8) maintain the erosion resistance of the spillway to avoid scouring during the design flood.

Decommissioning Criteria

Hazardous Waste Dams

A professional engineer should be consulted prior to developing a decommissioning plan for a hazardous waste dam. Hazardous waste dams should be decommissioned by:

- (1) removing (where possible) all remaining liquids in the dam (e.g. it is generally acceptable to evaporate the liquid);
- (2) cap the dam with an appropriate capillary break and with one metre of clay or similar impermeable material;
- (3) design, install and maintain adequate diversion drains or similar structures to protect or minimise the erosion of dam surface by stormwater runoff;
- (4) design, install and maintain adequate surface drainage to prevent water ponding and infiltration into the underlying layers;
- (5) rehabilitate the disturbed areas in accordance with the conditions outlined in the rehabilitation section of this code;
- (6) address contaminated site issues by referring to Notes 16 and 17 from this code;
- (7) establish a monitoring program to determine the success of the decommissioning plan.

Non-Referable, Non- Hazardous Material Dams (3-8m high)

If required, remove the wall and rehabilitate the disturbed area in accordance with the relevant conditions in the rehabilitation section of this code.

Access and Protection for Livestock

- (1) Provide safe access to water for livestock and native animals by:
 - (a) providing hard surfaces around water storage areas; and
 - (b) fencing off any soft areas around the edge of water storage areas.

Safety controls for Dams

- (1) Provide, install and maintain adequate warning devices, signs and fences to exclude people, stock, birds and wild animals from dams containing hazardous contaminants.

APPENDIX C - SCHEDULE OF ENVIRONMENTAL MANAGEMENT PERFORMANCE

This schedule sets out the performance categories for financial discounts for good environmental management on mining leases. To qualify for a particular performance category, the holder of the environmental authority must be able to demonstrate that they have satisfactorily met the required performance criteria. An environmental audit statement must verify the performance category of the environmental authority holder. A record of satisfactory performance can be transferred from one project to the next new project.

Note: While an Environmental Management System (EMS) based on ISO 14001 is a requirement for performance categories 1, a discount of 15% for implementing an EMS can apply at any time.

Performance Category	Security Required	Performance Criteria	Validated by
<i>Basic Operational Requirements in Place</i>			
5	100%	<ul style="list-style-type: none"> • Environmental authority issued under the <i>Environmental Protection Act 1994</i>. • Other relevant licences and/or permits have been applied for. 	Not applicable.
<i>Demonstrated ability to comply</i>			
4	90%	<ul style="list-style-type: none"> • Hold all additional licences and/or permits. • Annual rehabilitation targets have been set. • Proof of financial capability, machinery and labour. • Erosion management and monitoring system in place. 	Environmental Audit Statement
<i>Demonstrated Compliance for Two Years</i>			
3	70%	<ul style="list-style-type: none"> • Full compliance with this code for the previous two years; and • All rehabilitation targets have been met. 	Environmental Audit Statement
<i>Demonstrated Compliance for Five Years</i>			
2	40%	<ul style="list-style-type: none"> • Full compliance with this code for the previous five years; 	Environmental Audit Statement
<i>Environmental management System (EMS)</i>			
1	25%	<ul style="list-style-type: none"> • EMS based on ISO 14000 approved. • Implementation of EMS demonstrated by audit. 	Independent Environmental Audit by EPA.

Note: If the holder of the environmental authority has demonstrated non compliance with the standard environmental conditions or an acceptable EMS for the mining project, the administering authority can reassess the performance criteria and reset the performance category at any time.

APPENDIX D - PLAN OF OPERATIONS

The holder of an environmental authority must submit a Plan of Operations to the District Mining Registrar, at least 28 days before carrying out an activity on the relevant mining lease(s), unless otherwise approved by the administering authority. The plan may relate to one or more mining leases in a project and may apply for a period of up to 5 years. Activities carried out on the mining lease must be consistent with the plan and performed in the period to which the plan applies. The plan must be accompanied by an environmental audit statement, made by or for the environmental authority holder, that states the extent to which the plan complies with the conditions of the environmental authority; and the fee (if any) prescribed under a regulation. The Plan of Operations can be amended at any time. The environmental authority holder must carry out work in accordance with submitted plan of operations.

Contents of the Plan of Operations

The plan of operations for a standard mining activity consists of the following:

- (1) Project Summary (Form 1);
- (2) Site Plan (Form 2);
- (3) Action Program (Form 3);
- (4) Schedule of Disturbance and Rehabilitation (Form 4);
- (5) Schedule of Rehabilitation Costs (Form 5);
- (6) Calculation of Financial Assurance (Form 6); and
- (7) Monitoring and Record Keeping Summary (Form 7)

Site Plan

The required site plan should be drafted or sketched on a page no larger than A3. The plan must contain the following information:

- (1) mining lease boundaries;
- (2) current and future mining areas;
- (3) current and future layout of all mine infrastructure including the locations of tracks and roads, processing plant, camp, workshop, mine excavations, adits, shafts and headworks, freshwater dam, tailings dam, silt traps, overburden stockpiles, waste rock stockpiles, product stockpile(s);
- (4) general slope of the land with the location of watercourses and wetlands;
- (5) dominant vegetation types (e.g. species and density);
- (6) distance and direction to the nearest residences;
- (7) location of any known or identified cultural heritage site on the mining lease; and
- (8) for each year of the period of the plan outline the:
 - (a) proposed areas of progressive mining disturbance
 - (b) previous rehabilitation (ie. now on a Care and Maintenance program) and;
 - (c) proposed future rehabilitation

Action Program

The action program will indicate, by reference to the condition number, which standard environmental conditions will be implemented for the period to which the plan of operations applies. Where necessary it should also describe how the activities on site are going to be carried out in accordance with the standard environmental conditions that are to be implemented.

PLAN OF OPERATIONS
FORM 1 PROJECT SUMMARY

Environmental Authority No:
Project No:
Term of Plan (yrs):
Commencement date:

Project Name: Location Description: GPS location (Lat/Long of approx centre of project):	Project Controller Name and Contact Details:
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Relevant Mining Lease(s)	Expiry Dates	Tenure Holder / Applicant Name & Contact Details:	Operational Land (i.e Lot on Plan.)	Nature and extent of all activities to be carried out on the operational land

PLAN OF OPERATIONS

FORM 2 SITE PLAN

Provide detail of : (1) mining lease boundaries; (2) current and future mining areas; (3) current and future layout of all mine infrastructure; (4) general slope of the land with the location of watercourses and wetlands; (5) dominant vegetation types; (6) distance and direction to the nearest residences; (7) location of any known or identified cultural heritage site on the mining lease; and (8) for each year of the plan outline, the: (a) proposed areas of progressive mining disturbance; (b) previous rehabilitation (i.e. now on a care and maintenance program); and (c) proposed future rehabilitation.

Environmental Authority No:

Project No:

Term of Plan (yrs):

Commencement date:

PLAN OF OPERATIONS

Environmental Authority No:

Project No:

Term of Plan (yrs):

Commencement date:

FORM 4 SCHEDULE OF DISTURBANCE AND REHABILITATION

Note: Complete the table by: (a) providing actual **areas (ha)** of disturbance and rehabilitation at commencement of the plan of operations; and (b) nominating areas of disturbance and rehabilitation planned for each financial year of the plan of operations, commencing with the current financial year.

DESCRIPTION	Prior to commencement of this plan (Actual)	Year 1 ____ / ____	Year 2 ____ / ____	Year 3 ____ / ____	Year 4 ____ / ____	Year 5 ____ / ____
Mine excavation						
Borrow pit						
Overburden stockpiles						
Soil stockpiles						
Rejects stockpiles						
Tailings dams						
Water supply dams						
Roads/tracks						
Plant area						
Workshop area						
Fuel, oil & chemical storage areas						
Camp						
Contaminated land						
Other						
Rehabilitation processes complete						
First year care & maintenance completed						
2nd year care & maintenance completed						
TOTAL DISTURBANCE						
Successfully Rehabilitated						

PLAN OF OPERATIONS

FORM 5 SCHEDULE OF REHABILITATION COSTS

Environmental Authority No:

Project No:

Term of Plan (yrs):

Commencement date:

Note: Complete Table 1 using **actual third party costs** to calculate the total cost to achieve the rehabilitation objectives for the project. The actual costs can be determined by completing Table 2, 3 and 4. A complete record of quotes and calculations used to determine rehabilitation costs for each disturbance type is to be maintained on site.

TABLE 1 Schedule of Rehabilitation Costs

DESCRIPTION OF DISTURBANCE	A. WORK REQUIRED to achieve the rehabilitation objectives (ie. method/ machinery/supplies/ services/no. persons/time)	B. COST (\$/ha) (third party cost to achieve rehabilitation objectives)	C. Maximum Area Disturbed and not Rehabilitated in any year of the PoO	D. Cost to Rehabilitate the Maximum Area of Disturbance (ie. BxC) (\$)
Mine excavation				
Borrow pit				
Overburden stockpiles				
Soil stockpiles				
Rejects stockpiles				
Tailings dams				
Water supply dams				
Roads and tracks				
Plant area				
Designated Service area				
Fuel, oil & chemical storage areas				
Camp				
Contaminated land				
Rehabilitation process complete				
Care & maintenance				
Other				
			TOTAL COST	\$

TABLE 2 Machinery Hire

Machine Description	Quote Obtained From (Contact Details)	Total Cost of Hire (\$/hr)	Operator Accommodation (\$/day)	Mobilisation Costs (delivery and return)
Backhoe <i>or</i> tractor with blade				
Grader				
Excavator (capacity)				
Dozer (size)				
Front end loader (capacity)				
Tip truck (capacity)				
Other				

TABLE 3 Revegetation Techniques

Disturbance Type	Description of Technique Used	Labour costs (No. of hours and rate \$/hr)	Seeding/Plant Rate		Fertiliser Application		Total Costs to Revegetate the Disturbed Areas
			Rate (Type & Rate per ha)	Total Cost (\$/ha)	Rate (Type & Rate per ha)	Total Cost (\$/ha)	
Mine excavation							
Borrow pit							
Overburden stockpiles							
Soil stockpiles							
Rejects stockpiles							
Tailings dams							
Water supply dams							
Roads and tracks							
Plant area							
Designated Service area							
Fuel, oil & chemical storage areas							
Camp							
Contaminated land							
Other							

TABLE 4 Rehabilitation Schedule for Contaminated Land

Description of Contaminated Land	Area (ha)	Technique to be Used	Costs (\$/ha)	Total Costs to Rehabilitate the Contaminated Land

PLAN OF OPERATIONS

FORM 6 CALCULATION OF FINANCIAL ASSURANCE

Environmental Authority No: Project No: Term of Plan (yrs): Commencement date:

GROSS FINANCIAL ASSURANCE

Total cost to rehabilitate the maximum area of disturbance at any time during the term of the plan of operations: \$

NET FINANCIAL ASSURANCE

Environmental Performance Category attained (Refer to Appendix C): _____

Percentage applicable to this Performance Category (Refer to Appendix C): _____ %

FINANCIAL ASSURANCE REQUIRED (Includes GST)

(multiply the Gross Financial Assurance by the applicable percentage payment) x 1.1

\$

CERTIFICATION

We certify that the determination of this Financial Assurance is correct and that information contained in Forms 1 to 6 is accurate.

Environmental Authority signature: _____ Date: _____

Auditor's name: _____ Auditor's signature: _____ Date: _____

LODGEMENT

The Financial Assurance must be lodged with a District Mining Registrar before any work can commence on the project.

PLAN OF OPERATIONS

FORM 7 MONITORING AND RECORD KEEPING SUMMARY

Environmental Authority No:
Project No:
Term of Plan (yrs):
Commencement date:

Data and Information	Method Of Record Keeping To Be Used				Frequency
	site plans	journal	photographs	Other	
Topsoil stripping and stockpiling (e.g. record topsoil stockpiles, location and age)					
Area disturbed and rehabilitation (e.g. map of the area of disturbance and photos of rehabilitation)					
Pre and post-mine landform (e.g. record photographs of the area prior to and following mining)					
Water discharge quality (e.g. note colour of discharge water from sediment dams)					
Dam maintenance (e.g. record of dam maintenance such as sediment removal)					
Record of complaints (e.g. air, noise, tracks etc) (e.g. record in journal any complaints received by adjoining land owner, actions taken and the outcomes of the action)					
Site specific conditions (e.g. record of monitoring to demonstrate compliance with any site specific conditions)					
Remediation of contaminated land (e.g. record of current and remediated contaminated land)					
Waste Management (e.g. record of waste taken to a regulated waste collection depot)					
Rehabilitation quotes, estimates and actual costs					
Others – relevant to performance category					

APPENDIX E EMERGENCY RESPONSE TABLE

Emergency situation	Who to contact in case of emergency situation occurring	Equipment required to be kept and maintained on site	Procedure to be followed in case of emergency situation occurring
Hydrocarbon spill causing serious or material environmental harm			
Chemical spill causing serious or material environmental harm			
Other			

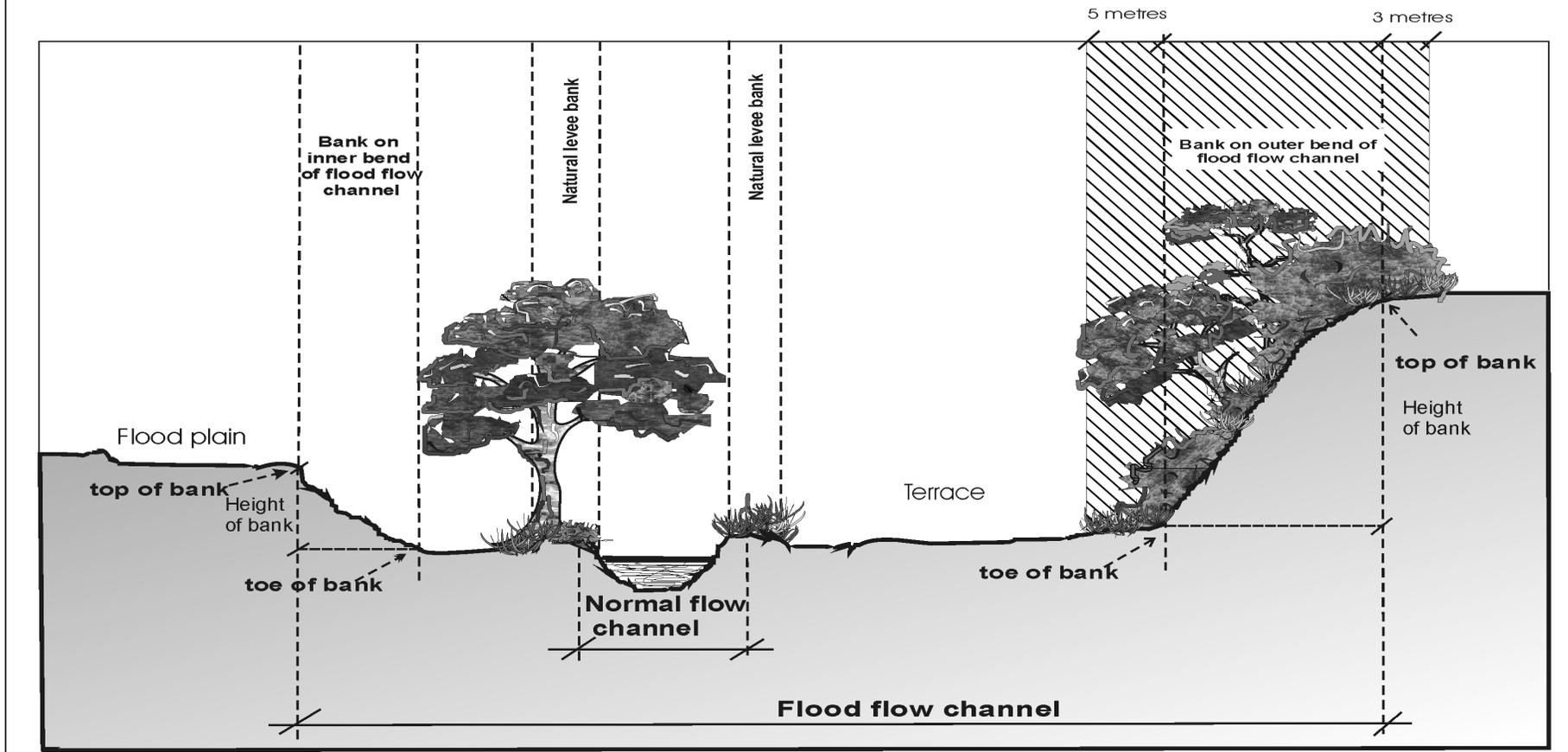
Cross section through a watercourse

Figure 1

(not to scale)

showing sections of the banks of the flood flow channel where mining is not permitted.

Mining is not permitted in the areas shown as 

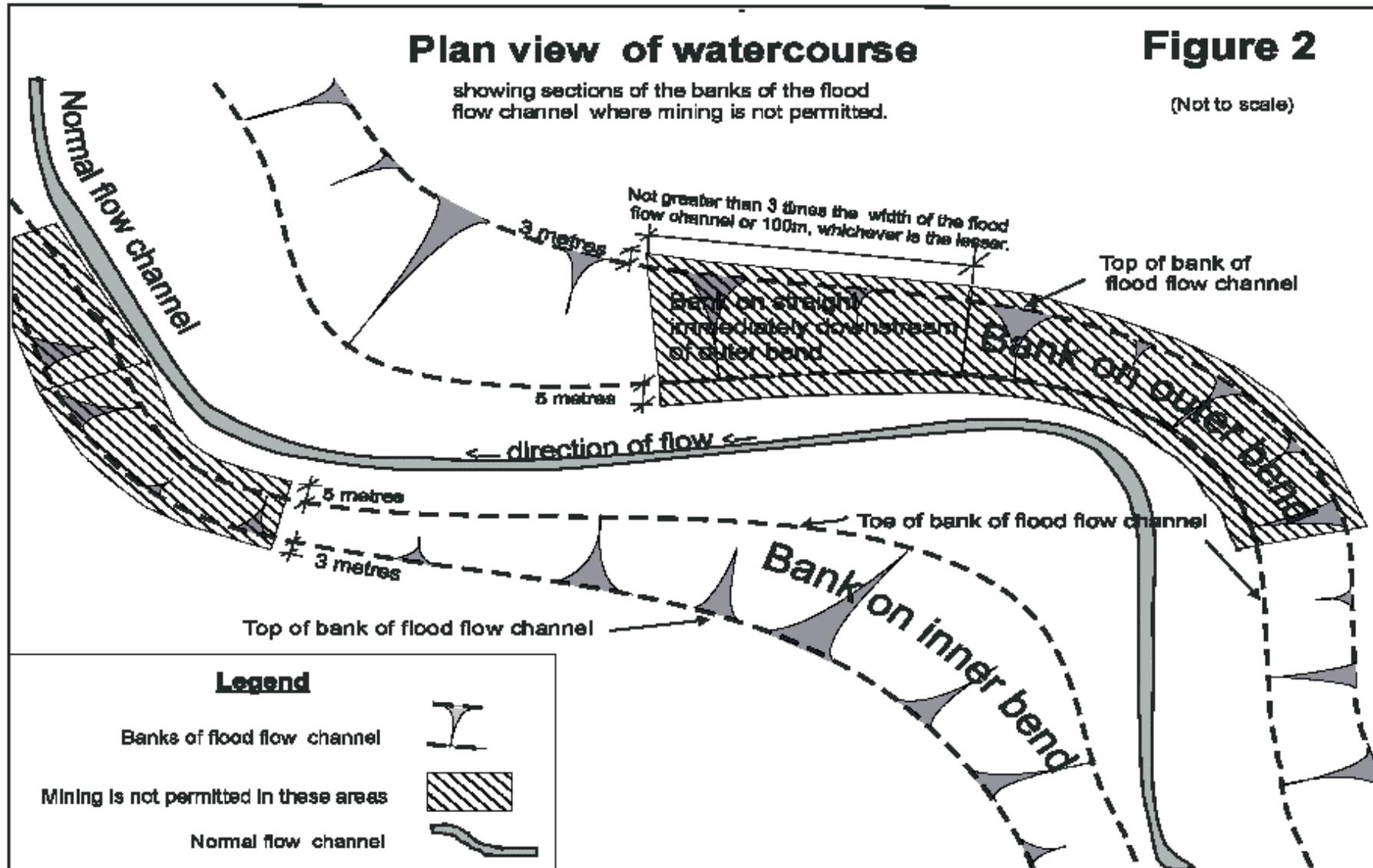


Plan view of watercourse

showing sections of the banks of the flood flow channel where mining is not permitted.

Figure 2

(Not to scale)



standard criteria means—

- (a) the principles of ecologically sustainable development as set out in the 'National Strategy for Ecologically Sustainable Development'; and
- (b) any applicable environmental protection policy; and
- (c) any applicable Commonwealth, State or local government plans, standards, agreements or requirements; and
- (d) any applicable environmental impact study, assessment or report; and
- (e) the character, resilience and values of the receiving environment; and
- (f) all submissions made by the applicant and submitters; and
- (g) the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—
 - (i) an environmental authority;
 - (ii) a transitional environmental program;
 - (iii) an environmental protection order;
 - (iv) a disposal permit;
 - (v) a development approval; and
- (h) the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and
- (i) the public interest; and
- (j) any applicable site management plan; and
- (k) any relevant integrated environmental management system or proposed integrated environmental management system; and
- (l) any other matter prescribed under a regulation.

standard environmental conditions, for an environmental authority or a chapter 4 activity, means the standard environmental conditions approved for the authority or activity under section 549.

Part 2 Regulatory requirements for all environmental management decisions

50 Application of pt 2

This part applies to the administering authority for making any environmental management decision.

51 Matters to be considered for environmental management decisions

- (1) The administering authority must, for making an environmental management decision relating to an activity, consider the following matters—
 - (a) each of the following under any relevant environmental protection policies—
 - (i) the management hierarchy;
 - (ii) environmental values;
 - (iii) quality objectives;
 - (iv) the management intent;
 - (aa) environmental values declared under this regulation;
 - (b) the characteristics of the contaminants or materials released from carrying out the activity;
 - (c) the nature and management of, including the use and availability of technology relating to, the processes being, or to be, used in carrying out the activity;
 - (d) the impact of the release of contaminants or materials from carrying out the activity on the receiving environment, including the cumulative impact of the release with other known releases of contaminants, materials or wastes;

[s 52]

- (e) the characteristics of the receiving environment and the potential impact on it from carrying out the activity;
- (f) for each affected person for the activity—the order of occupancy or use between the person carrying out the activity and the affected person;
- (g) the remaining capacity of the receiving environment to accept contaminants or wastes released from future activities while protecting environmental values;
- (h) the quantity and type of greenhouse gases released, and the measures proposed to demonstrate the release is minimised using best practice methods that include strategies for continuous improvement.

(2) In this section—

affected person, for an activity, means a person affected, or who may be affected, by the release of a contaminant or waste from carrying out the activity.

52 Conditions to be considered for environmental management decisions

- (1) The administering authority must, for making an environmental management decision relating to an activity, consider whether to impose conditions about the following matters—
- (a) implementing a system for managing risks to the environment;
 - (b) implementing measures for avoiding or minimising the release of contaminants or waste;
 - (c) ensuring an adequate distance between any sensitive receptors and the relevant site for the activity to which the decision relates;

Examples of a condition for paragraph (c)—

a condition requiring riparian buffers, noise buffers or buffers for protecting endangered regional ecosystems

- (d) limiting or reducing the size of the initial mixing zone or attenuation zone, if any, that may be affected by the release of contaminants;
- (e) treating contaminants before they are released;
- (f) restricting the type, quality, quantity, concentration or characteristics of contaminants that can be released;
- (g) the way in which contaminants may be released;

Examples of a condition for paragraph (g)—

- a condition restricting the release of a contaminant at a particular temperature, velocity or rate or during particular meteorological conditions or water flows
- a condition restricting the release of a contaminant to a depth below the level of surface waters

- (h) ensuring a minimum degree of dispersion happens when a contaminant is released;

Example of a condition for paragraph (h)—

a condition requiring the use of a diffuser for releasing a contaminant

- (i) protecting environmental values, and meeting quality objectives, under relevant environmental protection policies;
 - (j) recycling, storing, transferring or disposing of waste in a particular way;
 - (k) rehabilitating land to achieve particular outcomes;
 - (l) measures for the ongoing protection of environmental values that are, or may be, adversely affected by the activity.
- (2) In this section—

attenuation zone means the area around a release of contaminants to groundwater in which the concentration of the contaminants in the release is reduced to ambient levels through physico-chemical and microbiological processes.

[s 53]

sensitive receptor means a sensitive receptor under any relevant environmental protection policies.

53 Matters to be considered for decisions imposing monitoring conditions

- (1) The administering authority must, for making an environmental management decision relating to an activity, consider whether to impose monitoring conditions about the release of contaminants from the activity on the receiving environment.
- (2) For considering whether to impose a monitoring condition, the administering authority must consider the following matters—
 - (a) the potential impact on the receiving environment of—
 - (i) the activity to which the decision relates; and
 - (ii) the release of the contaminant;
 - (b) the characteristics of the contaminant;
 - (c) the potential for a control measure to fail and the effect of a failure of a control measure on the receiving environment;
 - (d) the protocols relevant to monitoring the release of the contaminant;
 - (e) whether the monitoring should be continuous or intermittent.
- (3) In this section—

monitoring condition, about the release of contaminants from an activity on the receiving environment, means a condition about any of the following matters—

 - (a) monitoring the quantity, quality, characteristics, timing and variability of the release;
 - (b) monitoring indicators of the effective operation of control measures;

-
- (c) monitoring the characteristics of the receiving environment;
 - (d) assessing the effectiveness of remedial or rehabilitation measures;
 - (e) monitoring the impact of the release on the values, objectives and biota in the receiving environment;
 - (f) analysing monitoring data against objectives and standards including, for example, by predictive modelling;
 - (g) reporting the results of monitoring in a stated form and timeframe;
 - (h) reporting on the time and way in which the release is made to the receiving environment.

Part 3 Additional regulatory requirements for particular environmental management decisions

54 Application of pt 3

If an environmental management decision relates to an activity mentioned in a provision in this part, the administering authority making the decision must comply with the provision in addition to part 2.

55 Release of water or waste to land

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity that involves, or may involve, the release of water or waste to land (the *relevant land*).

- (2) The administering authority must consider the following matters—
- (a) the topography, including the flooding potential of the relevant land;
 - (b) the climatic conditions affecting the relevant land;
 - (c) the available land on which the water or waste can be released;
 - (d) the storage of the water or waste in wet weather;
- Example—*
- storage of water or waste in ponds or tanks
- (e) the way in which the water or waste will be released to the relevant land;
 - (f) the need to protect soil and plants on the relevant land from damage;
 - (g) the potential for infiltration of the water or waste to groundwater;
 - (h) the potential for generation of aerosols or odours from the water or waste;
 - (i) the impact of any transfer or run-off of contaminants from the relevant land to surface waters;
 - (j) the ongoing availability of the land for the release of the water or waste.
- (3) The administering authority must also consider whether to impose conditions about each of the following matters—
- (a) developing and implementing a land release management plan for the relevant area that protects the environmental values affected, or that may be affected, by the activity;
 - (b) the way in which, or rate at which, the water or waste may be released;
 - (c) releasing the water or waste in a way that minimises infiltration to groundwater;

-
- (d) if the water or waste is to be transferred to another entity—the circumstances under which the transfer may occur;
- (e) releasing the water to a bio-retention system, including, for example, a constructed wetland, for the removal of nutrients from the water.
- (4) In this section—
- land release management plan*, for the relevant area, means a plan that achieves the following outcomes for the area—
- (a) the efficient application of water or waste using best practice methods;
- (b) control of sodicity in the soil;
- (c) minimal degradation of soil structure;
- (d) control of the build-up, from water, waste or other sources, of nutrients and contaminants in the soil and subsoil;
- (e) prevention of subterranean flows of contaminants to waters;
- (f) prevention of impact of infiltration on groundwater resources;
- (g) prevention of run-off by controlling the rate of application of water or waste, and by using structures, including, for example, tailwater dams;
- (h) prevention of surface ponding;
- (i) prevention of spraydrift or overspray from the relevant area;
- (j) prevention of damage to native vegetation;
- (k) reporting the results of monitoring, and an assessment of the impact on the groundwater in the relevant area of the release of the water or waste.

56 Release of water, other than stormwater, to surface water

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity that involves, or may involve, the release of water, other than stormwater, to surface water.
- (2) The administering authority must consider each of the following matters—
 - (a) any available toxicity data relevant to the release and the receiving environment;
 - (b) if there is an initial mixing zone—
 - (i) whether there is any practicable alternative that would reduce or eliminate the initial mixing zone; and
 - (ii) whether the size of the initial mixing zone is likely to adversely affect an environmental value or the ecological condition of the receiving environment, including, for example, a watercourse or wetland; and
 - (iii) whether concentrations of contaminants in the initial mixing zone are acutely toxic to the biota.
- (3) The administering authority must also consider whether to impose conditions about the following matters—
 - (a) releasing the water to tidal waters only during particular tidal conditions, including, for example, phases of the tide;
 - (b) releasing the water to non-tidal waters only if the rate of flow of the surface water is greater than a particular level.

57 Release of stormwater

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity

that involves, or may involve, the release of stormwater to the receiving environment.

- (2) The administering authority must consider the following matters—
 - (a) the topography of, and climatic conditions affecting, the receiving environment;
 - (b) if the activity involves exposing or disturbing soil—the soil type, its characteristics and the way it is managed;
 - (c) if the activity involves the storage of materials or wastes that are exposed to rainfall or stormwater run-off—the characteristics and containment of the material or waste;
- (3) The administering authority must also consider whether to impose conditions about the following matters—
 - (a) diverting upstream stormwater run-off away from the area contaminated or disturbed by the activity (the *affected area*);
 - (b) minimising the size of the affected area;
 - (c) covering, paving, roofing and cleaning the affected area;
 - (d) cleaning the affected area without using water;
 - (e) analysing and managing soil;
 - (f) installing and maintaining appropriate control measures;

Examples of control measures—

bio-retention system, buffers for improving waste water quality, first flush stormwater diversion systems, oil separators, rubbish traps, sediment fences, sediment traps

- (g) treating the affected area.

Examples—

mulching, revegetating, using surface covers or soil agglomerants

58 Release of water or waste to particular wetlands for treatment

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity that involves, or may involve, the release of water or waste to a referable wetland or a significant coastal wetland for treatment.
- (2) The administering authority must refuse to grant the application if the authority considers that, because of the activity—
 - (a) the wetland will be destroyed or reduced in size; or
 - (b) the biological integrity of the wetland may not be maintained.
- (3) In this section—

referable wetland means an area shown as a wetland on a document called 'Map of referable wetlands' made available by the chief executive.

Editor's note—

On the day this regulation was notified in the gazette, the document was available on the department's website.

significant coastal wetland has the same meaning as in the State coastal management plan.

State coastal management plan means the State coastal management plan prepared under the *Coastal Protection and Management Act 1995*.

Editor's note—

On the day this regulation was notified, the State coastal management plan was published on the department's website.

59 Activity involving berthing, docking or mooring a boat

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity

that involves, or may involve, berthing, docking or mooring a boat.

- (2) The administering authority must consider the following matters—
- (a) the availability of facilities for collecting and disposing of wastes generated from the boat;
 - (b) whether to impose a condition to provide facilities for collecting and disposing of wastes generated from the boat.

Examples of waste generated from a boat—

bilge waste, garbage, sewage

60 Activity involving storing or moving bulk material

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity that involves, or may involve, storing or moving bulk material.

Examples of bulk material—

alumina, cement, coal, grain, metaliferous ores, quarried materials, woodchips

- (2) The administering authority must consider each of the following matters—
- (a) the chemical and physical characteristics of the material;
 - (b) the way in which the material is, or is to be, contained during each stage of the storage or movement of the material;
 - (c) the methods of cleaning up any spillage during movement of the material;
 - (d) if storage or movement of the material is likely to result in the release of part of the material into waters, the impact of the accumulation of the material on the bed of the waters.

(3) The administering authority must also consider whether to impose conditions about the following matters—

(a) installing and maintaining appropriate control measures;

Examples—

- installing devices for collecting dust at places where bulk material is being moved
- installing dust collectors at transfer points
- enclosing, roofing or screening equipment used for storing or moving bulk material

(b) managing stockpiles of the material in a particular way;

Example—

setting a maximum height for a stockpile

(c) collecting, removing or disposing of spillage released while moving the material;

(d) monitoring the impact of releases of contaminants or waste from storing or moving bulk materials on the receiving environment including, for example, the impact of environmental nuisance and impacts on the biota of adjacent waters.

61 Activity involving acid sulfate soil

(1) This section applies to the administering authority for making an environmental management decision relating to an activity that involves, or may involve, disturbance of acid sulfate soil.

(2) The administering authority must consider—

(a) 'State Planning Policy 2/02—Planning and Managing Development Involving Acid Sulfate Soils' (*SPP 2/02*); and

(b) the guideline for *SPP 2/02* (the *guideline*).

Note—

The guideline states that it may be used as a source of general advice on investigation and management of acid sulfate soils for situations outside the scope of *SPP 2/02*.

Editor's note—

On the day this regulation was notified, SPP 2/02 and the guideline were available on the website of the Department of Infrastructure and Planning at <www.dip.qld.gov.au>.

- (3) The administering authority must also consider whether to impose conditions about the following matters—
- (a) minimising the generation of contaminated water;
 - (b) treating acid sulfate soils;
 - (c) treating or disposing of leachate and run-off;
 - (d) managing the fluctuations in the watertable;
 - (e) maintaining minimum levels of cover over any buried acid sulfate soils.
- (4) In this section—

acid sulfate soil means actual acid sulfate soil or potential acid sulfate soil.

actual acid sulfate soil means soil or sediment containing highly acidic soil horizons or layers affected by the oxidation of iron sulfides.

disturbance, of acid sulfate soil, means disturbance of the soil by—

- (a) excavating or removing the soil; or
- (b) exposing the soil to air; or
- (c) changing the level of groundwater.

potential acid sulfate soil means soil or sediment containing iron sulfides or other sulfidic material that has not been exposed to air and oxidised.

62 Activity involving acid-producing rock

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity

that involves, or may involve, disturbance of acid-producing rock.

Example of an activity involving disturbance of acid-producing rock—

tailings from processing acid-producing rock in a mining operation

- (2) The administering authority must consider the following matters—
 - (a) the physical and chemical characteristics of the rock;
 - (b) the potential of the rock to generate or neutralise acidity;
 - (c) the characteristics of the leachate leaching from, or potentially leaching from, the rock including, in particular, contaminants in the leachate that are likely to cause environmental harm if released to the environment.
- (3) The administering authority must also consider whether to impose conditions about the following matters—
 - (a) the ways in which waste may be disposed of or stored, including for example, the location of areas for waste disposal or storage;
 - (b) minimising the ingress of oxygen or water to areas used, or to be used, for waste disposal or storage;
 - (c) inhibiting the generation of acidity from waste rock, including for example, through using particular treatments;
 - (d) processes for collecting, storing and treating any generated leachate;
 - (e) monitoring of the waste disposal and storage areas including, for example, the water balance and oxygen levels;
 - (f) monitoring the potential seepage zone for indications of the formation of acid rock drainage.

- (4) In this section—

acid-producing rock means rock containing sulfidic minerals that have the potential to oxidise and generate acidity.

disturbance, of acid-generating rock, means disturbance of the rock by—

- (a) excavating or removing the rock; or
- (b) exposing the rock to air; or
- (c) changing the level of groundwater.

63 Activity involving direct release of waste to groundwater

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity that involves, or may involve, the release of waste directly to groundwater (the *receiving groundwater*).

Example of direct release of waste to groundwater—

an activity involving the release of contaminated water to groundwater through a well, deep-well injection or a bore

- (2) The administering authority must refuse to grant the application if the authority considers—
- (a) for an application other than an application relating to an environmental authority for a petroleum activity—the waste is not being, or may not be, released entirely within a confined aquifer; or
 - (b) the release of the waste is affecting adversely, or may affect adversely, a surface ecological system; or
 - (c) the waste is likely to result in a deterioration in the environmental values of the receiving groundwater.

- (3) In this section—

confined aquifer means an aquifer that is contained entirely within impermeable strata.

64 Activity involving indirect release of contaminants to groundwater

- (1) This section applies to the administering authority for making an environmental management decision relating to an activity that involves, or may involve, the release of contaminants indirectly to groundwater (the *receiving groundwater*).

Example of indirect release of waste to groundwater—

storage of contaminated water in a pond allowing infiltration of contaminated water to groundwater

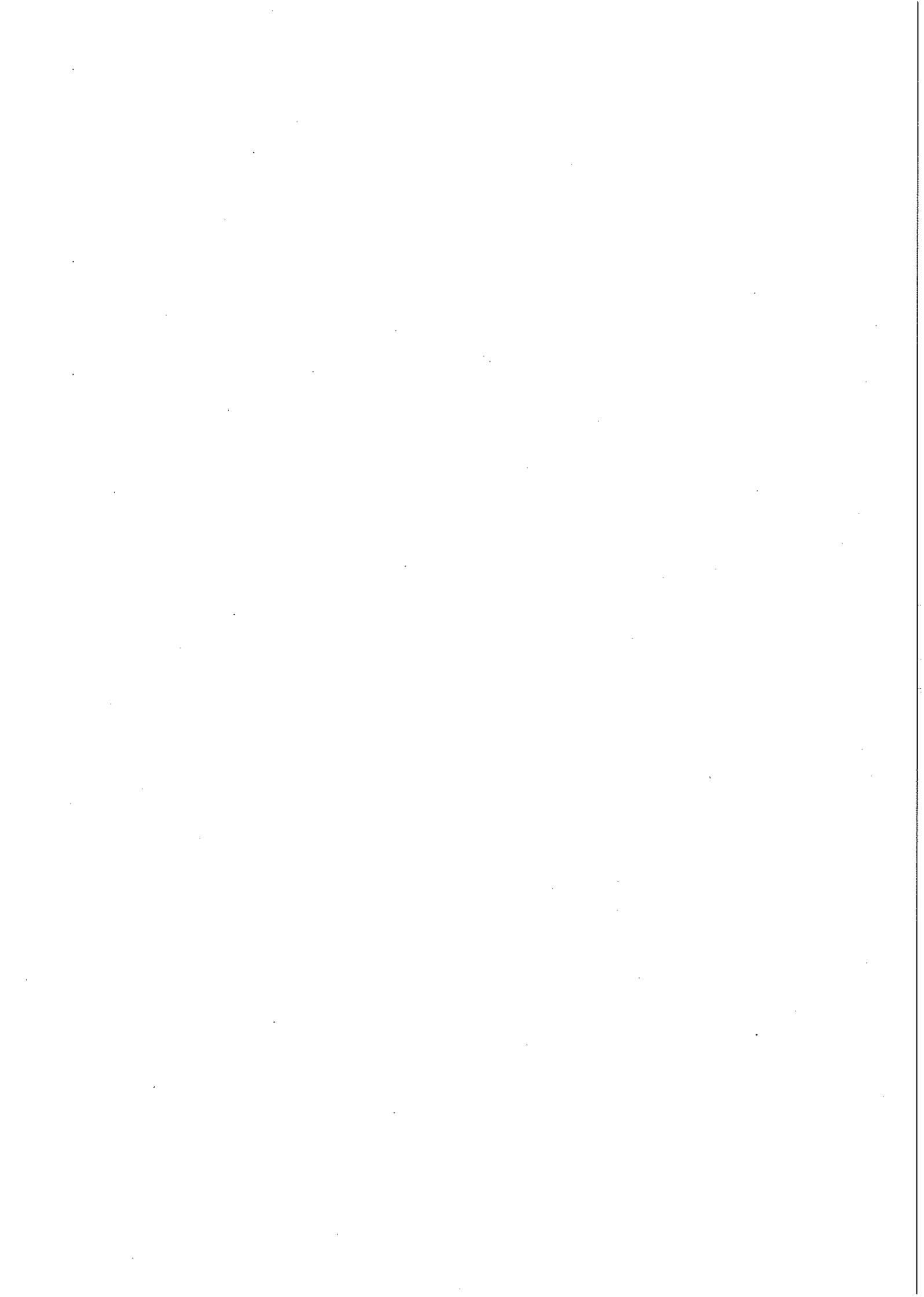
- (2) The administering authority must consider the following matters—
- (a) the geological stability of the relevant site for the activity;
 - (b) the location, quality and use, or potential use, of the receiving groundwater;
 - (c) the permeability of the earth under the place where the activity is carried out;
 - (d) the presence of containment devices at the relevant site for the activity and their effectiveness in preventing or minimising the release of the waste;

Example of a containment device—

a liner for a storage pond

- (e) the distance separating the receiving groundwater from any containment device;
- (f) the potential for fluctuations in the level of the receiving groundwater;
- (g) the way in which materials, including contaminants, will be removed from the containment system;
- (h) whether or not materials, including contaminants, will be removed from the containment devices and if so, the effectiveness of the methods that will be used for the removal.

- (3) The administering authority must also consider whether to impose conditions about the following matters—
- (a) the design, construction, function, protection and maintenance of containment devices;
 - (b) maintaining a particular distance between the receiving groundwater and the point of contact between each containment device and the underlying earth;
 - (c) removing materials from the containment devices.



Compliance Strategy 2010–14

June 2010



Photograph taken by: Barry Spooner, QPWS Ranger based at Springsure. Photograph title: Compliance—the result, peace and tranquility.

Vision

A green, strong and sustainable Queensland.

Role

The Department of Environment and Resource Management (DERM) conserves, protects and manages the state's environment and natural resources for the benefit of all Queenslanders. DERM's key areas of responsibility are:

- delivering services to our clients
- meeting the challenge of climate change
- protecting and enhancing the state's natural environment and cultural heritage
- securing water for Queensland's future
- managing Queensland's land responsibly.

Objectives

DERM's vision will be achieved through the realisation of the objectives set out in the Strategic Plan 2010–14, which are:

- client needs are understood and met
- Queensland is prepared for climate change
- ecosystems are healthy, protected and bio-diverse
- natural resources are well managed
- Indigenous land access and ownership is improved and Queensland's cultural heritage is conserved
- decisions are evidence based.

Compliance strategy

DERM is committed to proactively managing and monitoring risks to Queensland's environment and natural resources through the implementation of a compliance strategy founded on a targeted and transparent approach to compliance, supported by a modern and strong enforcement capability.

Approach to compliance

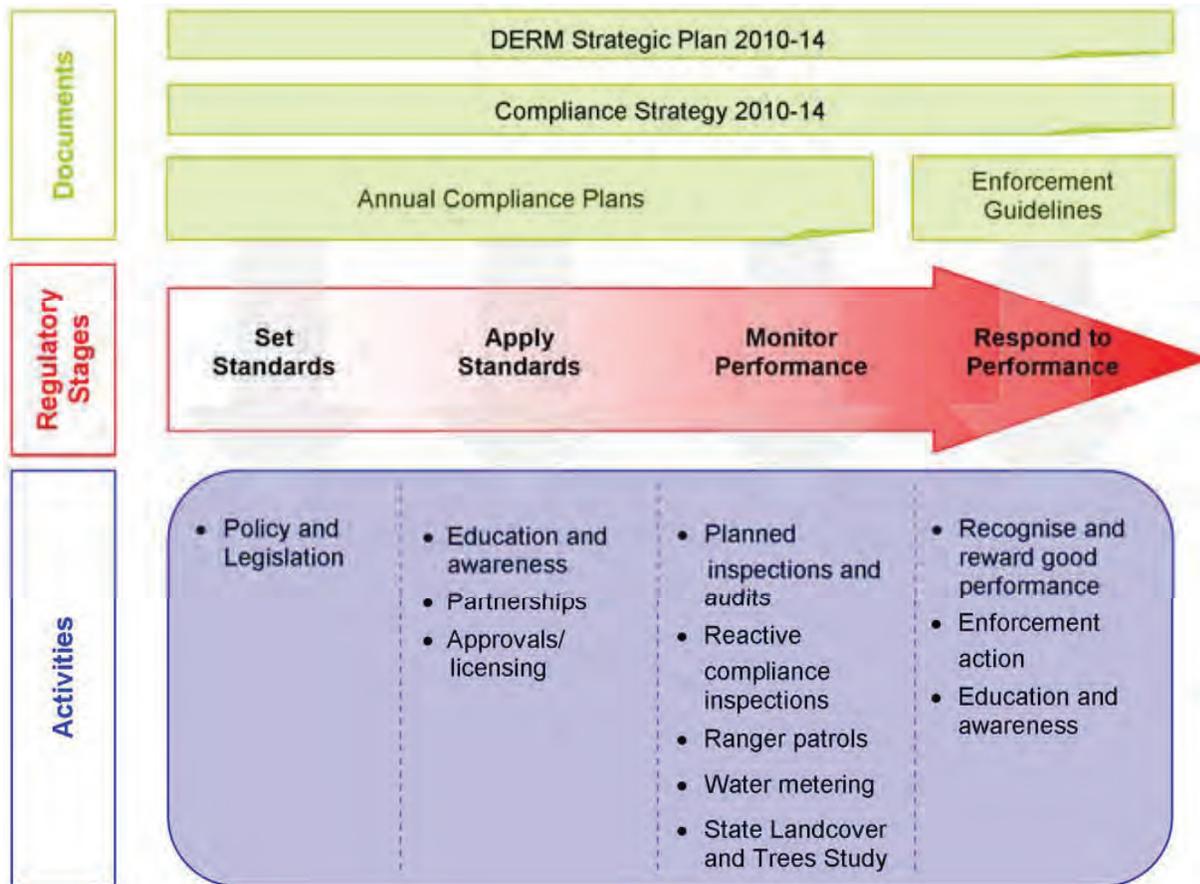
DERM will:

- ensure that our clients understand Queensland's environmental and natural resource management obligations
- encourage voluntary compliance with those obligations
- work with government, business, industry and the community to improve performance
- monitor compliance with Queensland's environmental and natural resource management laws
- take consistent and proportionate responses to non-compliance in accordance with the Enforcement Guideline to achieve environmental and natural resource outcomes and deter further non-compliance.

For more information about DERM's compliance program or for copies of the annual compliance plans or Enforcement Guideline, visit <www.derm.qld.gov.au>.

Agency objective	Strategies	Implementation actions
Natural resources are well managed	Develop a compliance strategy and enforcement program to proactively manage and monitor Queensland's environment and natural resources.	<p>Tell clients and the broader community about DERM's approach to compliance.</p> <p>Tell clients and the broader community about DERM's compliance focus areas through the publication of annual compliance plans.</p> <p>Educate and raise the awareness of clients about their obligations under the legislation that DERM administers.</p> <p>Give staff the skills, knowledge and support needed to undertake monitoring activities and enforcement action.</p> <p>Take enforcement responses that are consistent and proportionate to identified non-compliance.</p> <p>Maintain DERM's investigation and litigation capability so that the department can respond to serious incidents and breaches of legislation.</p> <p>Assess the effectiveness of the compliance program and use the information to continually improve it.</p>
	Work collaboratively with Government, business, industry and community groups to improve industry environmental performance and encourage sustainable behaviours.	<p>Undertake compliance projects and activities that are directed primarily to giving clients the opportunity to improve performance and levels of compliance with their obligations; supported by a commitment to take enforcement action should they choose not to meet their obligations.</p> <p>Develop a framework to recognise and reward good performance.</p>
Decisions are evidence based	Ensure processes to develop policy advice, legislation, statutory plans and management decisions include the analysis of comprehensive, accurate and contemporary science and information.	<p>Enhance DERM's compliance planning processes, with an emphasis on science and information, to ensure that compliance projects and activities address the most significant risks to the environment and natural resources.</p> <p>Enhance DERM's understanding of what motivates clients to comply with their obligations so that the department can more effectively design its compliance plans, projects and activities can be more effectively designed.</p>
Client needs are understood and met	Ensure clear and concise regulatory guidelines and procedures are readily accessible for business and industry.	<p>Progressively make available new guidance material detailing how clients can comply with their environmental and natural resource obligations.</p> <p>Publish compliance alerts that identify common non-compliance issues and identify ways to avoid those specific problems.</p>

Our compliance framework



Our legislation

We administer approximately 60 Acts and associated regulations and statutory instruments. The Acts that are the focus of our compliance program are listed below:

- *Aboriginal Cultural Heritage Act 2003*
- *Coastal Protection and Management Act 1995*
- *Environmental Protection Act 1994*
- *Forestry Act 1959*
- *Land Act 1994*
- *Land Protection (Pest and Stock Route Management) Act 2002*
- *Marine Parks Act 2004*
- *Nature Conservation Act 1992*
- *Queensland Heritage Act 1992*
- *Recreation Areas Management Act 2006*
- *Sustainable Planning Act 2009*
- *Torres Strait Islander Cultural Heritage Act 2003*
- *Vegetation Management Act 1999*
- *Water Act 2000*
- *Water Supply (Safety and Reliability) Act 2008*

For a full list of the legislation administered by DERM, visit <www.derm.qld.gov.au>.

Enforcement Guidelines

#29493

Prepared by:

Litigation Unit

Department of Environment and Resource Management

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Overview

Queensland's economic, social and ecological welfare is reliant upon the sustainable management of its environment and use of natural resources.

The Queensland Government is committed to ecologically sustainable development—protecting the ecological processes on which life depends, while allowing for development that improves the total quality of life, both now and in the future.

In seeking to meet the challenge of protecting Queensland's natural assets, legislation has been introduced to ensure sustainable environmental and natural resource management. The Department of Environment and Resource Management (DERM) is the government's lead agency for the administration of this environmental and natural resource legislation. DERM has produced a solid policy platform on which it has built partnerships with the community and industry to encourage greater understanding of the sustainable environmental and natural resource management practices and support for innovation.

Notwithstanding the co-operative approach taken by DERM, it is sometimes in the public interest for DERM to take enforcement action. The effective management and use of natural resources requires DERM to have a clear guideline for the selection of matters for enforcement.

DERM has an established litigation unit, which works in conjunction with specialist investigation teams, to provide a strong and consistent enforcement response to non-compliance.

To the extent possible in the circumstances, it is the goal of DERM's enforcement responses to:

- reinforce the legal obligations required under environmental and natural resource legislation
- achieve good environmental and natural resource outcomes
- deter non-compliant behaviour from others within the general public.

This enforcement guideline aims to foster a corporate and community culture of positive action, consultation and co-operation with DERM. They are general in nature to provide a broad understanding of how DERM will approach enforcement.

1. Introduction

DERM is the lead agency responsible for administering the legislation for the protection of the environment and management of natural resources. The legislation that is commonly the focus of enforcement action by DERM includes:

- *Aboriginal Cultural Heritage Act 2003*
- *Coastal Protection and Management Act 1995*
- *Environmental Protection Act 1994*
- *Forestry Act 1959*
- *Sustainable Planning Act 2009 (with respect to those parts relevant to DERM business)*
- *Land Act 1994*
- *Marine Parks Act 2004*
- *Nature Conservation Act 1992*
- *Place Names Act 1994*
- *Queensland Heritage Act 1992*
- *Recreational Areas Management Act 2006*
- *Survey and Mapping Infrastructure Act 2003*
- *Torres Strait Islander Cultural Heritage Act 2003*
- *Vegetation Management Act 1999*
- *Water Act 2000*
- *Wet Tropics World Heritage Protection and Management Act 1993.*

DERM has focused its attention on compliance and is working with the community and industry to achieve good environmental performance and natural resource management through provision of advice, technical assistance and support of innovation. However, in appropriate cases, DERM will pursue enforcement action against those who ignore their legal obligations with respect to their environmental and natural resource responsibilities.

This guideline explains how DERM determines the enforcement action it will take in any given situation. As far as possible, it provides guidance on what behaviour will result in prosecution or other enforcement action. More specific guidance can be obtained by reference to other guidelines addressing specific pieces of legislation. This guideline has been published to ensure that DERM's enforcement responses are:

- proportionate to the conduct
- consistent with past responses for similar conduct
- occur in a timely fashion.

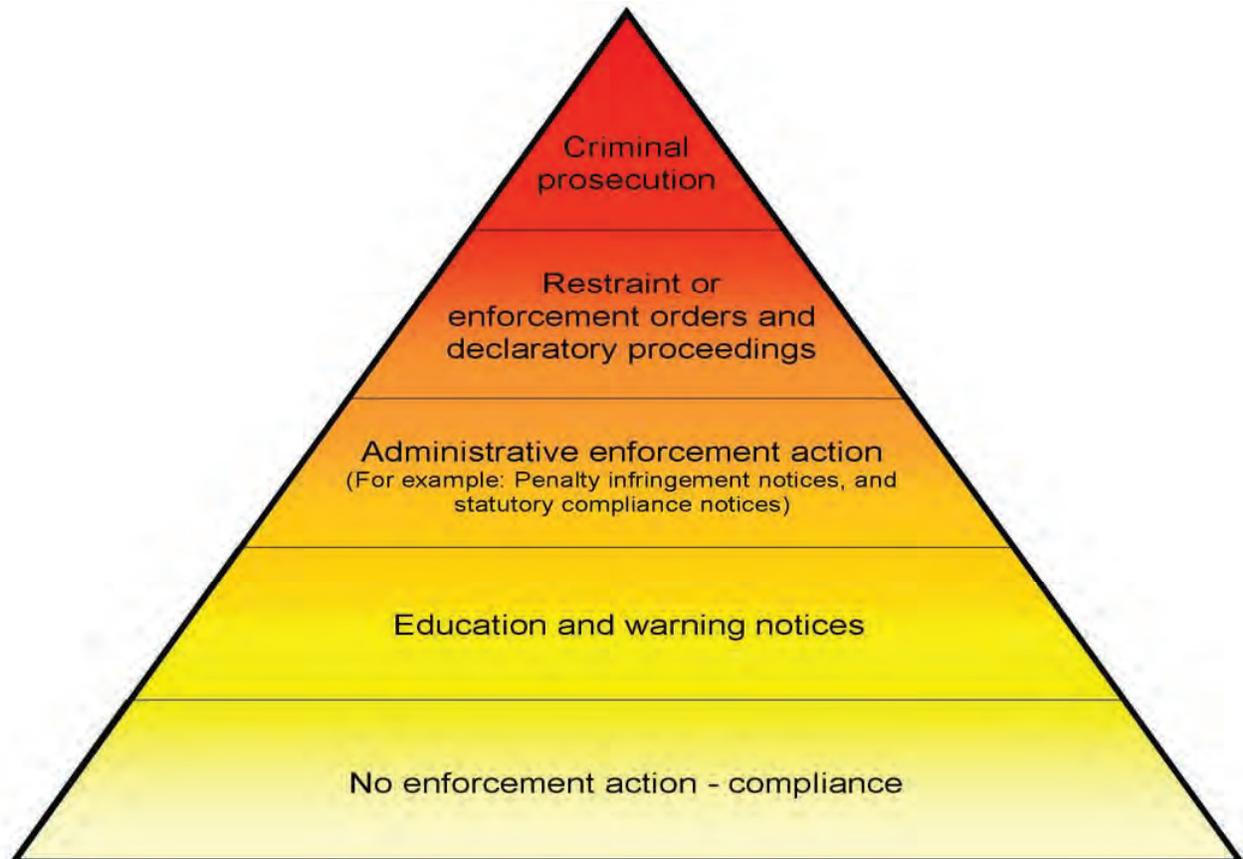
2. Enforcement approach

DERM takes a comprehensive approach to environmental and natural resource regulation. Enforcement is one of the measures used by DERM to achieve the objectives of the legislation it administers. It is not the only tool and will be used with restraint. If an alternative to enforcement action will be more effective in achieving the objectives of the Act being administered, then that alternative will be considered. Sometimes a number of enforcement measures are used in combination. In order to determine whether enforcement action will be taken, DERM will investigate all significant breaches of the law and then exercise its discretion in a consistent and logical fashion.

DERM has a wide range of enforcement measures available to it. Each piece of legislation has its own suite of enforcement measures, but generally they consist of the following:

- encouraging voluntary compliance through education and self regulation
- strategic compliance audits and site impact programs
- working with other agencies
- verbal warnings and warning letters
- infringement notices
- administrative and court orders to stop an activity or to take action to remedy a breach or both
- cancellation, suspension or amendment of licence, lease or other permits
- prosecution.

Rather than focusing on one particular enforcement response, this guideline provides general principles that can be applied to assist in choosing the appropriate enforcement tool in any given situation. The enforcement pyramid below (adapted from the model made famous by Ayers and Braithwaite) demonstrates the path of escalation in the enforcement response that has been adopted by DERM.



From this pyramid, it is clear that prosecution may occur where alternative enforcement measures have not been successful. Consideration needs to be given to whether money is better spent on preventing a problem or remediating the impacts of an unlawful activity rather than undertaking costly prosecution actions. In some cases, DERM may decide to negotiate a prompt and satisfactory environmental or natural resource outcome. However, negotiation does not necessarily suspend investigation. Where DERM is satisfied that negotiation is not leading to a satisfactory and prompt outcome, higher level enforcement tools may be the preferred course of action.

If the impact of the conduct is of a minor or trivial nature, enforcement action from lower down the pyramid is more likely. Higher level enforcement action, such as prosecution, may be the preferred option for unlawful conduct:

- involving dishonesty
- involving an attempt to deceive DERM or the provision of false information to it
- involving intentional, negligent or reckless behaviour
- where that unlawful conduct was motivated wholly or partly by commercial considerations
- where there has been a failure to assess, manage or mitigate risk associated with commercial and industrial activities
- resulting in clear commercial gain
- resulting in severe or irreversible harm to the environment or natural resources
- if the impact is unacceptable or dangerous.

Ultimately, DERM has the discretion to determine the appropriate response to unlawful conduct under the legislation administered by it.

2.1 Public interest considerations

DERM may take into account the following public interest considerations when deciding on an appropriate enforcement response:

- the seriousness, the triviality, or 'technical nature' of the offence
- the harm or potential harm to the environment caused by the offence
- any mitigating or aggravating circumstances
- the degree of culpability of the alleged offender
- the availability and effectiveness of any alternatives to enforcement action
- whether the offender has been dealt with previously without enforcement action and, if so, what level of enforcement action
- whether the breach is a continuing or second offence
- whether the offence is ongoing
- whether the administrative action or court orders are necessary to prevent a recurrence of the offence
- the prevalence of the alleged offence and the need for deterrence of the offence
- the length of time since the alleged offence occurred
- the age and physical or mental health of the offenders
- whether there are counter-productive features of the proposed enforcement tools
- in cases involving Aboriginal and Torres Strait Island cultural heritage issues, the views of the traditional owners of the area or object.

The following are further factors that should be considered specifically in the case of considering prosecution:

- the length and expense of any court hearing
- the likely outcome in the event of a conviction having regard to the sentencing options available to the court
- any precedent which may be set by not instituting proceedings
- whether the consequences of a conviction would be unduly harsh or oppressive

- whether proceedings are to be instituted against others arising out of the same incident
- the sentencing principles set out in the *Penalties and Sentences Act 1992*.

DERM adopts the overriding principle that enforcement tools must not be instituted (or not instituted) for improper purposes. A decision whether or not to use an enforcement tool will not be influenced by:

- any elements of discrimination against the person, such as ethnicity, nationality, political associations, religion, sex or beliefs
- personal feelings towards the offender or, alternatively, the victim
- possible political advantage or disadvantage to a government or any political group or party
- the possible effect of the decision on the personal or professional circumstance of those responsible for the enforcement response decision.

2.2 Determining who is liable for prosecution or other enforcement action

2.2.1 General principles

Some general considerations in determining who is liable to prosecution or other enforcement action are:

- who was primarily responsible for the offence—that is, who committed the act, who formed the intention (if relevant) and who created the material circumstances leading to the breach
- where a person is liable because the law creates strict liability—what was the role of the potential recipient
- the likely effectiveness of the enforcement tool against the potential recipient.

2.2.2 Corporate liability

The law normally makes legal entities and individuals liable for breaches committed by employees, agents or officers in the course of their employment. Where evidence available to DERM indicates an offence was committed with the employer's knowledge, or the employer failed to take adequate steps to avoid the harm, the employer may be the subject of an enforcement response. DERM will also consider the existence and effective implementation of management programs aimed at ensuring the compliance of the corporation to Queensland's environmental and natural resource laws. This is considered in greater detail in the next section.

2.2.3 Liability of employees

Employees cannot use as a defence the fact that they were acting under direction from a supervisor. Acting under orders might, however, be a mitigating factor in determining the appropriate enforcement response. The guiding principle in deciding whether to pursue an employee is the degree of culpability or responsibility involved. Factors to be considered in assessing the degree of culpability include:

- whether the employee knew or should have known that the activity was probably illegal or inappropriate
- whether the employee feared the loss of livelihood if they did not breach, or continue acting in breach, of the legislation
- the seniority of the employee and the scope of the employee's employment duties
- whether, having regard to the employee's seniority and employment duties, the employee had taken reasonable steps to draw to the attention of the employer or any other relevant person the impropriety of the practice
- whether the employee has taken reasonable steps endeavouring to mitigate or prevent any harm (if it was in the employee's power to do so).

Where employees in good faith and without negligence endeavour to follow specific requirements set by legislation or a licence or permit condition, and an offence occurs, they should not be the subject of an enforcement response.

2.2.4 Liability of directors and executive officers

When determining whether to institute any enforcement response against executive officers, in accordance with a provision that creates executive officer liability, the crucial issue will be whether the person had actual control or influence over the conduct of the corporation.

As a general policy, DERM will institute proceedings under the executive officer liability provisions only where evidence links the person with the corporation's illegal activity. That linkage needs to show:

- intent to engage in the unlawful conduct
- that the action or omission was negligent or reckless
- there was a failure to monitor or periodically assess and manage risks associated with the corporation's relevant activities or review supporting systems and programs
- there was intent to defraud.

The general legislative exceptions to executive officer liability are:

- the executive officer was not in a position to influence the corporation's conduct
- the officer took all reasonable steps to ensure that the corporation complied with the law.

DERM may take the view that reasonable steps were taken if executive officers ensured that:

- the corporation had an effective environmental or natural resource risk management system in place, which was aimed at ensuring compliance with relevant legislative requirements
- all staff were aware of the system
- the system had been effectively implemented throughout the corporation
- the system was under regular review and was amended when necessary.

The better the corporation's documentary evidence of these matters, the stronger the executive officer(s)'s defence.

2.2.5 Liability of lenders, liquidators and trustees

Although there are few situations in which lending institutions might attract liability under the law for an offence, the guiding principle for DERM is the culpability of potential recipients of an enforcement response in relation to an offence. Legal liability is necessary as a pre-requisite to any statutory enforcement response.

DERM acknowledges that in framing the law the intention was not to restrict legitimate commercial activities of lending institutions. DERM takes the view that if the lender did no more than lend money to the corporation under normal commercial processes, and did nothing that led to the causing of the unlawful activity, no enforcement action should be instituted against the lender. The closer the lender is to the management decisions that caused the unlawful activity, the greater the chance of liability.

Where a company has gone into liquidation, the lender might have day-to-day management responsibility for the company. If the lender becomes aware that the company's current activities are unlawful, or were unlawful in the past, then the lender has an obligation to take steps to stop or mitigate the impacts of the activities on the environment. The most appropriate way of doing this, and also the most effective way of ensuring that DERM will not consider the lender to be liable for unlawful environmental or natural resource impacts, is to immediately notify DERM and take steps to prevent future unlawful activities. By mitigating the impacts of unlawful activity on the environment, lenders will not only fulfil their obligations under the law but also maintain the value of their assets.

Similarly, trustees and liquidators that take over the management responsibilities of a company must ensure the company's action comply with Queensland's natural resource and environmental legislation.

2.2.6 Liability of state and local governments

The legislation administered by DERM binds all people including state and local governments. The decision to commence enforcement action against state and local governments will depend on whether it is in the public interest. The laws in place are to be equally applied to both private and public sectors. The public has an interest in everyone abiding by these laws and public authorities have a greater responsibility to lead by example. One factor relevant to public interest is the potential cost of enforcement action to the taxpayer; this becomes a significant consideration as this involves a consideration of the costs of both parties.

3. Voluntary compliance

DERM recognises that one way to enhance environmental and natural resource protection is to protect companies that continuously improve their management practices and move beyond 'compliance'. To this end, DERM encourages companies to audit and monitor their operations. To maximise protection from higher level enforcement action, companies can follow these steps:

- implement (not just document) an appropriate risk management system that caters for routine and non-routine situations
- have contingency plans in place
- practise 'due diligence'
- comply with all statutory instruments
- have strategies in place to move towards industry best practice environmental management
- notify DERM immediately of any non-compliance
- give formal notice to DERM that the non-compliance will be appropriately dealt with and rectified.

3.1 Disclosure and co-operation

Encouraging voluntary disclosure and co-operation is in the public interest. DERM recognises that early notification of an incident and full co-operation with any investigation often mitigates the impact of the non-compliant activity. Accordingly, these factors will be taken into account when considering enforcement action.

3.2 Duty to notify and voluntary disclosure

The law creates a duty on all citizens to notify DERM, as soon as they become aware, of any actual or threatened environmental harm arising from an activity. Where this occurs, failure to notify DERM is an offence.

DERM wants to establish a culture of environmental and natural resource stewardship in the community where problems are reported before irreparable harm is caused. In determining whether to use information that a person has disclosed about themselves to initiate an enforcement response, DERM will consider whether the person or corporation made a voluntary, timely and complete disclosure of the incident giving rise to the offence. Specifically:

- whether the person promptly notified DERM
- whether the information assisted in the control or mitigation of any harm caused to the environment or natural resource
- whether the information substantially aided DERM's investigation of the incident
- whether the information was available from other sources
- whether the disclosure occurred prior to DERM or any other regulatory body obtaining knowledge of the non-compliance.

3.3 Without prejudice negotiations with alleged offenders

From time to time, it will be necessary for DERM to enter into 'without prejudice' discussions with alleged offenders about the type of enforcement tool to be employed in response to the unlawful conduct. The driving consideration in these discussions should be to achieve the best environmental or natural resource outcome. No agreement can be reached with an alleged offender who is not prepared to take responsibility for the impacts of the unlawful conduct. When taking part in these discussions, DERM may take into consideration the public interest considerations outlined above and in particular:

- the costs of the enforcement response relative to any outcome achieved
- whether a negotiated response sets an unsatisfactory precedent for DERM's response to the conduct
- whether a negotiated response provides an adequate deterrent for similar conduct.

General guideline on the enforcement tools

4. Administrative response (education and warnings and other statutory enforcement tools)

There are a number of non-statutory tools available to DERM to enhance regulatory compliance with Queensland's environmental and natural resource laws. As most of the community and industry are concerned with protection of the environment and natural resources, the majority of minor non-compliance can be dealt with by way of educating them regarding their obligations. Warning letters and notices are also an effective means to ensure that the recipient is made aware of their responsibilities in this respect.

There are a range of other statutory tools that provide an appropriate regulatory response to situations requiring a stronger response. Generally, the legislative provisions mandate certain criteria that have to be met prior to the use of these tools. Specific guidance on when these tools should be used is contained in separate guides prepared by DERM.

5. Infringement notices

5.1 Background

Infringement notices are a way of dealing with common breaches of the law where the impacts are not serious enough for court action. Some of these could be traversing a State forest without a permit, exceeding noise limits, working outside given hours, emitting black smoke from chimneys, or failing to carry out monitoring. The State Penalties Enforcement Regulation 2000 nominates the infringement notice offences and penalties under the law.

The infringement notice system modifies the traditional legal system. A notice is served because it appears an offence has been committed. However, payment of the penalty does not lead to the recording of a criminal conviction. Non-payment of the fine is not dealt with by a jail sentence but is recoverable as a civil debt. On the other hand, if a person elects to have the matter heard, proceedings are commenced in the criminal jurisdiction of the Magistrates Court.

Infringement notices can be issued by authorised officers. These can include officers from organisations, such as local governments and DERM. DERM has no direct control over how authorised officers from other organisations carry out their duties. However, for fairness and consistency, DERM's authorised officers will implement the infringement notice guidelines set out here.

5.2 Operation

Just as there is discretion to use any other enforcement tool, there is discretion whether to serve an infringement notice. Any discretion by individual officers must take into account the intention of the legislation to penalise those breaches that, in the past, might have gone unpunished, and to recognise those active in managing and minimising their environmental and natural resource use impacts.

Infringement notices are designed primarily to deal with one-off breaches that can be remedied easily. They are usually a first response when a preventable breach is discovered. Issuing successive infringement notices for multiple statutory breaches is generally inappropriate, unless the breaches are unrelated. In such circumstances, even though each breach might be comparatively minor, there is probably a major and continuing compliance problem. Such a problem needs to be dealt with through other enforcement measures if a past infringement notice has not motivated the recipient to successfully address the underlying issue.

The legislation does not set a time by which infringement notices have to be issued. Since serving a notice might be the first notification a person has of an alleged breach, it should be issued promptly out of fairness and courtesy.

The *State Penalties Enforcement Act 1999* gives DERM the discretion to withdraw an infringement notice after serving the notice. This allows for two possibilities:

- A more serious breach of the law might have taken place without the authority's knowledge when the notice was issued. The notice can be withdrawn to allow the more serious breach to be pursued.
- A mistake of fact was made and the notice should not have been issued. In such a case, the State Penalties Enforcement Regulation 2000 allows the authority to withdraw the notice, even if the penalty has been paid.

Withdrawal provisions should be seen as a safety net, not a mechanism to be applied regularly.

5.3 Summary

Infringement notices are generally appropriate when the following conditions are met:

- the breach is minor
- the facts are apparently indisputable
- the breach is a one-off situation easily remedied
- inspection discovers a breach that normal operating procedures should have prevented
- where the issuing of an infringement notice is likely to act as a deterrent.

Infringement notices should not be issued in the following circumstances:

- where large-scale habitat or environmental damage has occurred
- where the breach is continuing and not within the alleged offender's ability to remedy quickly
- where the penalty seems inadequate for the severity of the offence

- where the extent of the harm to the environment cannot be assessed immediately
- where the evidence is so controversial or insufficient that court action is unlikely to succeed
- where there has been substantial delay since the alleged breach
- where another authority has issued a notice for the same or similar offence in the same period
- where a notice, direction or order has been issued by DERM to do specified work within a time limit and the limit has not expired
- where multiple breaches have occurred, unless all are minor
- where the offence took place under a proposal approved by DERM.

6. Court orders

Many of the Acts administered by DERM provide a power to seek orders from a court to ensure compliance with legislative requirements. These orders may take a variety of forms, including declaratory orders, enforcement orders, restraint orders or orders resulting from a criminal prosecution. Court orders are amongst the strongest enforcement tools available to DERM and will only be sought where other alternatives have failed or where the conduct is of such a serious nature that DERM considers it necessary. The public interest considerations listed above (at section 2.1) should be considered by DERM when deciding whether court orders are appropriate.

6.1 Model litigant

As a Queensland Government department, DERM is bound to follow the model litigant principles, which can be found on the Department of Justice and Attorney General website. The principles ensure that when conducting litigation, DERM meets the community's and the courts' expectations that the State conducts itself in a manner which exemplifies the principles of justice, and that State power be used in the public interest.

6.2 Declarations

Where there is uncertainty regarding if an activity is unlawful in relation to the provisions of an Act administered by DERM, the Act may provide an avenue to seek a declaration from the court. A declaration is a formal statement of legal rights enabling or disallowing an activity. Seeking a court declaration enables an activity to proceed with a clear statement of the legal situation.

An example of where a court declaration may be sought is for consideration of whether a proposed commercial activity venture would be 'interfering' with the habitat of an endangered wildlife resource in a national park. Under similar provisions in the *Sustainable Planning Act 2009* people may seek a declaration about whether an activity is lawful under a planning scheme or is in breach of a condition of the development approval.

6.3 Enforcement and restraint orders

Where there is an existing ongoing or potential unlawful activity under legislation administered by DERM, the legislation may provide that a court may issue either a restraint order or an enforcement order. Enforcement orders are applied in the case of a development offence. Restraint orders may be issued for a threatened or anticipated offence against relevant legislative provisions.

Generally the legislation provides the court with very broad powers when issuing orders. For example, the court may, in some cases, direct the company or person to:

- a) stop an activity that either constitutes, or will constitute, the offence
- b) do anything to comply with the law
- c) cease activities that are in contravention of the law
- d) do anything required to stop committing an offence
- e) rehabilitate or restore an area.

When making a restraint or enforcement order, the court will specify the time required for compliance with the order. It is usually an offence for a person to contravene a court order. In order to stop frivolous or vexatious applications for restraint or enforcement orders, the court has the discretion to make an order in relation to costs.

7. Principle prosecution

7.1 Background

This guideline aims to identify the key steps in DERM's approach to initiating and progressing prosecutions by outlining:

- the basis on which DERM makes a decision to prosecute
- factors taken into account in deciding which charges to lay
- factors considered in determining the appropriate type of proceedings
- submissions on sentence.

7.2 The decision to prosecute

7.2.1 Evidence

The basic pre-requisite of any prosecution is that the available evidence, on first impression, appears to establish a *prima facie* case. At all times there is discretion not to prosecute, but the discretion to prosecute only arises once there is a *prima facie* case. This is a well established principle of law and has been enunciated in the Prosecutions Guidelines of the Queensland Office of the Director of Public Prosecutions.

The criteria that are to be applied in deciding whether to prosecute fall into two categories. First, is the evidence sufficient to justify proceedings? Second, does the public interest require a prosecution? The prosecutor must be satisfied as to the first question before moving on to the second.

Similarly, the Prosecution Policy and Guidelines of the Director of Public Prosecutions, New South Wales states:

A *prima facie* case is a necessary but not sufficient condition for launching a prosecution. Given the existence of a *prima facie* case it must be understood that a prosecution should not proceed if there is no reasonable prospect of a conviction being secured . . . This decision requires an evaluation of how strong the case is likely to be when presented in court. It must take into account such matters as the availability, competence and credibility of witnesses and their likely impression on the arbiter of fact, and the admissibility of any alleged confession or other evidence. The prosecutor should also have regard to any lines of defence which are plainly open to, or have been indicated by the alleged offender and any other factors which in the view of the prosecutor could affect the likelihood or otherwise of a conviction.

7.2.2 Discretion

Sufficient evidence is not the only criterion for prosecution since:

- not every breach of the criminal law is automatically prosecuted
- the laying of charges is discretionary
- the dominant factor in exercising that discretion is the public interest.

The Prosecution Policy of the Commonwealth Director of Public Prosecutions notes:

The decision whether or not to prosecute is the most important step in the prosecution process. In every case great care must be taken in the interests of the victim (in this case the environment), the suspected offender and the community at large to ensure that the right decision is made . . . The criteria for the exercise of this discretion cannot be reduced to something akin to a mathematical formula; indeed it would be undesirable to attempt to do so.

The breadth of the factors to be considered in exercising this discretion indicates a candid recognition of the need to tailor general principles to individual cases.

One of Parliament's main aims in making a breach of the law a criminal offence is to deter someone else from similar behaviour. By extending criminal liability to many people, for example, landowners and directors and managers of corporations, the law generates increased awareness and responsibility for environmental performance and natural resource management within corporate structures and throughout the community. Prosecution is part of DERM's strategy for achieving its objectives. If prosecution is unlikely to lead to deterrence, other measures may be considered.

Each case is to be assessed to determine whether prosecution is the appropriate strategic response. The factors to be considered when deciding to institute proceedings are listed above in 'public interest considerations' (at section 2.1).

Once a decision has been made to prosecute, DERM must present facts fairly and impartially to the court. DERM should have no interest in procuring a conviction, other than to ensure that the right person is convicted, that the truth is known and that justice is done (*R v Hay and Lindsay* (1968) QdR 459 at 476 and the Queensland Barristers' Rules).

7.3 Decisions relating to what charges to lay

7.3.1 General principle

The charges laid must reflect the nature and extent of the conduct disclosed by the evidence with the aim of providing a basis for the court to impose an appropriate penalty. In line with this general principle, the following policy is adopted:

The administering authority has a duty to refine its case to avoid laying either duplicate or multiple charges. There will be occasions where the same conduct is prohibited under separate statutes and involves an offence under each. Where another prosecuting authority is involved, DERM is to liaise with the other organisation to ensure the most appropriate charge(s) are laid. Conversely, other prosecuting bodies, which know of DERM's actual or potential involvement in a case, should initiate contact before proceedings begin.

7.4 Mode of trial – summary or indictable proceedings

Most offences under legislation administered by DERM are 'summary' offences that are heard by a Magistrate, who is the arbiter of fact and law. However, some offences are indictable, meaning that they may be heard in the District Court. Often the decision as to whether an indictable matter is to be heard summarily (before a Magistrate) is an election that can be made by the prosecution. In DERM's case, the decision as to whether or not to proceed on indictment ultimately rests with the Office of the Director of Public Prosecutions (ODPP). The ODPP have published guidelines on when it considers proceeding on indictment appropriate in the circumstances of environmental and natural resource offences. The Director of DPP guidelines can be found on its website at <www.justice.qld.gov.au>.

7.5 Sentencing considerations

The *Penalties and Sentences Act 1992* outlines the factors that can be considered by a court at sentence. When seeking a sentence for environmental and natural resource offences, the following is a non-exclusive list of factors which may be considered by DERM in preparing sentence submissions:

- the seriousness of the environmental impact or impact on natural resources (the 'victim' of the offence)
- the potential for the impact to be rectified or mitigated
- the steps taken by the defendant to rectify or mitigate the impact
- the level of cooperation by the defendant with DERM
- any prior convictions of the defendants relevant to environmental or natural resource management
- the level of penalty sufficient to deter others from similar conduct
- the prevalence of the offence
- the maximum penalty for the offence
- any relevant sentencing precedents.

8. Breaches of licence conditions

Breaches of licence, lease, permit, authority or the conditions of some other form of permission, can in some cases, lead to the following:

- the issuing of a warning notice or letter
- the issuing of an infringement notice
- prosecution of the offender
- the licence being cancelled.

Cancelling or suspending a licence is potentially the strongest penalty DERM can invoke as it may result in licensee's operations to close. In most cases, DERM will only take this step when:

- the breach of licence conditions has had serious consequences to human health, environment or natural resources
- continual minor breaches have occurred despite warnings being given by DERM
- provision is made for the automatic cancellation of the licence (e.g. accumulation of demerit points).

Specific legislative provisions provide the process DERM must follow before suspending or cancelling a licence. Once the process has been followed and a decision to suspend or cancel has been made, a licensee has the option to seek to have the decision reviewed by a court.

9. Conclusion

This guideline is not intended to have legal status. The matters outlined in this guideline are not legally binding on DERM and do not confine, restrain or limit the discretion of DERM to take any action. However, they provide general guidance on how enforcement decision-making is approached by DERM. More specific guidance can be obtained by reference to guidelines addressing specific pieces of legislation.

Should you wish to make comments or suggestions on this guideline, send them to:

Litigation Unit
Department of Environment and Resource Management
GPO Box 2454
Brisbane QLD 4001

If you want to provide information about an incident relating to Queensland environment or natural resource legislation, the DERM hotline is available 24 hours a day on 13 74 68 (13QGOV).

Annual Compliance Plan 2009–10

Objective

To reduce risks from the activities regulated by the Department through improving the levels of compliance in the community.

Introduction

The Department of Environment and Resource Management's (DERM) compliance program is based on being targeted, transparent and risk-based. These principles guide the development of annual compliance plans that set out the proactive compliance activities that DERM will undertake during the year. The plans address all of the areas for which DERM is responsible, including:

- efficient use of water and protection of unspoiled rivers
- sustainable use of land resources, including integrated management of soil, water and vegetation
- preservation of Indigenous and other cultural heritage
- protection of air, water, and soil quality
- waste management
- protection and conservation of ecosystems, landscapes and native plants and animals.

Projects selected for inclusion in DERM's annual compliance plans address one of three key areas:

- **Critical issues**—require immediate attention because they are causing unlawful harm to the natural landscape, or severely threatening the conservation of our natural and cultural heritage, or have an impact on issues that may affect public safety.
- **Emergent issues**—activities within a particular business sector or area that have a high potential to impact on the natural environment. These projects focus on issues such as establishing baseline compliance performance, effectiveness of current regulatory activities, strategies to improve compliance performance and identifying best practice. These projects drive improved regulatory strategies and compliance outcomes.
- **Maintenance issues**—ongoing compliance monitoring of DERM clients to ensure adherence to legislation, zoning plans, permit conditions and other regulatory instruments.

Critical issues

Project	Issue	Objective	Approach
<i>Environmental Protection Act 1994—mine management</i>			
Mine water management	Wastewater discharges from mines during high rainfall events.	Improved stormwater and wastewater management practices at high risk mines within Queensland.	<ul style="list-style-type: none"> • Review adequacy of design guidelines and consistency of permit conditions in relation to water storages. • Inspect those sites identified as representing highest risk, taking remedial action where required.
<i>Nature Conservation Act 1992—wildlife management</i>			
Human safety in the presence of dingoes	Managing interactions between humans and dingoes to maximise safety.	A better public understanding of how to behave in the presence of dingoes will assist with implementing the <i>Dingo Management Strategy</i> on Fraser Island, and lead to fewer dangerous interactions and a reduction in intervention from the Queensland Parks and Wildlife Service (QPWS).	<p>Dingo habitats on protected areas, with particular emphasis on Fraser Island.</p> <ul style="list-style-type: none"> • Educate visitors and local residents about the importance and dangers of dingoes and responsibilities under the <i>Dingo Management Strategy</i>. • Monitor human–animal interactions taking remedial action, where necessary.
Human safety in the presence of estuarine crocodiles	Managing interactions between humans and estuarine crocodiles to maximise safety.	Enhanced community awareness and capacity leads to a reduction in negative interactions with estuarine crocodiles.	<p>Crocodile habitats across Queensland.</p> <ul style="list-style-type: none"> • Educate visitors and local residents about the importance and dangers of crocodiles to build community awareness and capacity. • Monitor human–animal interactions taking remedial action, where necessary.

Emergent issues

Project	Issue	Objective	Approach
Environmental Protection Act 1994—mine management			
Mining Financial Assurance	Accuracy of financial assurance estimates in Plan of Operations.	<ul style="list-style-type: none"> • Ensure Plans accurately disclose rehabilitation works and costs. • Develop and implement tools to allow regional implementation of financial assurance and rehabilitation assessments. 	<ul style="list-style-type: none"> • Examine the accuracy of information contained in Plan of Operations, particularly the categorisation of significantly disturbed land and calculation of financial assurance. • Conduct site inspections, taking remedial action where required.
Environmental Protection Act 1994—industry/agriculture management			
Sewage treatment plants (Great Barrier Reef)	Sewage treatment plants discharging into Great Barrier Reef catchments.	Improve quality of sewage treatment plant effluent discharges into Great Barrier Reef catchments.	Inspect high-risk sewage treatment plants discharging to Great Barrier Reef catchments, taking remedial action where appropriate.
Erosion and sediment control (urban development)	As identified in the <i>South East Queensland (SEQ) Healthy Waterways Strategy 2007–12</i> , urban development is a major contributor of sediment and other pollutants to Queensland waterways.	Expand an existing 2008–09 northern SEQ project to southern SEQ (in partnership with local governments) to protect the environmental values and water quality objectives of waters from urban development sites.	<ul style="list-style-type: none"> • Provide training to DERM and local government staff. • Educate industry on stormwater management and water quality objectives. • Inspect urban development sites, taking remedial action where required.
Waste disposal facilities	The operation of waste disposal facilities presents significant risk to environmental values, in particular surface and groundwater.	Improve levels of environmental compliance and minimise unlawful contamination from waste disposal facilities.	<ul style="list-style-type: none"> • Assess levels of environmental compliance across a sample of the sector, taking remedial action where required. • Review current regulatory procedures and make recommendations into an improved regulatory regime.
Water quality in Great Barrier Reef catchments (subject to the passing of the Great Barrier Reef Protection Amendment Bill 2009)	Impact of agricultural activities on the quality of water entering the Great Barrier Reef.	Support the implementation of new regulatory requirements for commercial sugar cane growing and cattle grazing in the Wet Tropics Mackay-Whitsunday, and Burdekin dry tropics catchments.	<ul style="list-style-type: none"> • Ensure effective record keeping is carried out and the implementation of environmental resource management plans can commence.

Nature Conservation Act 1992—wildlife management

Flying fox management	Minimise threatening processes for flying fox populations.	Protect flying fox populations from threats by ensuring compliance with non-lethal control methods and requirements for roost protection from disturbance.	<ul style="list-style-type: none"> Educate industry and community groups on the importance of, and requirements for, protecting flying fox populations. Inspect a sample of fruit growing properties to ensure compliance with non-lethal control. Liaise with communities and inspect flying fox roosts near urban areas to ensure that lethal or illegal disturbance is not occurring.
Protected plants	Minimise threatening processes for protected plants.	Enhanced community awareness and streamlined permitting requirements lead to a reduction in threats to protected plant populations.	<ul style="list-style-type: none"> Educate industry and community groups on importance of and requirements for protected plant populations. Enhance responsiveness of legislation to community and industry needs by reviewing the <i>Nature Conservation (Protected Plants) Conservation Plan 2000</i>.

Nature Conservation Act 1992—estate management

Recreational vehicle use	Illegal use of four-wheel-drive, trail bikes and quad bikes on managed estate in SEQ.	Avoid environmental degradation, disturbance to wildlife and disturbance to user amenity through illegal use of recreational vehicles following closure of private 'off road' facilities.	<ul style="list-style-type: none"> Educate user groups on requirements for vehicle use of managed estate. Contribute to planning processes to identify appropriate sites for recreational vehicle use in SEQ.
Arson	Arson on QPWS managed estate.	<ul style="list-style-type: none"> Protect ecosystems from unsustainable damage caused by arson. Protect life and property from loss caused by arson on QPWS managed estate. 	<ul style="list-style-type: none"> Continue to educate the public, rural communities and park neighbours on the QPWS fire management program. Undertake fuel reduction burns in accordance with the fire management program.

Water Act 2000

Drillers Licensing	Protecting aquifers from physical degradation and contamination.	Subartesian and artesian bores are drilled to the respective best practice standards and are compliant with work approvals.	<ul style="list-style-type: none"> Ensure drillers submit their drilling logs. Review drilling logs to identify potential non-compliance with mandatory standards and license conditions, taking remedial action where required. Regular attendance on drilling sites, particularly during artesian bore grouting activities, taking remedial action if required.
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Water Supply (Safety and Reliability) Act 2008

Referable Dams	Ongoing identification and monitoring of dams that if they were to fail would effect a population of 2 or more.	To ensure safety of people that would be at risk if a dam were to fail.	<ul style="list-style-type: none"> • Continue to identify dams with potential population at risk. • Ensure dam owners submit required Failure Impact Assessments, taking remedial action with those that don't. • Continue to educate dam owners on how to comply with legislation. • Audit dam owner's compliance with dam safety conditions for at least 10 referable dams.
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Vegetation Management Act 1999

Native vegetation management	Maintenance of native vegetation consistent with the tree clearing laws.	To maintain and enhance levels of compliance with the VMA to ensure the purposes of the act are achieved, using efficient, targeted and innovative approaches.	<ul style="list-style-type: none"> • Targeted education campaigns for landholders in the reef catchment and for those affected by the Regrowth Moratorium. • Identify unlawful clearing impacting on reef water quality, taking remedial action, where required. • Continue supporting industry partnerships. • Use the remote sensing and the Statewide Landcover and Tree Study (SLATS) to analyse vegetation clearing and permit activity trends, and target compliance activities. • Audit fodder and thinning permit activity compliance with the Native Forest Practice Code, taking remedial action where required.
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Maintenance issues

Project	Issue	Objective	Approach
<i>Environmental Protection Act 1994—general</i>			
Licensed activities under the <i>Environmental Protection Act 1994</i> .	Ongoing monitoring of high-risk Environmentally Relevant Activities, mine operations and petroleum and gas operations.	Compliance with permit conditions, and environmental harm minimised or prevented.	<ul style="list-style-type: none"> • High-risk sites will be identified, inspected, and remedial action taken, where required. • Focus will be, but not limited to, aquaculture facilities in the north, port operations in Townsville and Brisbane, mine operations governed by a Special Agreement Act, Ipswich extractive industry, meat and other food processing, industrial estates, and small sewage treatment plants and large sewerage infrastructure.

Permit fees/returns	Illegal operations under the <i>Environmental Protection Act 1994</i> , including unpaid permit fees, abandoned sites, incorrect fee discounts, incorrect cancellations.	Ensure permit authorisations are paid in full and on time (or late fees are paid).	<ul style="list-style-type: none"> • Set internal procedures, review annual return templates and processes, and educate operators on their requirements. • Identify extent of non-payment or incorrect payment of fees, inspect random sample of operations, and take remedial action where required.
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Freshwater/estuarine catchments (Caboolture Estuary)	<i>Ecosystem Health Monitoring Program Report Card 2007–08</i> for waterways of SEQ and Moreton Bay.	Improve quality and/or reduce quantity of industrial discharges to a freshwater/estuarine catchment. Focus for 2009–10 is the Caboolture Estuary.	<ul style="list-style-type: none"> • Inspect industrial and commercial activities that discharge into the Caboolture Estuary, taking remedial action where required. • Develop partnerships with local government and Department of Employment, Economic Development and Innovation, if possible; and inspect land development and rural activities that have the potential to discharge into the Caboolture Estuary, taking remedial action where required.
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Nature Conservation Act 1992—wildlife management

Commercial macropod inspections	Ongoing monitoring of high-risk commercial macropod activities under the Nature Conservation (Administration) Regulation 2006.	Ensure annual quotas for commercial harvesting are not exceeded, and compliance with the <i>National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes 2008</i> .	<ul style="list-style-type: none"> • Inspect a selection of harvesters, chiller premises and meat processors across Queensland, in conjunction with other agencies, taking remedial action, where required. • Monitor permit return data for harvesters and dealers, taking remedial action, where required.
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Nature Conservation Act 1992—estate management

Marine parks	All State marine parks, with particular focus on Moreton Bay Marine Park.	Enhanced protection of marine ecosystems and values through encouraging appropriate user behaviour.	<ul style="list-style-type: none"> • Educate users on appropriate vessel operation and the activities permitted in State marine parks, focussing on those within 'green zones' and no anchoring zones. • Monitor behaviour and permit compliance and take remedial action where required.
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Terrestrial parks	All terrestrial parks.	Enhanced protection of terrestrial ecosystems and values through improved user behaviour.	<ul style="list-style-type: none"> • Educate users on activities such as vegetation clearing, fire management, domestic pets, protecting sensitive areas, feeding/taking wildlife, littering etc. • Monitor visitor behaviour, taking remedial action where required.
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Protected area boundary incursions	All terrestrial parks and marine park islands.	Enhanced protection of ecosystems and values through improved community respect for protected areas.	<ul style="list-style-type: none"> Educate the community on the importance of respecting protected area boundaries. Monitor protected area boundaries for incursions and taking remedial action where required.
Commercial activities on managed estate	Managed estate where timber harvesting or grazing leases occurred.	Better management of the impacts of timber harvesting and grazing on managed estate, and manage compliance with relevant codes, operational standards and lease requirements.	<ul style="list-style-type: none"> Audit a strategic sample of grazing leases and timber harvest sales on both current and transitioning QPWS estate for operational compliance. Assess native forest harvest plans for compliance with the code of practice and harvest scheduling.
Permit fees/returns	Ongoing monitoring at key parks and sites of commercial and non-commercial activities under the <i>Nature Conservation Act 1992</i> and subordinate legislation.	Ensure all activities are appropriately licensed or permitted, and all fees and returns are paid in full.	<ul style="list-style-type: none"> Continue to educate commercial and non-commercial users about permit requirements. Undertake audits of high use parks and sites and take remedial action where required.
Threatened species	Managed estate and marine parks where threatened species and their habitat occur.	Enhanced protection of threatened species and their habitat through minimizing human related disturbance.	<ul style="list-style-type: none"> Educate visitors and volunteers on appropriate behaviour around threatened species and in their habitat. Monitor behaviour and permit compliance and take remedial action where required.

Queensland Heritage Act 1992

Heritage inspections	Ongoing monitoring of high risk heritage places and heritage development under the <i>Queensland Heritage Act 1992</i> .	Compliance with requirements including minimum maintenance requirements and permit conditions.	Audit high-risk heritage places and development approvals, taking remedial action where required.
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Aboriginal Cultural Heritage Act 2003 and Torres Strait Islander Cultural Heritage Act 2003

Aboriginal and Torres Strait Islander cultural heritage	Duty of care when conducting activities on lands that contain Aboriginal and Torres Strait Islander cultural heritage.	Effective recognition, protection and conservation of Aboriginal and Torres Strait Islander cultural heritage by land holders.	<ul style="list-style-type: none"> Educate landholders on requirements to comply with their duty of care in relation to protecting and managing cultural heritage. Develop cultural awareness training modules for delivery to judiciary.
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Forestry Act 1959

Commercial management of forest products under the *Forestry Act 1959*

- Compliance with sales permit terms and conditions.
- Compliance with relevant codes of practice.
- Unauthorised removal of forest products and quarry materials.

To maintain and enhance levels of compliance in relation to commercial management of forest products, and commercial use of State-owned native forest areas.

- Educate contractors in the correct application of sales permit terms and conditions and codes of practice.
- Regular monitoring of sales activities in relation to sales permit conditions and codes of practice, taking remedial action where required.

Land Act 1994

State land

Managing State land and associated values to maximise and sustain the flow of economic, social and environmental benefits to Queenslanders now and in the future.

Ensure the most appropriate use, tenure and management of land are a reflection of the intrinsic values inherent in that land.

- Educate stakeholders and the community on how to comply with their legislative and other obligations.
- Increase awareness about trespass actions via signage in high risk areas.
- Proactively identify possible breaches of legislation, and audit compliance with development leases, taking remedial action where required.

Land Protection (Pest and Stock Route Management) Act 2002

Stock route network (SRN) management

Managing stock routes in partnership with local governments to ensure they are managed sustainably.

State *Stock Route Network Management Strategy* compliance targets achieved, including improved voluntary compliance amongst SRN users.

- Assist local governments in managing the SRN.
- Support provided where possible through planning and signage and other initiatives.

Water Act 2000

Water Management

Managing access to water in Water Management Areas.

Sustainable allocation and management of water to achieve Water Resource Plan outcomes; equitable and consistent user access to water; and a secure basis for water accounting.

- Educate water users on importance of compliance with entitlements.
- Monitor metered use and take remedial action where required.

Managing access to water outside Water Management Areas.

Sustainable allocation and management of water to protect the interests of existing authorisation holders and water dependant ecosystems.

- Ensure appropriate limiting access conditions on entitlements.
- Monitor individual entitlements and take remedial action where required.

Water Supply Schemes	Regulating Resource Operations License (ROL), Distribution Operations License (DOL) and Interim Resource Operations License (IROL) holders in the operation and management of Water Supply Schemes.	Ensure compliance with licenses; to ensure performance of entitlements and environmental outcomes, both within and outside water resource plan/ resource operations plan areas.	<ul style="list-style-type: none"> • Audit ROL and IROL, in accordance with audit program and take remedial action where required. • Analyse reported data for compliance with license conditions and take remedial action where required.
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Riverine Management	Protecting the physical integrity of non tidal watercourses, lakes and springs.	Manage access to riverine quarry material to protect the physical integrity including the stability of non tidal watercourses, lakes and springs.	<ul style="list-style-type: none"> • Ensure compliance with Quarry Material Allocation Notices by establishing reporting conditions, monitoring provided reports and random site audits and take remedial action where required.
	Protecting the physical integrity of non tidal watercourses, lakes and springs.	Manage the placement of fill, excavation and destruction of native vegetation in non tidal watercourses, lakes and springs.	<ul style="list-style-type: none"> • Ensure compliance with riverine protection permits and statutory guidelines through routine inspections of activity sites and take remedial action where required.

Water Supply (Safety and Reliability) Act 2008

Drinking Water Monitoring and Reporting	Protecting public health through safe drinking water supplies	Ensure providers are managing risks for producing safe drinking water.	<ul style="list-style-type: none"> • Ensure water quality incidents are reported and appropriate remedial action is undertaken. • Continue to educate providers on how to comply with legislation.
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Water and Sewerage Infrastructure	Ongoing monitoring of water supply and sewerage infrastructure to ensure compliance with the legislation.	To ensure that service providers have appropriate operation, maintenance and renewal strategies in place to ensure the ongoing provision of water and sewerage services.	<ul style="list-style-type: none"> • Review and monitor management plans and service standards. • Education and advice to service providers on how to comply with legislation. • Independent audits of water and sewerage infrastructure, with service providers implementing recommendations where appropriate.
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Annual Compliance Plan 2010–2011

June 2010

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Prepared by:

Compliance and Investigations Branch

Department of Environment and Resource Management

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July 2010

Foreword

At the heart of the Department of Environment and Resource Management's (DERM) approach to compliance is the goal of encouraging people to voluntarily comply with their obligations. DERM does this by actively engaging with companies and individuals subject to environmental regulation through activities, such as education and awareness raising, and planned inspections and audits. Compliance and enforcement activities are also important when used in response to breaches of legislation in order to deter future breaches.

The Annual Compliance Plan 2010–11 advises Queenslanders of DERM's proposed activities over the next year to address the key compliance issues that affect our environment and natural resources. Not only do resources underpin our economic activity but also our natural heritage, which we must protect for future generations.

By publishing annual compliance plans, and advising the community what can be expected in the coming year, DERM is giving effect to its commitment to transparency in the way that compliance activities are carried out.

DERM regulates a broad range of activities—from protecting cultural heritage and water resources, to managing national parks and preventing pollution—and the work that DERM does to ensure that people comply with laws is equally broad. This year's annual compliance plan sets out both the general activities that DERM will be undertaking, as well as specific projects aimed at reducing particular risks to the environment.

For example, taking into account the expansion of the coal seam gas (CSG) industry across the state, including multiple proposals to construct liquefied gas plants for the liquefaction and export of CSG, the Queensland Government has ramped up its compliance monitoring and investigation of mining and petroleum activities. A new team has been established in Roma and DERM is committed to ensuring coal seam gas operators comply with new laws and policies affecting the industry.

Potential impacts on agricultural land, rivers and groundwater supplies are being assessed before approvals are granted. To ensure CSG operators comply with stringent operating conditions, compliance inspections will focus on land disturbance and rehabilitation, water and wastewater management, and the performance of dams used to store CSG water and brine waters.

Moreton Bay and other south-east Queensland coastal environments will also benefit under the annual compliance plan, which will see property developments and major infrastructure projects facing increasing scrutiny in relation to erosion and sediment control.

DERM will also continue to educate cane farmers and cattle graziers about the Great Barrier Reef protection laws that came into effect on 1 January 2010, which require better management of fertiliser and pesticide use to improve the quality of water that runs off their properties onto the reef.

The publication of this annual compliance plan, and the compliance activities and projects within the plan, provides an opportunity for companies and individuals to access support to improve their performance levels. It also helps deliver the vision of a green, strong and sustainable Queensland.

John Bradley
Director-General

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Introduction

Regulatory coverage

The Department of Environment and Resource Management (DERM) conserves and manages the environment and natural resources for the benefit of all Queenslanders. DERM's key areas of regulatory responsibility are:

- **Protecting and conserving the natural environment and cultural heritage**

This includes pollution control and waste management, managing vegetation loss and the state's coastline, conserving ecosystems, landscapes and native wildlife, and conserving Indigenous and built heritage.

- **Managing land wisely**

This includes effective planning and development, State land and stock route management, native title recognition, and the selling of quarry materials and forest products from State land.

- **Securing water for Queensland's future**

This includes managing resource use, protecting unspoiled rivers and maintained sufficient flow for healthy ecosystems, monitoring surface and groundwater levels and quality, and providing safe and reliable water supplies.

Regulatory compliance program

DERM's regulatory compliance program is founded on a targeted and transparent approach to compliance, supported by a modern and strong enforcement program. DERM's approach is to:

- ensure that clients understand Queensland's environmental and natural resource management obligations
- encourage voluntary compliance with those obligations
- work with government, business, industry and the community to improve performance
- monitor compliance with Queensland's environmental and natural resource management obligations
- take consistent and proportionate responses to non-compliance, in accordance with the Enforcement Guidelines, to achieve environmental and natural resource outcomes and deter further non-compliance.

A key output of the regulatory compliance program is developing an overarching compliance strategy and publishing compliance plans annually. It is intended that annual compliance plans (ACPs) enable participation and information exchange and help build capacity for compliance, by transparently outlining all the compliance activity to occur in a given year, both proactive and reactive.

DERM's Compliance Strategy 2010–14, annual compliance plans, and enforcement guidelines, which set out how DERM selects matters for enforcement, are available at <www.derm.qld.gov.au>.

Compliance activity

Types of compliance activity

The two main types of compliance activity DERM carries out to ensure risks are being managed appropriately are outlined below:

1. DERM **responds** to reports about incidents that affect the environment and natural resources. These reports can come from members of the public, industry self-reporting or from monitoring programs. This responsive work drives remedial and/or enforcement action on a site-by-site basis.
2. DERM **plans** a variety of compliance activities throughout the year aimed at addressing risks before they become problems, many of which would be irreversible. Activities include:
 - a. Strategic response to non-compliance
These projects target issues that require immediate attention because they are threatening the safety of people, or the environments and natural resources that DERM protects and manages. These projects drive compliance outcomes and remedial action.
 - b. Strategic response to compliance risks
These projects target a particular business or community sector or area that has a high potential to impact upon the natural environment or the safety of people. They focus on issues such as establishing baseline compliance performance, the effectiveness of current regulatory frameworks, strategies to improve compliance performance and identifying best practice. These projects drive improved regulatory systems and tools, and compliance outcomes.
 - c. Ongoing compliance monitoring and assistance to clients to ensure adherence to legislation, zoning plans, permit conditions and other regulatory instruments.

Recent compliance activity

Throughout 2009–10, DERM progressively improved compliance levels in several business sectors through more open communication and by providing better educational forums and guidance materials.

For example, facilities at the Port of Brisbane, while demonstrating good performance levels overall, are further improving their stormwater emergency preparedness; more dam owners are submitting failure impact assessments and upgrading dam spillways to acceptable standards; and fruit growing properties in central Queensland are using more appropriate flying fox control measures.

DERM also prosecutes those choosing not to comply or who cause serious environmental harm.

In 2009–10, for example, DERM prosecuted five mining companies in north-west Queensland in relation to alleged environmental offences, including release of contaminated water following heavy rainfall. DERM is working with these companies to ensure mines are better prepared for the wet season.

DERM also brought criminal charges against people interfering with dingoes and feeding them on numerous occasions. DERM's strategy aims to reduce deliberate feeding of dingoes and reduce their aggressive behaviour so there is a sustainable dingo population.

Partnership building, ongoing compliance monitoring, data collection and regulatory system changes in 2009–10 have also placed the department in good stead in 2010–11 to:

- work with south-east Queensland local governments and improve erosion and sediment controls on government infrastructure and private development projects
- improve regulatory tools and compliance levels in relation to water management at high-risk waste disposal facilities and mine sites
- effectively regulate the rapidly expanding coal seam gas to liquid natural gas industry, and other petroleum and gas activity, to ensure that groundwater is protected from contamination and over extraction
- use the Statewide Landcover and Trees Study to detect potential unlawful clearing
- focus on the humane shooting of macropods rather than over-harvesting
- address overuse and degradation of our water resources.

Annual Compliance Plan 2010–11

The Annual Compliance Plan 2010–11 sets out DERM's compliance approach in each of the following areas that it regulates:

1. coastal and inland waters – development and agriculture
2. environmental management
3. Queensland heritage conservation
4. Indigenous heritage conservation
5. land management – State land and the stock route network
6. estate management – conservation estate, marine parks and commercial native forests
7. vegetation management
8. wildlife and ecosystems
9. water supply – water use and service provision.

For each of those areas, this plan provides a brief overview, identifies any key risks, sets out DERM's general approach to ensuring compliance for that area and outlines any specific, planned compliance projects that will be carried out in 2010–11. Some projects will continue past June 2011.

Compliance projects for 2010–11 include:

- erosion and sediment control on urban development sites in south-east Queensland
- acid sulphate soils management
- Port of Townsville material handling
- mine water management
- mining rehabilitation
- petroleum and gas activity, including coal seam gas and underground coal gasification
- landfill gas migration
- heritage place compliance
- arson in the Lockyer Valley
- vehicle use in Byfield and D'Aguilar national parks
- vegetation management framework best practice
- Statewide Landcover and Tree Study assessment
- water meter compliance across the state.

1. Coastal and inland waters

Development

Certain development may need to consider the State Planning Policy 4/10 – Healthy Waters, which has been developed to mitigate the risks to water quality and waterway health from urban stormwater and waste water management. Unmanaged urban stormwater causes contaminants, such as nutrients, sediment and rubbish, to enter waterways. Waterway erosion can also occur through the concentration of stormwater flows entering natural waterways. The draft policy does not apply to existing land uses, or drinking water supply or quality issues. In addition, the draft policy addresses large-scale development, and does not deal with single lots or dwellings as these are addressed by existing design and construction criteria through the building regulations and Queensland Development Code.

Developers must also be aware of the State Planning Policy 2/02 – Planning and Managing Development involving Acid Sulfate Soils (SPP 2/02) when developing land in low-lying coastal areas in certain local government areas. Development involving acid sulfate soils (ASS) should be planned and managed to avoid potential adverse effects on the natural and built environment (including infrastructure) and human health. Development permits may include a requirement to prepare and implement an ASS management plan, consistent with the SPP 2/02 Guideline.

The Draft State Planning Policy for Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments also seeks to ensure that development in or adjacent to wetlands of high ecological significance in Great Barrier Reef catchments is planned, designed, constructed and operated to prevent the loss or degradation of wetlands and their values, or enhances these values, or particularly the hydrological regime and ecological values of those wetlands.

Permits under the *Water Act 2000* are required to extract quarry material, such as sand, gravel, rocks and soil, from non-tidal reaches of streams and freshwater natural lakes. Permits are also required to clear vegetation, excavate, or place fill within a watercourse, lake or spring.

General compliance monitoring or assistance

- Respond to valid reports from the public to ensure placement of fill, excavation and destruction of native vegetation in non-tidal watercourses, lakes or springs is legal and protects the physical integrity of those riverine areas.
- Ensure compliance with high-risk quarry material allocations within riverine areas by monitoring reports and/or onsite activity; and only renewing permits where sustainable management of the resource and appropriate operator performance is occurring.

Compliance projects

Project	Goal	Objectives	Scope	Expected outcomes
Erosion and sediment control (ESC) 2009–2012	To protect the environmental values of waters and water quality objectives from urban development sites.	To increase monitoring of ESC practices on construction sites to ensure compliance with the <i>Environmental Protection Act 1994</i> . To build internal capacity of DERM and south-east Queensland (SEQ) local governments for undertaking compliance actions.	SEQ Healthy Waterways Strategy 2007–12 identified urban development as a major contributor of sediment and other pollutants to waterways. The project was endorsed by the chief executive officer committee for natural resource management in SEQ, as one of the strategic actions to address stormwater contamination. Undertaking compliance inspections during construction phase of high-risk public infrastructure and private developments. In partnership with SEQ local governments.	Significant improvement in ESC practices at construction sites. Significant reduction of sediments entering SEQ waterways.
Acid sulphate soils (ASS)	To ensure development doesn't result in land degradation and environmental harm from ASS, by either avoiding or appropriately treating and managing disturbance to ASS.	To provide streamlined and standardised development permit conditions requiring preparation and implementation of ASS management plans. To work with applicants and local governments to mitigate environmental harm and land degradation caused by insufficient ASS management.	In 2010–2011, implement standardised conditions for development requiring ASS management plans in accordance with the SPP 2/02 Guideline. In 2011–12, developing a range of compliance auditing tools to enable DERM to better assess, within available resources, as broad a range as possible of activities that affect ASS.	Promotion of vigilance and/or awareness to appropriately manage ASS when developing in high-risk ASS areas. Increased compliance with development permit conditions.

Further information – *Environmental Protection Act 1994*, Environmental Protection (Water) Policy 2009, *Sustainable Planning Act 2010*, State Planning Policy 4/10 – Healthy Waters, State Planning Policy 2/10 – Planning and Managing Development Involving Acid Sulfate Soils, Draft State Planning Policy for Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments, *Water Act 2000*.

Agriculture

There has been increasing concern about impacts to the waters of the Great Barrier Reef lagoon as a result of runoff from agricultural activity in the Mackay–Whitsunday, Burdekin Dry Tropics and Wet Tropics catchments.

In January 2010, DERM introduced new laws that require the adoption of best practice land management in these catchments, through three key measures:

- All graziers and sugar cane farmers in the priority catchments must calculate, and apply no more than, the optimum amount of fertiliser.
- These farmers must also keep records (from 1 January 2010) of annual soil tests used to determine optimal fertiliser rates, fertiliser and herbicide applications and prescribed agricultural product use (specifically ametryn, atrazine, diuron, hexazinone, tebuthiuron).
- Farms that have a high risk of impacting the reef through poor management practices must also prepare environmental risk management plans (ERMPs). High-risk farms are considered those where sugar cane is growing on more than 70 hectares in the Wet Tropics catchment, and where cattle is grazing on more than 2000 hectares in the Burdekin Dry Tropics catchment. ERMPs were required to be submitted before 1 October 2010.

The new laws aim to reduce by at least 50 per cent the amount of nitrogen, phosphorous and pesticides flowing from catchments into the reef lagoon by the end of 2013, and to cut sediment flowing to the reef by 20 per cent by 2020.

While DERM will initially focus its efforts on providing extensive information, assistance, and education to operators about the new requirements, recalcitrant operators or those causing serious environmental harm can be penalised under the new laws. Research work aiming to understand the motivations and barriers to compliance with the new laws will inform future compliance strategies.

General compliance monitoring/assistance

- Continue to deliver education and assistance programs to landowners regulated by the new laws (in conjunction with industry groups, natural resource management bodies and the Department of Employment, Economic Development and Innovation).
- Provide additional assistance with the record-keeping requirements to operators, and conduct random reviews of record-keeping in the latter part of 2010–11.
- Identify operators who do not hold an accredited ERMP, to guide further compliance activities including education and assistance.
- Respond to public reports about inappropriate farming practices.

Further information – *Environmental Protection Act 1994, Chemical Usage (Agricultural and Veterinary) Control Act 1988, Chemical Usage (Agricultural and Veterinary) Control Regulation 1999*, information packages sent to known operators.

2. Environmental management

Everyone in the community is responsible for actions they take that affect the environment. No one may carry out an activity that causes, or is likely to cause, environmental harm unless they take all reasonable and practicable measures to prevent or minimise the harm. In addition, if someone becomes aware of serious or material environmental harm being caused or threatened by an activity they are involved in, they have a duty to report that harm (unless the harm is authorised by law).

To protect the environment, DERM regulates an extensive range of primary, secondary and tertiary industries under the *Environmental Protection Act 1994* broadly categorised as mining and petroleum activity, aquaculture and intensive animal industry, chemical manufacturing, fuel burning, extraction, metal fabrication, non-metal product manufacture, food processing, timber processing, transport and bulk material handling, waste management and water treatment. DERM also manages contaminated land resulting from poor environmental management and waste disposal practices, or accidental spills in industrial or commercial activities.

It is important that emerging new energy industries, such as the rapidly expanding coal seam gas (CSG) to liquid natural gas (LNG) industry, are managed so that any potential environmental impacts upon agricultural lands, rivers and groundwater supplies are assessed before approvals are given, and that the industries are then regulated effectively during operation. In addition to new laws and policy that DERM has recently implemented to improve the management of impacts from CSG water dams and to manage residual salt, DERM is developing new laws to require stringent management of water extraction impacts on bores, aquifers and springs. DERM will ensure that the CSG and later the LNG industries are proactively inspected to ensure that protected vegetation is not impacted, that waste products including CSG water and residual salts are managed and disposed of correctly, that previously contaminated areas such as decommissioned evaporation dams are rehabilitated, and that groundwater is protected from contamination and over extraction.

Industry that meets certain thresholds, such as fuel use and substance handling, must report emissions and transfers of substances to DERM. This information is publicly available on the National Pollutant Inventory (NPI) internet database <www.npi.gov.au>.

The community can report an environmental issue from anywhere in the state through a 24-hour, seven-day-a-week hotline service. Examples of incidents and complaints reported to DERM include oil and chemical spills, sewage overflows and fish kills.

General compliance monitoring or assistance

- Carry out compliance inspections of licensed sites (including environmentally relevant, mining and petroleum activities) posing the greatest environmental risk. Sectors targeted this year include sewage treatment plants (municipal and small operators), extraction, waste facilities, various processing industries (including meatworks, refineries, metal production, chemical manufacturers, and bulk material handling), and mine sites.
- Review the performance of, and regulatory requirements (including adequacy of development approval conditions) for, eight sites identified as presenting a high or very high risk in the Review of Queensland Industrial Estates 2006–09 project.
- Respond to incident reports received on the DERM hotline.
- Assess, and where necessary, improve the quality of all submitted NPI reports.

Compliance projects

Project	Goal	Objectives	Scope	Expected outcomes
Port of Townsville material handling	To obtain compliance with current approvals and identify areas for improvement for premises that are potential sources of air contaminants.	To work with the port and relevant port users to promote best practice for materials handling, particularly for bulk mineral concentrates. To clearly determine air quality within the Townsville airshed, relating to total suspended particles, dust fall, and the heavy metal analysis of the particles and/or dust. To advise the community about air quality in Townsville including any relevance to potential public health issues.	Activities conducted within the Townsville port area. Conducting compliance inspections of the port area and bulk materials handling facilities within the port, commenced March 2010. Air quality monitoring to occur at three locations within Townsville: two inner city locations and the Townsville Sports Reserve.	Minimised risk associated with dust nuisance and a possible public health issue in Townsville if dust fall containing metal concentrates from bulk handling activities increases.
Mine water management	To improve stormwater and waste water management practices at identified high-risk mines in Queensland.	To identify and document high risk factors and inconsistencies in water management practices. To identify appropriate conditioning and other environmental management issues to ensure effective water management.	Two-year project from September 2009 to 2011. Site water management at level 1 mines across Queensland. Targeted compliance inspections of high-risk mine sites in north Queensland.	Minimisation of wastewater discharges from mines during high rainfall events.
Mining rehabilitation (financial assurance)	To address any gap between total financial assurance held by the State and the total cost of rehabilitating disturbed land. To prevent financial liability associated with unexpected closure (such as bankruptcy) of mines.	To ensure mining plans of operations accurately reflect disturbed land and financial assurance calculations. To improve tools for DERM staff to accurately assess rehabilitation progress and financial assurance requirements.	Four-year project from August 2008 to 2012. Mining rehabilitation and financial assurance issues at level 1 mining operations across the state. Compliance inspections of a selection of mine sites across Queensland.	Improved accuracy of plans of operations, which disclose rehabilitation works and costs. Adequate financial assurance is held by the State.

Project	Goal	Objectives	Scope	Expected outcomes
<p>Petroleum and gas (P&G) activity, including coal seam gas (CSG) and underground coal gasification (UCG)</p>	<p>To track and manage the P&G sector's environmental performance and impacts on Queensland's environment.</p>	<p>To ensure industry holds and complies with the correct level environmental authority for the activity being carried out.</p> <p>To improve outcomes for protecting receiving waters, including groundwater, from discharge impacts, and protecting environmentally sensitive areas and important agricultural land.</p> <p>To increase awareness of rehabilitation practices, challenges faced and success rates.</p> <p>To ensure that residual salt is managed and not allowed to contaminate the landscape.</p> <p>To minimise and ensure remediation of impacts to other water users from CSG water extraction activity.</p> <p>To minimise the impacts of petroleum activities on the amenity of the community.</p>	<p>Administer CSG water management policies and legislation amendments when assessing disposal options for CSG water, including salt management and disposal—banning the use of evaporation dams unless there are no feasible alternatives, and ensuring town drinking water supplies are protected.</p> <p>An assessment of compliance by the petroleum and gas sector commenced in August 2010 and continues until April 2011.</p> <p>Level 1 and 2 petroleum activity, as well as UCG trials, will be proactively inspected. Any beneficial use approvals related to petroleum activities will also be assessed.</p> <p>Compliance inspections will assess disturbance to land, water management and releases, dam management including hazard assessment, and rehabilitation of completed activities.</p> <p>Approximately 150 groundwater bores will be sampled to assess the impacts of CSG activities on groundwater.</p> <p>Community concerns about petroleum activities will be responded to, and landowner opportunities and access to information on CSG activities on their properties, will be enhanced.</p>	<p>Minimise harm to high value conservation areas, namely Category A, B and/or C environmentally sensitive areas.</p> <p>Manage risk of dams to prevent contaminant releases to land and/or waters.</p> <p>Rehabilitation successfully undertaken to restore the land after activities cease.</p>
<p>Landfill gas migration</p>	<p>To establish a risk status for subsurface migration of landfill gas from Queensland landfills.</p>	<p>To ensure landfills operators are managing landfill gas appropriately.</p> <p>To identify any risks posed to encroaching land uses on landfill facilities.</p>	<p>Complete a desktop study to identify landfill sites within Queensland that are at risk of encroachment by incompatible land uses, prioritising putrescible waste facilities and large facilities in the first instance.</p> <p>Conduct site audits of high risk facilities and complete a review of landfill gas management procedures. Where existing data does not confirm 'no gas migration', require evaluation of potential gas migration pathways.</p>	<p>Develop a risk profile associated with potential landfill gas migration for Queensland landfill facilities.</p>

Further information – *Environmental Protection Act 1994*, draft Code of environmental compliance for level 2 petroleum activities.

3. Queensland heritage conservation

Heritage places contribute to our sense of place, reinforce our identity and help define what it means to be a Queenslanders. Heritage places include buildings and structures, cemeteries, archaeological sites, gardens, urban precincts and cultural landscapes.

Development involving a place on the Queensland Heritage Register must minimise the impact on the heritage values of the place, although changes designed to give a heritage place new life can often be accommodated and are regularly encouraged. Development work to heritage-listed places must first be approved by DERM with either an exemption certificate or development permit. Unauthorised works and failure to maintain heritage places is of particular concern to the department.

General compliance monitoring or assistance

- Provide information and advice on complying with development conditions and essential maintenance obligations, as requested.
- Work with individuals undertaking development on heritage places to ensure the cultural heritage significance of the place is retained.

Compliance projects

Project	Goal	Objectives	Scope	Expected outcomes
Approved development and essential maintenance compliance	To protect the cultural heritage significance of places on the Queensland Heritage Register.	To ensure essential maintenance obligations are met. To ensure development consent conditions are observed and met.	Continued focus on heritage places identified as posing a high risk of disrepair in 2009–10. Heritage places for which there are recently issued notices or permits will also be inspected across the state.	Improved percentage of clients meeting their compliance obligations.

Further information – *Queensland Heritage Act 1992*, Queensland Heritage Strategy 2009.

4. Indigenous heritage conservation

Cultural heritage is the physical traces left behind by past inhabitants, both tangible and intangible, and is strongly tied to Aboriginal and Torres Strait Islanders' connection to the land and sea. Cultural heritage management involves effectively recognising, protecting and conserving Indigenous cultural heritage, which includes areas, objects, rituals and traditions.

Cultural heritage can easily be destroyed and it is the responsibility of all Queenslanders to help protect it. Anyone conducting activities in areas of significance, irrespective of the underlying land tenure, must take all reasonable and practical measures to avoid harming Indigenous cultural heritage (known as the 'duty of care').

Duty of care guidelines should be referred to prior to undertaking a land-use activity. While DERM can provide information on previously identified Indigenous cultural heritage places, people carrying out land-use activities should not rely solely on previous work, but rather consult with the relevant Indigenous party to determine the location and extent of any cultural heritage places or objects affected by the proposed activity.

General compliance monitoring or assistance

- Education workshops to be carried out, where possible, for Traditional Owners, other government agencies, proponents and local governments.
- Working with individuals undertaking intensive land use activity, to improve operational procedures to better protect cultural heritage.
- Respond to reports of allegations of damage and disturbance to cultural heritage places.

Further information – *Aboriginal Cultural Heritage Act 2003*, *Torres Strait Islander Cultural Heritage Act 2003*, *Duty of Care Guideline*.

5. Land management

State land

DERM administers about 70 per cent of land in Queensland, commonly referred to as State land. State land comprises unallocated State land, land held under leases, reserves including deeds of grant in trust, and all dedicated roads. Over each of these tenure types, secondary tenures, such as subleases, licences and permits, may be issued.

Occupying and using unallocated State land is illegal without the prior authority of DERM. Illegal occupation leads to risks, such as personal injury or the loss of life or property because of wild fire, coastal erosion, unsafe structures, pollution, and public health and safety issues, associated with unplanned development and poor living conditions, such as lack of potable water, sanitation and garbage disposal facilities.

Leases and licences are granted over State land for specific purposes, including pastoral, grazing, agriculture, industry, tourism, sport and development. Permits to occupy can be issued over unallocated State land, a road, or reserve for a specific purpose, such as a pump site or for short-term grazing. To protect values on leasehold land, land management agreements may be negotiated with lessees on how values will be protected.

In managing State land, DERM ensures land managers comply with their duty of care, comply with the conditions of use or trustee responsibilities, and collect an appropriate return to the State on behalf of the community for use of the land. The duty of care that applies to rural leasehold land that is leased for agricultural, grazing or pastoral purposes, is outlined in the Delbessie Agreement. This agreement takes into account the aspirations of leaseholders, conservation and Indigenous groups, and rural industry.

General compliance monitoring or assistance

- Promote effective and sustainable land management practices through departmental and industry support services.
- Further develop remote sensing capability to identify long-term condition trend risk properties for audit purposes.
- Annual review of major development leases.
- In association with DERM's debt management program, ensure lessees comply with terms and conditions of leases particularly rent payments.
- Help lessees implement land management agreements, including through compliance inspections and assessment processes.
- Develop and publish self-assessment guidelines for use by lessees.
- Identify illegal occupation of State land during fire and pest management activities and other inspection opportunities. Progressively deal with illegal occupation throughout Queensland as resources permit.

Further information – *Land Act 1994*, *Land Regulation 1995*, *Delbessie Agreement* (*State Rural Leasehold Land Strategy*).

Stock route network

Stock routes are pathways for travelling stock on roads, reserves, and other lands. They provide pastoralists with a means of moving stock 'on the hoof' around the state's main pastoral districts as an alternative to trucking and other contemporary transport methods. Approximately 72,000 kilometres (covering 2.6 million hectares) of Queensland's road network is declared as stock route. These routes, together with reserves for travelling stock, make up the Queensland Stock Route Network (SRN). There are many facilities for travelling stock use associated with the network, including more than 700 operational stock route water facilities.

Select local governments are required to have a stock route network management plan, which outlines how the local government will manage and administer the SRN in their local government area, including issuing permits to travel and agist stock on the SRN and managing the natural values located on the SRN.

A landowner or stockowner must apply to the relevant local government for a permit to walk (travel permit) or graze (agistment permit) stock on the SRN. Water agreements must be in place where a landholder takes a supply of water from a stock route water facility, or supplies water to a stock route water facility. Water agreements negotiated under previous legislation have been terminated in order to introduce a consistent equitable water agreement framework. Previous agreements must be replaced with new agreements where a landholder continues to take or supply water.

When land that has a stock route crossing is sold, the stock route must not form part of the land that is transferred to the buyer.

General compliance monitoring or assistance

- Review local government stock route network management plans to ensure inclusion of policies to promote compliance.
- As requested by applicants, review local government permitting decisions, for both stock travel and agistment, to ensure permitting decisions are made in accordance with legislative provisions and approved local government policy.
- Help local governments establish water agreements with landholders taking water from, or supplying water to, stock route water facilities.
- Review rural property sales, and inform real estate agents if their listings include stock routes.

Further information – *Land Protection (Pest and Stock Route Management) Act 2002*, Queensland Stock Route Network Management Strategy 2009–14.

6. Estate management

Conservation estate

The management principles of conservation estate are to:

- provide, to the greatest possible extent, for the permanent preservation of the area's natural condition and protect the area's cultural resources and values
- present the area's cultural and natural resources and their values
- ensure that the only use of the area is nature-based and ecologically sustainable.

The majority of visitors to, and users of, the conservation estate behave in a reasonable and sustainable manner. However, on occasion DERM's Queensland Parks and Wildlife Service (QPWS) deals with non-compliant activities, including inappropriate visitor behaviour, illegal or unsustainable vehicle use, grazing or cattle incursions, green waste and other litter dumping, illegal firewood collection, tree clearing and other boundary incursions, and interference with historic sites.

General compliance monitoring or assistance

- Systematic program of compliance and education patrols, particularly during high volume visitor periods at Easter and Christmas.
- Systematic program of compliance and education patrols on Fraser Island to ensure visitor safety near dingoes.
- Audit commercial tour operators to verify compliance with permit conditions and legislative obligations.

Compliance projects

Project	Goal	Objectives	Scope	Expected outcomes
Arson in the Lockyer Valley	To protect ecosystems on QPWS-managed estate from damage caused by arson.	To protect life and property from loss caused by arson on QPWS-managed estate. To educate the public, rural communities and park neighbours about the QPWS fire management program.	Lockyer Valley protected areas and forests. In partnership with Queensland Fire and Rescue Service. QPWS fire management program implemented.	Alleviate community concern about fire risk arising from protected areas and QPWS-managed estate. Community understanding of, and respect for, QPWS fire management leads to the elimination of arson. Unnecessary land clearing by property owners in response to perceived fire risk is reduced.

Project	Goal	Objectives	Scope	Expected outcomes
Inappropriate vehicle use in national parks	To avoid environmental degradation and disturbance to wildlife, and to enhance visitor amenity and safety through eliminating illegal use of vehicles in protected areas.	To educate users about requirements for recreational vehicle use in managed estate, and ensure they are complied with. To contribute to planning processes to identify appropriate sites for recreational vehicle use on and off QPWS-managed estate.	Byfield National Park and D'Aguilar National Park. In partnership with Queensland Police and local government, where appropriate.	Reduced occurrence of illegal vehicle use. Reduced occurrence of accidents resulting in personal injury.

Further information – *Nature Conservation Act 1992*, Nature Conservation (Protected Areas Management) Regulation 2006, *Recreation Areas Management Act 2006*.

Marine parks

Marine parks are established over tidal lands and waters and protect habitats, including mangrove wetlands, seagrass beds, mudflats, sandbanks, beaches, rocky outcrops and fringing reefs. DERM's Queensland Parks and Wildlife Service (QPWS) has a comprehensive program to ensure stakeholders are aware of their compliance obligations. This is achieved through interpretation, awareness, information and education. However, there continues to be unlawful activities impacting on nature conservation within these areas.

QPWS, in conjunction with the Great Barrier Reef Marine Park Authority, focuses on issues including fishing in protected zones, illegal taking of vulnerable marine and terrestrial species, damage to cultural resource or sites, non-permitted tourism operations, littering, and illegal structures and dredging.

General compliance monitoring or assistance

- Patrols during the day or night around problem sites at various locations within the Great Barrier Reef World Heritage Area and State Marine Park.
- Implementation of the Moreton Bay Marine Park Zoning Plan, in particular ensuring visitors conduct appropriate activities in green zones.
- Respond to shipping and pollution incidents.

Further information – *Marine Parks Act 2004*, *Great Barrier Reef Marine Park Act 1975*, marine park zoning plans.

Commercial native forests

DERM manages native forest timber production and the sale of quarry materials from State forests, timber reserves and other State-controlled lands across Queensland, as well as administering permits for apiary sites and stock grazing on designated areas of State forest. DERM's goal is to maximise financial returns to the State from the management of native forest products and quarry materials, within social, environmental and cultural expectations.

While managing the commercial sale of forest products, enhancing access to State-owned quarry resources to support infrastructure development projects, and improving the efficiency of commercial management of State-owned forest resources, DERM also ensures all native forest and quarry activities on State lands comply with relevant environmental legislation and applicable codes of practice. DERM regularly monitors timber production activities and provides constructive feedback to harvesting contractors to improve overall environmental performance. Compliance monitoring will focus on activities that have the potential to cause soil erosion and damage to forest roads and tracks.

General compliance monitoring or assistance

- Educate contractors about the correct application of sales permit terms and conditions and codes of practice, including introducing koala identification training.
- Regular monitoring of all sales activities in relation to sales permit conditions and codes of practice.
- Investigate removals of forest products and quarry materials not consistent with the regulations.

Further information – *Forestry Act 1959*, Code of Practice for Native Forest Timber Production on State Lands 2007.

7. Vegetation management

Regional ecosystems are communities of native vegetation consistently associated with a particular combination of geology, land form and soil in a bioregion. Each regional ecosystem has been assigned a conservation status based on its current remnant extent (how much of it remains) in a bioregion.

Regulating the clearing of remnant vegetation ensures the conservation of biodiversity, maintains ecological processes and ensures clearing does not cause land degradation. In Queensland, this regulation is predominantly achieved through the *Vegetation Management Act 1999* and the *Sustainable Planning Act 2009* (the vegetation management framework).

Under the vegetation management framework, clearing remnant vegetation identified on a regional ecosystem or remnant map (on freehold land, Indigenous land, and State tenures) can only occur if done under a development permit or if considered exempt development. Exempt activities include routine clearing required to manage existing fence lines, yards, establishing firebreaks and burning off. Clearing requiring a development permit can only occur for certain purposes, including significant projects, to control non-native plants or declared pests, ensuring public safety, necessary infrastructure, fodder harvesting, thinning, clearing of encroachment or extractive industry.

Since October 2009, regulated regrowth vegetation on freehold, Indigenous and leasehold land for agricultural and grazing is also protected. No permit is required to clear regulated regrowth on such tenures. However, landholders need to notify DERM that they intend to clear and any clearing must comply with the regrowth code. The government introduced the new regrowth laws to protect high-value regrowth vegetation and native vegetation alongside waterways in priority Great Barrier Reef catchments. On some other State land tenures the clearing of native woody regrowth may require a development permit.

Under certain circumstances, clearing vegetation for a development may be offset by the management and protection of another area of ecologically equivalent vegetation.

General compliance monitoring or assistance

- Continue industry co-delivery implementation program for vegetation management, in partnership with Agforward and the Queensland Farmers' Federation, to help landowners understand their obligations under the new regrowth arrangements.
- Use the Statewide Landcover and Trees Study to detect potential unlawful clearing and understand shifting patterns of unlawful clearing.
- Continue to work with clients (including local governments) to improve their understanding of the vegetation management framework. In response to unexplained clearing, staff will undertake appropriate compliance actions that may include discussions with landholders, warning letters, Property Maps of Assessable Vegetation (PMAV) and restoration notices.

Compliance projects

Project	Goal	Objectives	Scope	Expected outcomes
Vegetation management framework – best management practice	To promote and enable effective interpretation and implementation of the vegetation management framework.	To make refinements to vegetation management codes, making them more practical and understandable. To increase client awareness and ability to interpret and implement aspects of the vegetation management framework.	Remake of the Regrowth Vegetation Code, based on feedback received and a review of its implementation. The remake will include more comprehensive best management practice guidelines to help landholders understand and comply with the code. Finalise random audit and survey of the Native Forest Practice Code. Website updates and improvements to assist landholders in understanding the vegetation management framework.	Release of a new version of the Regrowth Vegetation Code by the end of 2010, incorporating improvements. Increased compliance with vegetation management framework. Increased opportunity for self-regulation and education.
2007–2008 Statewide Landcover and Trees Study (SLATS) identification of vegetation clearing	To identify and prioritise vegetation clearing cases for investigation in a targeted manner.	To review the 12 500 hectares of unexplained clearing reported in the Analysis of Vegetation Clearing Rates in Queensland report (supplementary report to the SLATS Landcover Change in Queensland 2007–2008 report), prioritising possible illegal clearing for further investigation.	Unexplained clearing is remotely identified from the 2007–2008 SLATS. Further analysis and prioritisation will occur to determine clearing that requires further investigation. Compliance responses will be implemented where appropriate, based on the scale of clearing and the biodiversity value of the vegetation cleared.	Appropriate investigation and enforcement of illegal clearing. Compliance actions include discussions with landholders, warning letters, penalty infringement notices, restoration notices or legal proceedings.

Further information – *Vegetation Management Act 1999*, State Policy for Vegetation Management, Regional Vegetation Management codes, Regrowth Vegetation Code, Native Forest Practice Code, *Sustainable Planning Act 2009*, Vegetation Management Concurrence Agency Policies for Material Change of Use and Reconfiguring a Lot, Queensland Government Environmental Offsets Policy and the Policy for vegetation management offsets.

8. Wildlife and ecosystems

As well as its management of wildlife on conservation estate (such as national parks), DERM manages interaction between people and protected native wildlife 'off-park'. DERM aims to conserve and protect the wildlife while being responsive to the social and economic needs of the community.

Areas of interest to DERM include wildlife harvesting, damage mitigation, problem wildlife and incident response, enforcement and compliance, and licensing and permits. A major part of DERM's approach is liaison and engagement with key stakeholders, the general community and other parts of government.

In a vast state hosting a diverse and vast array of species, ecosystems and significant sites, nature refuges fill an important niche in promoting a community-based landscape approach to conservation. Nature refuges are voluntary agreements between a landholder and the Queensland Government that acknowledge a commitment to manage and preserve land with significant conservation values while allowing compatible and sustainable land uses to continue. Nature refuges comprise the second largest expanse of Queensland's protected areas estate. With more nature refuges changing hands from one landowner to the next, the department is committed to ensuring that new landowners are aware of their obligations under these conservation agreements. The investigation of breaches of nature conservation legislation on nature refuges includes breaches by landowners and may include breaches by third parties.

DERM is protecting more areas as national park to secure our unique biodiversity, by increasing land for conservation by 50 per cent. This will bring the total land protected in national park estate to 12.9 million hectares. As a result, some State forests and unallocated State land are being converted to protected area. As a result, the department is keen to ensure that commercial users and visitors to these newly created protected areas are aware of their new obligations.

General compliance monitoring or assistance

- Inspect commercial macropod harvesters, dealers and processors, and monitor permit return data to ensure annual quotas for commercial harvesting of macropods are not exceeded and relevant codes are being complied with.
- Implementation of the Crocodile Management Strategy, to enhance community awareness and reduce negative interactions between human and estuarine crocodiles.
- Monitor flying fox roosts near urban areas and fruit growing farm practices, to ensure lethal or illegal disturbance of flying fox populations are not occurring.
- Investigate any suspected, reported or identified breaches of nature conservation legislation on nature refuges.
- Investigate any reported or identified potential breaches of nature conservation legislation concerning the taking of wildlife from the wild, particularly with respect to threatened species.

Further information – *Nature Conservation Act 1992*, Nature Conservation (Wildlife Management) Regulation 2006, National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes 2008.

9. Water supply

Water use

Water is a fundamental and vital resource that underpins the prosperity and wellbeing of all Queenslanders. Regional water supply strategies are the Queensland Government's approach to ensuring short- and long-term regional water supply security. These strategies, developed in partnership with local governments, water service providers, industries and community groups, balance water demand and supply requirements and provide regional water supply solutions for the next 50 years. Water resource plans complement parallel initiatives like regional water supply strategies.

DERM is responsible for planning the state's future needs by securing supplies for social and economic needs, such as towns, industry, irrigation, mines, fisheries, and tourism, while setting out strategies to support river health. Water resource plans, resource operations plans and resource operations licences are DERM's principal tools to strategically manage water. Water metering provides a clear picture of water-use patterns to enable effective planning, allocation and management of the resource.

Landowners require authorisation in the form of a water licence, water allocation or water permit to access, use, or distribute surface and underground water. Development permits may also be required to construct works that either take or interfere with water. Unlawfully taking water, or interfering with a watercourse, can jeopardise both the ability of other users to enjoy the benefit of the resource and the ecosystems that rely on the water.

In the case of underground water, bore drilling can reduce pressure in aquifers, possibly cross contaminate aquifers and harm nearby ecosystems, so it is important that best practice standards are complied with.

A national framework for ensuring that water users comply with their legal obligations is being developed by the Australian Government. If it is endorsed by the Council of Australian Governments, DERM will implement the framework by increasing monitoring of high-risk water resources, providing additional education to water users and moving towards nationally consistent offences, penalties and best practice compliance tools.

General compliance monitoring or assistance

- Audit water supply scheme operations, including monitoring data, and particularly in areas where a new resource operations plan has commenced.
- Respond in a timely manner to all reports of water entitlement overuse, unlawful take of water, or illegal works in water courses.
- Ensure subartesian and artesian bores are drilled to the respective best practice standards, compliant with work approvals, and drilling logs are submitted.
- Monitor, as required, approved land and water management plans under the *Water Act 2000* to ensure risks from irrigation water use are properly managed.

Compliance projects

Project	Goal	Objectives	Scope	Expected outcomes
Statewide meter compliance project	To reduce the risk of overuse and degradation of the water resource, such as salt water intrusion.	To ensure landholders operate in accordance with their water use entitlements. To inform clients about meter installations and potential impacts on the resource from overuse.	Landholders within metered areas of the state. Meter readings will be reviewed in accordance with water sharing rules, to identify and make landholders aware of potential non-compliance with entitlements. Inspections of works exempt from metering, to determine if still appropriate.	Maximised water resource security. Environmental flow conditions are met.

Further information – *Water Act 2000*, water resource plans, minimum standards for the construction and reconditioning of water bores that intersect the sediments of artesian basins in Queensland.

Service provision

Providing water, sewerage services and water dam safety is regulated under the *Water Supply (Safety and Reliability) Act 2008*.

Service providers (except recycled water providers) must be registered, and where required, must have approved plans (or exemptions) in place to ensure a continuity of the provision of water and sewerage services.

Owners of water supply referable dams in Queensland are also required to ensure that they meet the requirements of the Act. Guidelines have been written to help clients address their responsibilities.

A shortage of suitably qualified people to help meet legislative requirements or time frames can impact upon the ability of owners of small size referable dams and small and/or remote service providers to meet their obligation. Introducing new requirements for drinking water and recycled water that require incident and water quality reporting has highlighted difficulties in relation to resource availability and workforce skills and capacity. The recent drought has identified the importance of drought management plans in helping service providers ensure they can meet community needs during water supply shortages.

DERM provides general information to service providers and dam owners to help them comply with their regulatory requirements, and works individually and collectively with service providers and dam owners to discuss issues and identify ways to improve compliance.

General compliance monitoring or assistance

- Ensuring primary plans that are due, are received. The main focus for 2010–11 is on drought management plans for larger urban communities, drinking water quality management plans, and recycled water management plans.
- Working with dam owners and key stakeholders to ensure spillway upgrades occur in accordance with the timings approved by DERM.
- Educating, informing and working with drinking water providers to ensure that they:
 - undertake E.coli monitoring at the required frequency and sample numbers
 - report all water quality incidents as required and manage them appropriately
- Monitor and work with service providers with an approved recycled water management plan to ensure they are complying with their plans.

Further information – *Water Supply (Safety and Reliability) Act 2008*.

More information

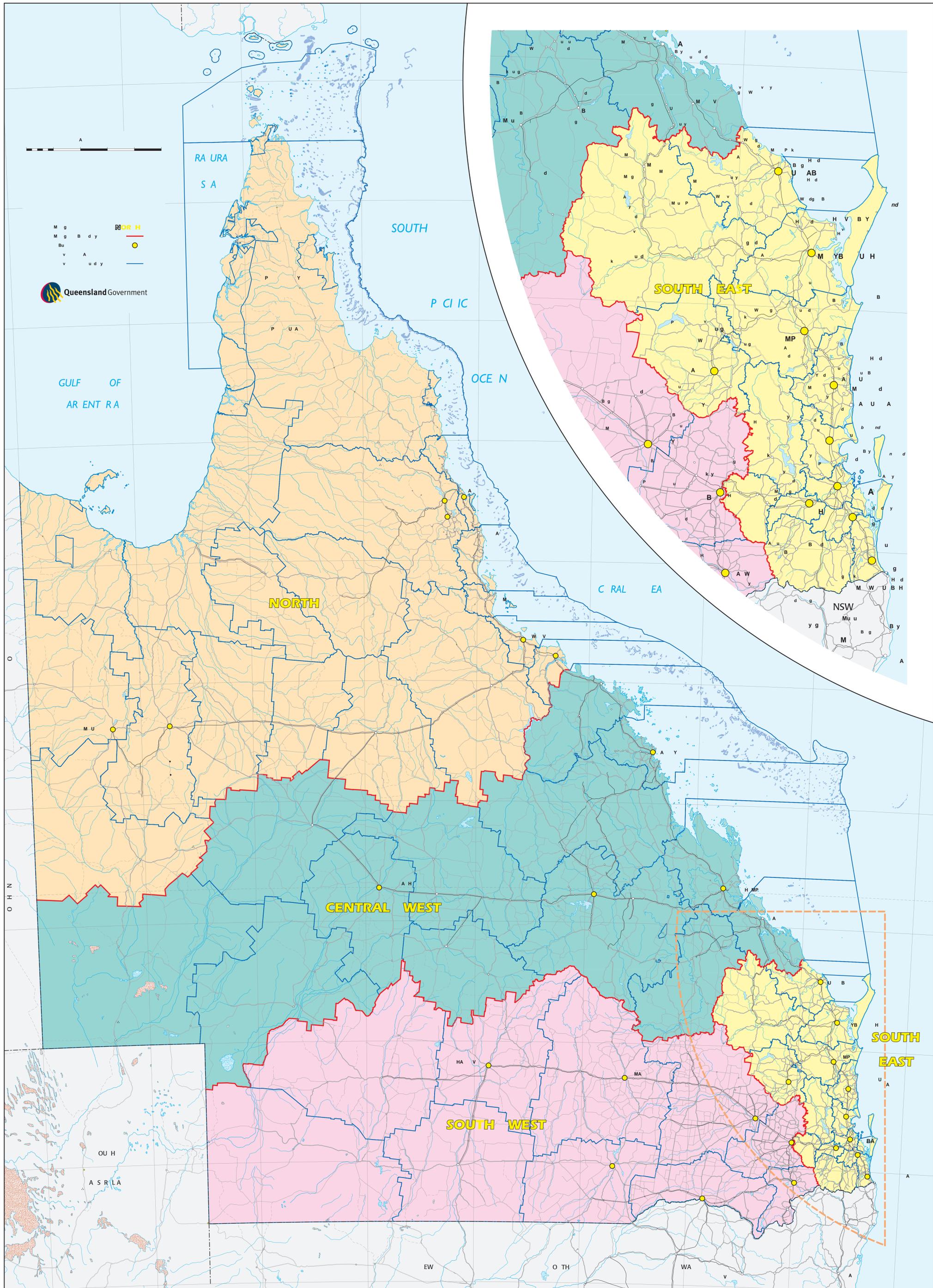
To view this plan, previous annual compliance plans, or the Compliance Strategy 2010–14, visit <www.derm.qld.gov.au>.

For general enquiries, contact 13 74 68 (13 QGOV).

To provide feedback on this plan, visit <www.derm.qld.gov.au> to lodge a comment or complaint.

Queensland

Department of Environment and Resource Management Regions



Assessment of Formal Investigation Requests

Information Sheet

The purpose of this document is to outline the considerations used to assess formal investigation requests.

How Formal Investigation Requests Are Assessed

Upon receipt of a Formal Investigation Request (FIR), the Investigations Team within the Compliance & Investigations Branch assesses a FIR to determine whether the matter should be formally investigated (with a view to producing a full brief of evidence for potential litigation proceedings). The assessment is recorded in a document called 'Assessment Report – Formal Investigation Request'.

The purpose of the assessment is to ensure that DERM delivers proportionate, consistent, transparent, accountable and effective enforcement decisions. This is achieved by directing resources to matters which warrant a formal investigation.

Generally, a decision to commence a formal investigation is made where certain factors indicate that litigation proceedings are warranted. Under DERM's Enforcement Guidelines, litigation proceedings are considered the appropriate enforcement tool in serious matters and/or where dishonesty or wilful conduct is involved.

Assessment considerations

The assessment of a FIR is based on DERM's Enforcement Guidelines. In particular, the Investigations Team will consider the information provided on a FIR under the following questions:

- Did the conduct involve dishonesty?
- Has there been an attempt to deceive DERM?
- Has DERM been given false or misleading information by the alleged offender?
- Was the conduct wilful (i.e. was it intentional, reckless or negligent)?
- Was the conduct motivated wholly or partly by commercial considerations?
- Was there a failure to assess, manage or mitigate risk associated with the conduct or activity?
- Did the conduct result in commercial gain?
- Did the conduct result in severe or irreversible harm to the environment, natural resources, human health or property?
- Did the conduct have the potential to result in severe or irreversible harm to the environment, natural resources, human health or property?

Affirmative answers to the above suggest that a formal investigation is warranted. A formal investigation is generally required where the conduct concerned is of such a serious nature as to warrant high level enforcement action. Decisions to commence formal investigations will vary depending on the particular circumstances of each case.

There are a number of other factors that will be considered by the Investigations Team when assessing a FIR, such as, the seriousness and nature of the alleged offence, whether the alleged offender has previous history with DERM and the degree of culpability of the alleged offender.

Alternative enforcement tools are evaluated prior to the submission of a FIR and by the Investigations Team when assessing a FIR. Consideration is given to the following:

- Is there an alternative enforcement tool to litigation proceedings which would be an effective means of responding to the non-compliance? Alternative enforcement tools include, for example, education/warning letters, Penalty Infringement Notices, Show Cause Notices or Environmental Protection Orders.
- Is the alternative enforcement action effective in achieving the object of the Act being administered?
- How the alternative enforcement action may be perceived by the public?
- Whether the alternative enforcement action would be a sufficient deterrent?

Completion of the Assessment

Following the consideration of a FIR, the Investigations Team will recommend a proposed course of action. Given that every case is different, the assessment of FIRs is flexible to ensure that DERM's enforcement response is proportionate, consistent, transparent, accountable and effective.

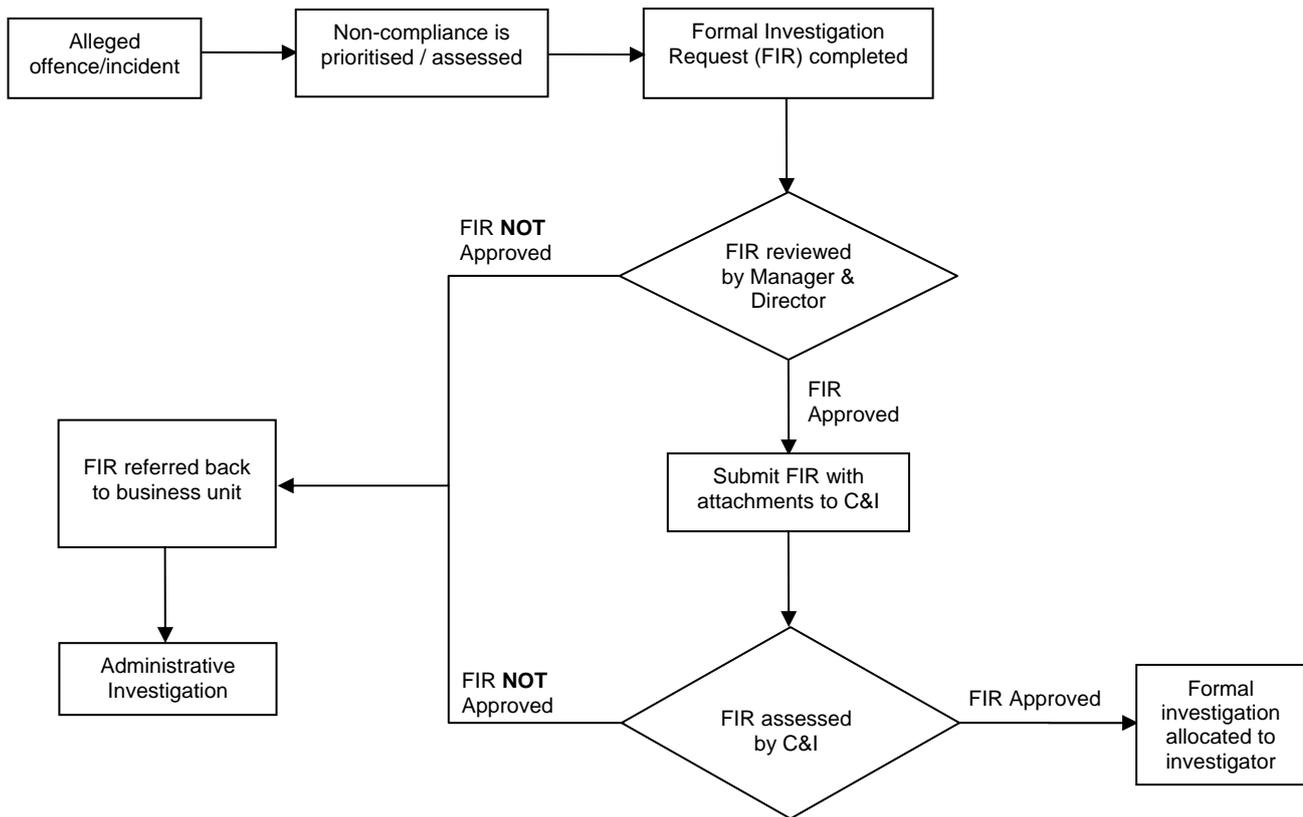
Based on the above, the Investigations Team will recommend whether the FIR should be approved or not approved. Comment may also be made on the type of litigation proceedings or alternative enforcement action that may be appropriate in light of the recommendation.

Decisions will be communicated to key stakeholders to build a greater understanding of decisions following formal investigation requests. Copies of completed assessments are available on request.

Resources

Availability of resources within the Compliance and Investigations Branch is also a consideration when assessing a FIR. Matters are prioritised using a state-wide perspective of DERM's compliance priorities.

Process Overview



ASSESSMENT REPORT – FORMAL INVESTIGATION REQUEST

This assessment report documents the recommendation and reasoning of the Investigations Team following the assessment of a Formal Investigation Request.

1. DETAILS OF ASSESSMENT

Date	<INSERT date request was received>
Assessing Officer	<INSERT name and position of assessing officer completing this report>
Contact Details	<INSERT phone number and e-mail address>
Timing	<INSERT details including date and reasons of any relevant timeframes> <input type="checkbox"/> Tick this box if the matter urgent (i.e. requires action within 6 months)

2. OFFENCE/INCIDENT

Offence	<INSERT details of the alleged offence/incident>
Relevant Legislation	<INSERT offence provision and legislation>
Alleged Offender(s)	<INSERT primary alleged offender and any other potential alleged offenders>

3. RECOMMENDATION

<input type="checkbox"/> APPROVE FORMAL INVESTIGATION REQUEST Type of litigation to be considered:
<input type="checkbox"/> NOT APPROVE FORMAL INVESTIGATION REQUEST Recommendations/comments:

4. ASSESSMENT

What were the primary considerations for the recommendation?	
What other considerations were relevant to the assessment?	
Comments on availability of other enforcement actions	
Are there any counter productive features/implications of the proposed enforcement action?	

Was there any contact/further information obtained from the DERM officer who submitted the request?	
Is there any further evidence required to support or improve prospects of success for the proposed enforcement action?	
Comments on any relevant DERM material (e.g. Annual Compliance Plan, Compliance Strategy, Enforcement Guidelines)	
Other comments	

5. ASSESSING OFFICER SIGN OFF

Name	Signature	Date

6. APPROVAL

State Manager, Compliance and Investigations		
<input type="checkbox"/> Approve Recommendation <input type="checkbox"/> Not Approve Recommendation		
Comments		
Name	Signature	Date

Director, Compliance and Investigations		
<input type="checkbox"/> Approve Recommendation <input type="checkbox"/> Not Approve Recommendation		
Comments		
Name	Signature	Date

7. COMMUNICATION

Name	Position	Date
Communicated by and method of notification:		

Audit checklist

Compliance

Compliance program — audit checklist

Where undertaking a Level C audit this checklist must be used to ensure that each aspect of a condition, standard or legislation is addressed throughout the Audit. It may also be used for Level B inspections.

GENERAL INFORMATION

Company name:		
Trading as:	EA/DA no. (if applicable):	
Description of Business Activity / ERAs:		
Site street address:		
Suburb:	City/Town:	Post Code:
Registered Office address (if different to site address):		
Suburb:	City/Town:	Post Code:
Site representative:	Position:	Contact phone:

AUDIT DETAILS

Date of audit:	Inspection Type		
	<input type="checkbox"/> Preliminary	<input type="checkbox"/> Compliance Assessment	
	<input type="checkbox"/> Potential enforcement measure	<input type="checkbox"/> Compliance progress check	
Environmental risk (1-5):	Inspection level	<input type="checkbox"/> A	<input type="checkbox"/> B <input type="checkbox"/> C
Audit focus is the following relevant Agency interests:			
<input type="checkbox"/> ERA	<input type="checkbox"/> Mining	<input type="checkbox"/> Contaminated land	<input type="checkbox"/> Petroleum
<input type="checkbox"/> Cultural heritage	<input type="checkbox"/> Coastal	<input type="checkbox"/> Other	
Details of scope or particular focus (if applicable):			

Audit protocol

Permit / Approval No.	
Condition No.:	Compliant: yes <input type="checkbox"/> no <input type="checkbox"/>
Element / Question	
Observations	
Options for remediation	
Condition No.:	Compliant: yes <input type="checkbox"/> no <input type="checkbox"/>
Element / Question	
Observations	
Options for remediation	
Condition No.:	Compliant: yes <input type="checkbox"/> no <input type="checkbox"/>
Element / Question	
Observations	
Options for remediation	
Condition No.:	Compliant: yes <input type="checkbox"/> no <input type="checkbox"/>
Element / Question	
Observations	
Options for remediation	

Legislation / standards etc	
Section / requirement:	Compliant: yes <input type="checkbox"/> no <input type="checkbox"/>
Element / Question	
Observations	
Options for remediation	
Section / requirement:	Compliant: yes <input type="checkbox"/> no <input type="checkbox"/>
Element / Question	
Observations	
Options for remediation	
Section / requirement:	Compliant: yes <input type="checkbox"/> no <input type="checkbox"/>
Element / Question	
Observations	
Options for remediation	

Signoff sheet

Additional comments

Inspecting officer

Signed

Date

Inspecting officer

Signed

Date

Audit – opening meeting

Compliance

Audit Opening meeting – meeting agenda/minutes

This form should be used to record minutes of the opening meeting held between EPA officers and auditee representative/s prior to onsite inspection.

Auditee Details	
Licensee and/or Company Name:	<name>
Site Address	<site address>
Development Approval No.	<insert EA or DA# and delete text opposite not required>
File No.	<Insert file number>
Meeting attendees	
Meeting date and time	/ / at am/pm

Agenda checklist	Minutes
Introduction	
Audit Team	
Confirm receipt of Letter of Intention to Audit	
Explain basis on which the business was chosen	
Confirm audit agenda	
Confirm contacts required for audit	
Are facilities available if required	

Audit Objectives and Scope	Minutes
Audit Objectives Audit Issues Timetable for audit	
Audit Criteria	Minutes
Approval/ Permit Conditions Proponent Commitments made Mitigation measures	
Audit Methodology	Minutes
Objective Evidence Documents, procedures and records May interview personnel Confidentiality of audit evidence Site inspection Will be taking photos and/or videos Audit can be terminated in the event of emergency or finding of significant non-compliance	
Consolidation of Audit Findings	Minutes
Confirm time to produce letter of findings	
EPA officer's name: _____ Auditee representative's name: _____ Auditee representative's signature: _____ Date: ___/___/___	

Audit Plan

Compliance

Audit plan – Objectives, Scope & Criteria

The audit plan must be used for Level C audits. It may also be used for Level B inspections. The audit plan outlines the audit's objectives, scope and timetable, and the outcomes the audit will generate. As an audit is not restricted to the site visit, it is essential for EPA officers to conduct careful and thorough planning before conducting on-site activities.

Auditee Details	
Licensee and/or Company Name:	<name>
Site Address	<site address>
Development Approval No.	<insert EA or DA# and delete text opposite not required>
Environmentally Relevant Activity (number & name):	<Insert ERA & #>
Name and Position of Contact Person/s during Inspection:	

Audit objectives

Audit criteria and reference documents

Audit scope

Statutory declaration

Environmental Protection Act

Environmental evaluation

In accordance with section 325 of the Environmental Protection Act 1994, this statutory declaration must be completed by the recipient of a Notice to conduct or commission an environmental evaluation. A copy of the environmental report must be attached to this statutory declaration.

Oaths Act 1867

QUEENSLAND TO WIT

I

Insert the name of the person making this declaration

of

Insert the street address of the person making this declaration

in the State of Queensland do solemnly and sincerely declare that in accordance with section 325 of the *Environmental Protection Act 1994*, I have:

- not knowingly given any false or misleading information; and
- given all relevant information

to the auditor/investigator who, over the period _____ to _____, conducted:

Insert start date

Insert end date

(tick applicable box)

- the environmental audit, or
- environmental investigation

for the purpose of submitting a report in accordance with the *Notice to conduct or commission an environmental evaluation* pursuant to section 324 of the *Environmental Protection Act 1994* issued by the administering authority to:

Insert name of recipient of the notice

Insert date of the notice

A copy of my report is attached to this statutory declaration and marked "A".

And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the *Oaths Act 1867*.

**Statutory declaration
In relation to an application**

Taken and declared before me,
at

Insert location

this

day of

in the year

Insert day (e.g. 18th)

Insert month

Insert year

Signed

(Person making this declaration)

Signed

(Delete whichever is not applicable — Justice of the Peace
/ Commissioner for Declarations / Solicitor / Barrister)

Printed name and registration number (if applicable)

Statutory declaration

Environmental Protection Act

Auditor/investigator

A statutory declaration is a written statement of facts that is sworn or declared under the Oaths Act 1867. In accordance with section 325 of the Environmental Protection Act 1994, this statutory declaration must be completed by the auditor/investigator who conducted the environmental evaluation. A copy of the environmental report must be attached to this statutory declaration.

Oaths Act 1867

QUEENSLAND TO WIT

I

Insert the name of the person making this declaration

of

Insert the street address of the person making this declaration

in the State of Queensland do solemnly and sincerely declare that in accordance with section 325 of the *Environmental Protection Act 1994*:

- I am the auditor/investigator and author of an environmental report entitled

Insert title of the environmental report

In accordance with the *Notice to conduct or commission an environmental evaluation* pursuant to section 324 of the *Environmental Protection Act 1994* issued to:

Insert name of recipient of the notice

Insert date of the notice

- A copy of my report is attached to this statutory declaration and marked "A";
- I possess the following qualifications and experience relevant to this environmental evaluation:

- I have not knowingly included any false, misleading or incomplete information in the report; and
- I have not knowingly failed to reveal any relevant information or document to the administering authority.

**Statutory declaration
In relation to an application**

I certify that:

- The report addresses the relevant matters for the evaluation and is factually correct; and
- The opinions expressed in it are honestly and reasonably held.

And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the *Oaths Act 1867*.

Taken and declared before me, at _____

Insert location

this _____

day of _____

in the year _____

Insert day (e.g. 18th)

Insert month

Insert year

Signed

(Person making this declaration)

Signed

(Delete whichever is not applicable — Justice of the
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In relation to an application**

I certify that:

- The report addresses the relevant matters for the evaluation and is factually correct; and
- The opinions expressed in it are honestly and reasonably held.

And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the *Oaths Act 1867*.

Taken and declared before me, at

Insert location

this

Insert day (e.g. 18th)

day of

Insert month

in the year

Insert year

Signed

(Person making this declaration)

Signed

(Delete whichever is not applicable — Justice of the
Peace / Commissioner for Declarations / Solicitor /
Barrister)

Printed name and registration number (if applicable)

Cancellation of Infringement Notice

This infringement notice is submitted for confirmation of cancellation. Copy of this report together and copies of notice to be filed at your office for audit purposes.

Office _____

Date _____

Infringement Notice No. _____ was cancelled for the following reason:

Error made during completion. Infringement Notice No. _____ issued in lieu.

Other: _____

This infringement notice is submitted for confirmation of cancellation. Copies (duplicate and triplicate) attached.

Signature _____

Position _____

Date _____

Authorised Use Only

Infringement Notice No. _____ is cancelled.

Copy of this report together and copies of notice to be filed at your office for audit purposes.

Manager signature _____ Date ____/____/____

Chain of Custody Data Sheet & Sample Submission Form

Person(s) who took sample(s)	
Date sample(s) taken	
Start & Finish Times of Sampling	
Location	
Other EPA officers observing sampling	
EPA officer(s) with custody & control of sample from sampling to lab	
Time/Date Received at Lab	
Who received at Lab	
Signature of receiver at lab certifying seal intact	

EPA Contact:

Your Name
 Address
 Phone
 Fax

SAMPLE ANALYTICAL REQUIREMENTS

SAMPLE I.D.	DATE SAMPLED	ANALYSIS REQUIRED



Checklist

Compliance

Compliance program — site inspection hazard checklist

This checklist has been devised to help officers conduct an initial hazard identification and perimeter inspection. (Adapted from the Agency's draft workplace health and safety manual)

Site use: Consider the industry specific hazards.	<i>For industrial sites</i>	
	Engineering	<input type="checkbox"/>
	Light manufacturing	<input type="checkbox"/>
	Food processing	<input type="checkbox"/>
	Waste	<input type="checkbox"/>
	Chemical production	<input type="checkbox"/>
	Health/medical	<input type="checkbox"/>
	Other	<input type="checkbox"/>
	<i>For rural sites</i>	
	Farming	<input type="checkbox"/>
Mining	<input type="checkbox"/>	
Quarrying	<input type="checkbox"/>	
Other	<input type="checkbox"/>	
Personal protective equipment required:	Safety helmet	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Hearing protection	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Eye protection	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Protective clothing	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Protective footwear	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Respiratory protection	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Other	Yes <input type="checkbox"/>
Training for site-specific hazards:	Arrange safety induction training with occupier of Site before any work is done	Yes <input type="checkbox"/> No <input type="checkbox"/>



Compliance program – site inspection hazard checklist

Hazards to look for on perimeter inspection:	Ground: Uneven/Slippery/soft/unstable/holes/drops	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Water hazards (ponds, dams pools of liquid on the ground)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Flash flood (creek beds & s/w pipes)(consider weather)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Structures:	Hazardous means of access and egress	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Platforms/stairs/walkways unstable and poorly maintained/slippery	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Obstacles without guards or barriers from ground level to head height	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	No warning signs, tags or placards visible on fences, buildings, vehicles, containers, tanks, baths or machines	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Biological hazards:	Snakes, guard dogs, bio-wastes	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Evidence of dead fish/vegetation/animals/algae	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Aggressive or violent people (Is police help needed?)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Hazardous substances:	Dust, spray or vapour evident	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Unusual or unpleasant odours (e.g. hydrocarbons or 'rotten egg gas')	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Presence of gas generation/effervescence from pipes/containers or the ground	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Pesticides, asbestos	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Leaking, damaged or bulging drums	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Discoloured liquids, oil slicks or unknown substances (on ground or in water)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Machinery:	Indications of explosive atmosphere	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Use of heavy plant and equipment, such as earth moving machinery, forklifts and trucks	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Overhead gantries, cranes and hoists	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Steam outlets/hot pipes/condensate vents	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Air/water/steam hoses	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Electrical cables/overhead/ground	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Housekeeping, Stable storage of materials (e.g. pallets/timber/bricks)	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Disclaimer:

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Environmental Protection Agency should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Assessment report

Environmental Protection Act 1994

Clean-up notice

This document is for internal use to assist Environmental Service officers to record the information considered by the Department when forming the decision to issue a clean-up notice.

Identifying details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If applicable
File number	File number
Applicant number	Number
Trading as	Trading as details
Registered business address	Address

Note:

1. Assessment reports recommending that a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be approved by the responsible officer, supervisor and the delegated decision maker.

1. Brief history of the matter

Outline any historical information relevant to this decision in succinct dot point form.

Outline the historical information in chronological order.

2. Grounds for use of clean-up notice

Identify the relevant grounds upon which the decision to use a clean-up notice is based:

- a prescribed person has been identified **and**
- a contamination incident has occurred **and**

- the contamination incident has caused or is likely to cause serious environmental harm **or**
- the contamination incident has caused or is likely to cause material environmental harm.

3. Expand upon the grounds

The next step is to expand upon the grounds identified for issuing the clean-up notice. This can include identifying an alleged offence or any statutory requirement which must be met prior to the Department using a clean-up notice.

Each ground should be listed independently and be allocated a separate number.

Number	Specific ground
1	On 1 July 2010, hydrocarbons were observed leaking from the premises of ABC Pty Ltd into Murphy Creek.

4. Detail the matters considered

The purpose of the following table is to ensure that there is evidence to support the grounds for using the statutory tool. This is achieved by linking the elements of the breach to the evidence gathered and the conclusions formed. This section should also record how the Department has met any statutory requirements associated with the use of the tool.

When analysing evidence or developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of the information available, historical details, professional expertise and the weight attributed to any direct testimony provided.

Elements of the offence or legislative requirement	Evidence	Facts and circumstances
<i>List the elements of any alleged offence or (for grounds which are not offences) list the legislative requirement to be met by the Department</i>	<i>Identify the information considered which is relevant to the elements or requirement (i.e. statements, photographs and recordings)</i>	<i>Detail the facts and circumstance that support the Department's findings.</i>
Number 1 (Number taken from Section 2)		
1 July 2010	Notes from phone call from Mrs Green reporting the incident in file no: 1234	The Department received a telephone call from Mrs Green reporting that waste has been leaking into Murphy Creek.
Premises at 123 Creek Road, Murphyville.	Title search of Lot 123 on RP 45678, more particularly known as 123 Creek Road, Murphyville.	ABC Pty Ltd is the registered owner of 123 Creek Road, Murphyville.
2 July 2010	Photographs (x24) of Murphy Creek	Photographs show a thick, grey liquid

	and the area to the rear of premises situated at 123 Creek Road, Murphyville.	flowing from the rear of the premises at 123 Creek Road, Murphyville.
2 July 2010	Water samples taken	Water samples indicate that the liquid escaping from the premises at 123 Creek Road is a crude oil containing a variety of toxic hydrocarbons that meet the definition of contaminant under s11 of the Act. This liquid is leaking from storage tanks situated on the premises owned by ABC Pty Ltd at 123 Creek Road, Murphyville.
Identified the prescribed person	ASIC company search of ABC Pty Ltd.	ASIC company search shows that Mr John Paul Citizen is the sole director/secretary of ABC Pty Ltd. Mr Citizen is the prescribed person for the contamination incident.

5. Natural justice

The responsible officer is required to notify the prescribed person that the Department is considering issuing a clean-up notice and that the person is welcome to make representation to the Department as to why this action should not be taken. Any information provided by the prescribed person is to be documented and considered.

- The person has been provided with the opportunity to put their side of the story forward.
Describe how this was achieved.
- All information and/or defenses provided were considered.
Describe any information or defenses provided.
- The Department has considered the information or defences provided.
What consideration was given and what conclusions has the Department formed?
- The decision maker and responsible officer are free from bias or the perception of bias.

6. Recommended actions of the clean-up notice

List the proposed requirements of the clean-up notice below. In order to ensure conditions are enforceable, they should be SMART (specific, measureable, achievable, relevant and time specific). Refer to the *writing effective and enforceable conditions* procedural guide for more information on writing conditions and requirements.

To ensure the requirements are reasonable officers will need to provide justification for the inclusion of the requirement.

Proposed requirement	Justification
Proposed requirement	Justification

7. Recommended decision

I, the responsible officer recommend a decision that a clean-up notice be issued in relation to the allegation.

8. Approval

Responsible officer	Supervisor
Print name: Name	Print name: Name
Date: Date	Date: Date

Delegate decision maker	Approve/reject recommendation (circle one)
<p>Reasons for decision</p> <p>I approve this recommended decision based upon the information set out above.</p> <p>Or, I approve this recommended decision for the reasons set out above and I note Mr Citizen has previously received a warning letter in relation to this matter.</p> <p>Or, I reject the above recommended decision as I consider it more appropriate for the Department to take an educational approach to this breach.</p>	
Print name: Name	
Date: Date	

Procedural guide

Environmental Protection Act 1994

Clean-up notice

This document is for internal use to assist Environmental Services officers in completing a clean-up notice pursuant to ss 363F to 363L of the Environmental Protection Act 1994.

What is a clean-up notice?

A clean-up notice is a written notice which may be issued by the Department of Environment and Resource Management (the Department) to a person reasonably believed to be a prescribed person for a contamination incident.

The legislative provisions in regard to clean-up notices may be found in Chapter 7 part 5B, ss363F to 363L of the *Environmental Protection Act 1994* (the Act).

Who is a prescribed person?

A *prescribed person* for a contamination incident includes each of the following persons (s363G)—

- a person who caused or permitted the incident to happen
- a person who at the time of the contamination incident was the occupier of the place where the incident occurred
- the person who owns, or is in control of, a contaminant involved in the incident
- if a clean-up notice is issued to a corporation (the first corporation) and it fails to comply with the notice:
 - a parent corporation of the first corporation and
 - an executive officer of the first corporation.

What is a contamination incident?

The legislation defines a *contamination incident* as an event, involving the release (whether by act or omission) of a contaminant into the environment, that the Department is satisfied has caused or is likely to cause serious or material environmental harm.

A contaminant is defined in s11 of the Act as:

- a gas, liquid or solid
- an odour
- an organism (whether dead or alive), including a virus
- energy, including noise, heat, radioactivity and electromagnetic radiation or
- a combination of contaminants.

What is serious environmental harm?

Serious environmental harm is defined in s17 of the Act as environmental harm (other than environmental nuisance)—

- that is irreversible, of a high impact or widespread or
- caused to an area of high conservation value or special significance or
- that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount (\$50,000) or
- that results in costs of more than the threshold amount (\$50,000) being incurred in taking appropriate action to:
 - prevent or minimise the harm and
 - rehabilitate or restore the environment to its condition before harm.
 -

What is material environmental harm?

Section 16 of the Act defines *material environmental harm* as environmental harm (other than environmental nuisance)—

- that is not trivial or negligible in nature, extent or context or
- that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount (\$5,000), but less than the maximum amount of (\$50,000) or
- that results in costs of more than the threshold amount (\$5,000) but less than the maximum (\$50,000) amount being incurred in taking appropriate action to:
 - prevent or minimise harm and
 - rehabilitate or restore environment to its condition before the harm.

When should I use a clean-up notice?

The legislation (s363H(1) of the Act) specifies that the clean-up notice may be issued to a prescribed person for a contamination incident to require the person to take action to—

- prevent or minimise contamination or
- rehabilitate or restore the environment because of an incident, including by taking steps to mitigate or remedy the effects of the incident or
- assess the nature and extent of the environmental harm, or the risk of further environmental harm, from the incident, including by inspecting, sampling, recording, measuring, calculating, testing or analysing or
- keep the Department informed about the incident or the actions taken under the notice, including by giving to the Department stated reports, plans, drawings or other documents.

How do I successfully issue a clean-up notice?

Officers must complete an assessment report to document the decision to issue a clean-up notice as well as completing the clean-up notice.

Step 1 – Complete the assessment report

Before completing the clean-up notice officers are required to complete an assessment report which sets out the facts and circumstances relating to the matter, and documents the decision-making process used by the Department in determining to issue a clean-up notice.

The assessment report is not intended to replicate the Departmental file. Rather it is designed to capture all critical aspects that have led to the Department's decision. Accordingly, the information included should be limited to relevant points only. A template assessment report is attached [\[LINK\]](#).

1. Brief history of the matter

Outline briefly any historical information relevant to this decision, using succinct chronological dot points, and include how the Department became aware of the alleged incident.

2. Grounds for issuing a clean-up notice

Section 363H(1) of the Act provides that a clean-up notice can only be issued in certain circumstances. Please identify the relevant situation or 'grounds' upon which the decision to use a clean-up notice is based.

A clean-up notice may be issued if there has been:

- an incident involving contamination of the environment
- that the Department is satisfied has caused or is likely to cause:
 - serious environmental harm or
 - material environmental harm.

To determine whether an incident has caused or is likely to cause either serious environmental harm, or material environmental harm, officers should consider the context of the contamination incident, the harm caused and its associated long-term effects on the environment.

3. Expand upon the grounds

The purpose of this section is to clearly identify what the Department must 'prove' before deciding to use a clean-up notice and should be used to expand upon the grounds which have previously been identified. This should include the statutory requirements which must be met by the Department prior to issuing a clean-up notice.

Each ground (including breaches or requirements) should be allocated a separate number.

4. Detail the matters considered

The purpose of the table in the assessment report is to link the elements of the breach and/or the grounds to the evidence gathered and the conclusions formed. This is achieved by identifying: the elements of any specific breach or allegation, the evidence which has been considered for each element, and the conclusion that has been reached by the officer.

When documenting the evidence considered, officers should provide relevant points only. Information can include (but is not limited to):

- notes recorded in an officers official notebook
- samples collected for analysis and any subsequent lab reports
- photographs and copies of documents and
- any observed actions and direct testimony received from individuals.

When developing the facts and circumstances, consider the accuracy and relevance of available evidence, historical details, professional expertise and the weight attributed to any direct testimony provided.

5. Provide for natural justice

Prior to the Department making a decision which may adversely impact on an individual or group the Department must:

- **Notify** - Notify the individual that the Department is considering making adverse findings.
- **Respond** - Provide the individual with an opportunity to respond to the allegation.
- **Consider** - Consider any representations made by the affected person before finalising the decision.

The seriousness of the matter will dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers are encouraged to use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. While in some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site inspection or a telephone interview and to take contemporaneous notes, in more serious circumstances a written notification which includes a specific closing date for submissions should be used.

Regardless of the manner in which natural justice is afforded, any information provided by the affected person is to be documented. The summary of information should include how natural justice was provided as well as any responses provided by the affected person.

6. Proposed actions

A clean-up notice must state the actions required of the prescribed person. The officer is responsible for developing proposed requirements for consideration by the delegate. Officers must consider the provisions of s363H1(1) which provides that the clean-up notice must state the actions required of the person in order to—

- prevent or minimise contamination or
- rehabilitate or restore the environment because of an incident, including by taking steps to mitigate or remedy the effects of the incident or
- assess the nature and extent of the environmental harm, or the risk of further environmental harm, from the incident, including by inspecting, sampling, recording, measuring, calculating, testing or analysing or

- keep the Department informed about the incident or the actions taken under the notice, including by giving to the Department stated reports, plans, drawings or other documents.

As prescribed persons are able to seek a review of the Department's decision to impose one or more actions, it is necessary for officers to provide justification for the inclusion of conditions/required actions. Section 363H(7) of the Act provides that actions required of the prescribed person include achieving outcomes.

Requirements must be specific, measureable, achievable, relevant to the breach and time specific. When considering the reasonableness of proposed timeframes for the completion of requirements, officers should take into account all the circumstances, having regard to the actions the recipient must take (including the risk of further harm being caused by the incident). If the location is geographically isolated, the Department should consider allowing additional time to secure appropriate contractors. The notice may also include other relevant information such as how the Department intends to monitor compliance with the clean-up notice, including by using powers under chapter 9 of the Act.

For example:

<p><i>By 24 July 2010, ABC Pty Ltd must repair the leaking bunding surrounding tanks 36 and 45 containing wood preservative pentachlorophenol (PCP). The repair work must be certified by a technical engineer to be structurally sound and guaranteed for a minimum of 5 years.</i></p>	<p><i>The leaking bunding has caused chemical waste to leak from the chemical waste tanks, out of the premises of ABC Pty Ltd and into Murphy Creek causing serious environmental harm. The bunding has been temporarily patched, but must be properly prepared to prevent further incidents of chemical waste leakage.</i></p>
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A template clean-up notice is attached [\[LINK\]](#). Partial

If the recipient of the notice is not the owner of the land on which action is required

If the clean-up notice requires the recipient to take action on land that the recipient does not own, officers must refer to the steps listed below that must be taken in this situation and the additional requirements as outlined in s363J of the Act

The recipient may enter the land to take the action only with the consent of the owner and occupier of the land, or if the recipient or contractor has given at least 5 business days written notice to the owner and occupier.

The notice must inform the owner and occupier of:

- the intention to enter the land and
- the purpose of the entry and
- the days and times when the entry is to be made.

All reasonable steps must be taken to ensure that any inconvenience or damage is kept to a minimum. Section 363J of the Act recipient does not authorise the recipient to enter a building used for residential purposes. If a person incurs loss or damage because of action taken by the recipient, the person is entitled to be paid by the recipient the reasonable compensation for the loss or damage.

7. Recommended decision

The responsible officer is required to make a recommended decision to issue a clean-up notice in relation to the alleged breach. For example:

It is the opinion of the Department that the contamination incident that occurred at the ABC Pty Ltd site on 24

Jones Road has caused serious environmental harm. It is recommended that a clean-up notice be issued.

Administrative decisions are made based upon the balance of probabilities. This means that the decision-maker must be able to determine whether, based upon the information available, it was more likely than not that the event occurred.

Officers are encouraged to consider alternative actions/tools, Departmental enforcement guidelines and details of any consultations including site visit details.

8. Approval

The assessment report and decision to issue a clean-up notice must be approved by an appropriately delegated officer. As the individual (or position) that holds delegation changes regularly, officers must review the Department's list of delegations at <http://insite2.dnr.qld.gov.au/derm/delegations/>. The clean-up notice should be signed by the delegated decision-maker in conjunction with the assessment report which records the formal decision. Decisions made by individuals who do not have the delegated authority to make the decision are generally found to be invalid.

Step 2 - Complete the clean-up notice

The tool must meet a number of legislative requirements in order to be legally binding. Section 363H(2) of the Act provides that a clean-up notice must include the following information –

- the name of the recipient (if there is more than one recipient, each recipient must receive a notice)
- a description of the contamination incident
- the place at or from which the Department is satisfied the incident happened
- the actions the recipient must take (this can include achieving outcomes)
- for each action, the time by which it must be taken.
- that it is an offence for the recipient not comply with the notice unless the recipient has a reasonable excuse
- the maximum penalty for the offence
- that, if the recipient does not comply with the notice, an authorised person may take any of the actions stated in the notice and the Department may recover from the recipient the cost incurred in taking the actions
- the name, address and contact details of the Department
- the review or appeal details.

The legislation (s363H(j)) specifies that the notice must include the review or appeal details. Basic information regarding the review and appeal process is included in the template notice. As well, a copy of the information sheet [Internal review \(DERM\) and appeal to Planning & Environment Court](#) should be attached to the clean-up notice.

Service of the clean-up notice

Service means delivery to the party who will be affected by the notice. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the recipient in question. The following methods of service are acceptable

- For a person:
 - by delivering it to the person personally, or
 - by leaving it at, or by sending it by pre-paid registered post to, the place of residence or business of the person, or
- For a body corporate - by leaving it at, or sending it by pre-paid registered post to, the head office, a registered office or a principal office of the body corporate.

If a notice is issued to two or more recipients, a copy must be given to each recipient (s363I(5) of the Act).

The method of service should be documented by contemporaneous notes, a file note, or any receipts arising from the postage. In particular, officers should record the date, time and method of service. Sending the notice by registered post with confirmation of delivery is good practice to ensure that the notice has been delivered to the recipient.

What follow-up is required?

It is important that the matter is appropriately followed up to make sure that the person to whom the clean-up notice is issued is complying with any requirements imposed. Follow-up is to be scheduled by the relevant officer and their manager. The manager is responsible for ensuring follow-up is undertaken.

This is usually achieved by a site inspection to be conducted one week after the time period nominated in the notice has expired.

Officers are encouraged to use tools such as diary reminders to ensure the matter is followed up in a timely manner.

If the recipient does not comply with the notice, an authorised person may take any of the actions stated in the notice as outlined in s363K of the Act. The Department may recover from the recipient the cost incurred in taking the actions.

What are my record-keeping responsibilities?

Officers are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measures screen (this includes a decision to take no further action). A hard copy of the signed assessment report and any accompanying documents should be placed on the paper file. The Department is required to make, and record, an informed decision about all allegations of non-compliance.

Making changes to an issued clean-up notice

If minor changes, or an extension of time are required, the prescribed person should be notified in writing. If significant amendments are required, officers should, in order to avoid confusion, repeal (revoke) the original clean-up notice, and issue a fresh one on the same grounds with the necessary changes. It is important to note that the recipient will have fresh appeal rights and should be advised accordingly.

The repeal and issue of a fresh clean-up notice should be carried out in the same way and subject to the same conditions as the issuing of the original clean-up notice. Accordingly, a new assessment report should be completed and endorsed by the appropriate delegate.

It is preferable if the decision is made by the original decision-maker. If this is not possible the decision should be made by a person with the appropriate delegation who holds a position equal or higher to that of the original decision-maker.

Officers should also update and record changes or the decision to repeal and reissue the clean-up notice in EcoTrack.

Review of decisions and appeals

The provisions regarding review of decisions and appeals may be found in Chapter 11, part 3 of the Act. A review of the decision does not stay the operation of the clean-up notice.

The Act specifies that a person who is dissatisfied by a decision by the Department in respect to a clean-up notice may apply for a review of an original decision by submitting an application on the approved form to the Department:

- within 10 business days after the day on which the person received notice of the original decision or the Department is taken to have made the decision, or
- if there are special circumstances, whatever longer period the Department allows.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#)

A person who has made an application for review of an original decision may immediately apply to the court for a stay of the decision.

If the person is dissatisfied with the review decision, the person may appeal against that decision to the Planning and Environment Court within 22 business days after the day the person receives notice of the decision or the decision is taken to have been made, unless the court extends the period.

The court may grant a stay of the decision appealed against until such time the appeal is decided. An appeal against a decision does not affect the operation or the carrying out of a decision unless the decision is stayed.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

What options exist for responding to non-compliance with a clean-up notice?

It is an offence under s363I of the Act not to comply with a clean-up notice without reasonable excuse. The maximum penalty for non-compliance is 2000 penalty units (\$200,000) for an individual or 10,000 penalty units (\$1,000,000) for a corporation.

Defences

The recipient of a clean-up notice must comply with the notice, unless the recipient has a reasonable excuse. It is a reasonable excuse not to comply with a notice if it requires information that might incriminate the person to whom it was issued (s363I of the Act).

In a proceeding regarding non-compliance with a clean-up notice, s363I(3) provides that it is a defence for the recipient of the clean-up notice to show that—

- the recipient of the cost recovery notice is not a prescribed person
- the contamination incident was caused by a natural disaster
- the contamination incident was caused by a terrorist act or act of sabotage that the recipient had taken all reasonable measures to prevent
- the recipient is a parent corporation of a first corporation and has taken all reasonable steps to ensure that the first corporation has paid the amount claimed in the cost recovery notice served upon it
- the recipient is an executive officer of a first corporation that the recipient:
 - has taken all reasonable steps to ensure that the first corporation has paid the amount claimed in the cost recovery notice served upon it or
 - was not in a position to influence the first corporation in relation to its compliance with the clean-up notice.

Cost recovery notice

The Department may issue a cost recovery notice to the recipient of a clean-up notice in the following circumstances—

- if a person who has been given a clean-up notice fails to comply with it and a person or contractor authorised by the Department carries out the actions stated in the clean-up notice pursuant to s363K or
- if a decision to issue a clean-up notice is stayed whilst the recipient appeals the decision, and during the period of the stay an authorised person or contractor carries out the actions stated in the clean-up notice pursuant to s363K, and either the appeal ends without an appeal decision or the decision confirms the decision to issue the clean-up notice.

If either of the above circumstances apply, a cost recovery notice may claim a stated amount for costs or expenses reasonably incurred—

- for taking an action stated in the clean-up notice or
- for monitoring compliance with the clean-up notice.

For the further information see the attached procedural guide for cost recovery notices [\[LINK\]](#).

Notice

Environmental Protection Act 1994

Clean-up notice

This clean-up notice is issued by the administering authority pursuant to ss363F to 363L of the Environmental Protection Act 1994 to advise you of a decision to require you to take particular action in regard to a contamination incident.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our reference: Our reference

Take notice that under the Environmental Protection Act 1994 (the Act) a clean-up notice is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department).

The clean-up notice is issued in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of the premises/place (the place).

A. Grounds

The clean-up notice is issued on the following grounds:

- A contamination incident has occurred. Describe the contamination incident.
- State the place at which the contamination incident has happened or is happening.
- You are a prescribed person for a contamination incident pursuant to s363G of the Act.

The facts and circumstances forming the basis for these grounds are:

- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.

B. Actions

You are required to do the following:

- Insert the requirements that are necessary to prevent or minimise environmental harm.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific. If the recipient is required to take action on land that the recipient does not own, refer to the steps that must be taken in this situation and the additional requirements that are necessary.
- Insert the requirements that are necessary to prevent or minimise environmental harm.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- Insert the requirements that are necessary to prevent or minimise environmental harm.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- Insert the requirements that are necessary to prevent or minimise environmental harm.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.

Take notice that:

- The requirements of the clean-up notice take effect immediately upon service of the notice.
- This notice remains in force until further notice from the administering authority.

C. Appeal rights

If you are dissatisfied with the decision to issue this clean-up notice, you may apply to the Department for a review of the decision within 10 business days of the service of the order. You may also apply to the court for a stay of the decision to issue the clean-up notice.

If you are dissatisfied with the review decision, you may appeal against this decision to the Planning and Environment Court. Further information about the review and appeal process is attached to this notice.

However, the information provided above should be considered as general advice only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

D. Penalties

You must comply with the clean-up notice unless you have a reasonable excuse. The maximum penalty for non-compliance is \$200,000.

If you do not comply with the clean-up notice, an authorised person may take any of the actions stated in the notice and the Department may recover from you the costs incurred in taking the actions.

Should you have any queries in relation to this notice, please do not hesitate to contact name of officer of the Department on telephone number telephone number who would be happy to assist you.

Signature:

Date: Date

Name of delegate

Position of delegate

Delegate of Administering Authority

Environmental Protection Act 1994

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Environmental Services

Clean-up Notice

This statutory notice is issued by the administering authority pursuant to section 363H of the Environmental Protection Act 1994, to advise you of a decision that requires you to take particular action in respect of a contamination incident.

<INSERT recipient's name>
<INSERT street address>
<INSERT suburb, State and postal code>

Your reference: <INSERT>

Our reference: <INSERT>

TAKE NOTICE that under the provisions of the *Environmental Protection Act 1994*, a Clean-up Notice is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management.

The Clean-up Notice is issued to <<Name of person/entity>> in respect of a contamination incident at <<State premises/place>> on land described as <<select ONE ONLY>> Lot ## on RP ##### situated at address OR description of locality e.g. causeway of Xyz Highway over Abc Creek to <<select ONE OR MORE>> to prevent or minimise the contamination; to rehabilitate the environment because of the incident, including by taking steps to mitigate or remedy the effects of the incident; assess the nature of the environmental harm from the incident, including by inspecting, sampling, recording, measuring, calculating, testing or analysing; keep the administering authority stated reports, plans, drawings or other document.

A. Grounds

The Clean-up Notice is issued on the following grounds:

- That a contamination incident <<select ONE ONLY>> is occurring OR has occurred, meaning an incident, involving contamination of the environment, that the administering authority is satisfied has caused or is likely to cause serious or material environmental harm.
- <<State name of person/entity>> <<select ONE ONLY>> is causing or permitting OR has caused or permitted the incident to happen.
- The contamination incident forming the basis of these grounds are:

<<Describe the contamination incident that triggered the notice.>>

B. Requirements

Pursuant to this Clean-up Notice you are required to perform the following actions by the time indicated for each action:

- (1) <<State action and time>>;
- (2)

C. Penalty

The maximum penalty for failure to comply with a Clean-up Notice is \$200,000 for an individual or \$1,000,000 for a company.

And also **TAKE NOTICE** that:

1. The requirements of this Notice take effect immediately upon service of the Notice.
2. Failure to comply with this Clean-up Notice, without reasonable excuse, is an offence under the *Environmental Protection Act 1994*.
3. Pursuant to section 363J of the *Environmental Protection Act 1994*, if the actions required in this Clean-up Notice requires the recipient to take action on land that the recipient does not own, the recipient (or person taking action for the recipient i.e. contractor) may enter the land to take the action only:
 - a. with the consent of the owner and occupier of the land; or
 - b. if the recipient or contractor has given at least five (5) business days written notice to the owner and occupier.
4. If this Notice is not complied with, the administering authority may take any of the actions stated in the Notice and may recover from the recipient the costs incurred in taking those actions.
5. There is no right for review of this Notice.
6. You may apply for an appeal against the decision to issue the Clean-up Notice within twenty-two (22) business days of the service of this Notice. Information regarding appeals is attached to this Notice.

Signature

<INSERT delegate's name>
<INSERT delegate's position>
Delegate of Administering Authority
Environmental Protection Act 1994

Date

Enquiries:
Department of Environment and Resource
Management
Ph. <INSERT contact phone number>
Fax. <INSERT contact fax number>

EXTRACTS FROM THE ACT REGARDING APPEALS

Who may appeal

- 531** (1) A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1 applies, may appeal against the decision to the Court.
- (2) The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.
- (3) A dissatisfied person who is dissatisfied with an original decision to which section 521 does not apply may appeal against the decision to the Court.

Stay of operation of decisions

- 535** (1) The Court may grant a stay of a decision appealed against to secure the effectiveness of the appeal.
- (2) A stay may be granted on conditions the Court considers appropriate and has effect for the period stated by the Court.
- (3) The period of a stay must not extend past the time when the Court decides the appeal.
- (4) An appeal against a decision does not affect the operation or carrying out of the decision unless the decision is stayed.

Stay of decision to issue a clean-up notice

- 535A** (1) This section applies to an application under section 535 for a stay of a decision to issue a clean-up notice.
- (2) In deciding the application, the Court must have regard to—
- (a) the quantity and quality of contamination of the environment that is likely to be caused if the stay is granted; and
 - (b) the proximity of the place at or from which the contamination incident is happening or happened to a place with environmental values that may be adversely affected by the contamination.

Compliance inspections (Level A, B and C)

This procedural guide is for internal use to assist Environmental Services officers when preparing for and undertaking compliance inspections. It also provides guidance relating to post-inspection activities.

Who does the Department inspect?

In the context of these guidelines, the Department inspects (or audits) organisations or individuals carrying out activities that are regulated by the *Environmental Protection Act 1994* (the Act).

What is a compliance inspection?

A compliance inspection is a systematic, independent and documented assessment of an environmentally relevant activity (ERA) or other activity to assess compliance with conditions in the relevant approval and/or the Act, its regulations and any other document that sets a standard of environmental performance.

What is the purpose of compliance inspections?

There are a number of reasons why the Department carries out compliance inspections of sites that it licenses:

- They enable the Department to measure the performance of individual operators, and to find out whether they are complying with their approval conditions or other legal requirements.
- They can reveal strategic or systemic issues with a particular industry or client group, and can allow the Department to address those issues before they become larger problems.
- They increase the Department's profile in the community, and demonstrate that the Department is actively managing activities that pose a threat to environmental values. This increased profile can also deter people from breaching their obligations.
- They can reveal whether people are carrying out activities without the necessary approvals.

It is important to remember that compliance inspections are fact-finding exercises. The aim of inspections is to gather information that allows the Department to fulfil one of the objectives set out above. Inspections are not tools designed to penalise bad behaviour, however they can be the catalyst for doing so and may act as a deterrent.

What are the types of compliance inspections?

There are three types of compliance inspections in the Department. They are **Level A (basic inspections)**, **Level B (condition inspections)** and **Level C (audits)**.

To determine whether a Level A, Level B or Level C inspection is triggered by a particular circumstance, refer to the [Procedural guide - Risk Assessment \(ERA and non-ERA industry/business activities\)](#) and the [Risk Assessment Tool \(ERA and non-ERA industry/business activities\)](#)

What is a Level A (basic) inspection?

Level A inspections are compliance inspections at the lowest level of detail for Departmental interests. They often involve a single issue and require minimal planning.

The **types of site** that Level A inspections relate to include:

- low or medium risk sites (identified as such using the Risk assessment (ERA and non-ERA) industries/business activities procedural guide and Risk assessment tool) or non-regulated sites
- non-licensed, pre-licensed or licensed sites
- sites where the degree of compliance is often unknown.

The **trigger or scope** for conducting a Level A inspection can include:

- responding to a public report or complaint
- responding to industry self-reporting, for example validating aspects of annual returns or permit applications
- checking compliance with one condition of an approval which requires only a simple observation.

The **objectives** of a Level A inspection are to:

- physically verify that corrective actions have been carried out (e.g. in response to a simple enforcement tool like a penalty infringement notice or environmental protection order)
- assess the risk and determine need for and extent of further compliance inspections.

The **methodology** involved with conducting a Level A inspection may include:

- carrying out low-level planning and record keeping
- conducting a visual examination, possibly just a drive-by.

What is a Level B (condition) inspection?

Level B Inspections are the most common level of inspection undertaken at licensed premises. They involve an assessment of compliance with regulations, licences and standards.

The **types of site** that Level B inspections relate to include:

- non-licensed or licensed sites
- medium or high risk sites (identified as such using the Risk assessment (ERA and non-ERA) industries/business activities procedural guide and Risk assessment tool)
- where there is an unknown or fair degree of compliance usually exhibited by the site.

The **trigger or scope** for conducting a Level B inspection can include:

- proactive monitoring programs and related follow-up (e.g. industrial estate, water catchment, or industry sector inspection programs)

- the need to review specific processes or discharges that relate to a proactive monitoring program and
- the need to physically verify that corrective actions have been carried out in response to a more complex enforcement tool issued by the Department (e.g. an Environmental Evaluation).

The **objectives** of a Level B inspection are to:

- determine whether the conditions of development approvals are being complied with and that they are valid, achievable, relevant and include required monitoring programs
- review the history of legislative compliance including prior enforcement action and public complaints
- review statutory licences, whether they are correct and current
- review other regulatory requirements, for example waste tracking, National Pollutant Inventory reporting, contaminated land site-based management plans and the general environmental duty and
- assess regulatory system effectiveness across an industry, including consistency, validity, relevance, achievability, enforceability, and degree of protection.

The **methodology** for conducting a Level B inspection includes:

- carrying out medium-level planning and record-keeping and
- using professional judgement and observations to assess compliance, which needs to be based on facts. The assessment will consist of observations, inquiry, analytical procedures and discussion related to information supplied by the operator.

What is a Level C (audit) inspection?

Level C inspections are the highest and most detailed level of compliance assessment that the Department will undertake. They usually involve a comprehensive audit of the whole site's operations. They require detailed planning and assessment.

The **types of site** to which Level C inspections relate include:

- licensed sites
- medium or high risk (identified as such using the Risk assessment (ERA and non-ERA) industries/business activities procedural guide and Risk assessment tool)
- sites that have exhibited a poor degree of compliance in the past.

The **trigger or scope** for conducting a Level C inspection can include:

- the need for proactive maintenance inspections of high-risk sites
- the need to focus on all activities, processes and discharges when generally chronic issues exist (comprehensive audit) or
- the need to examine specific processes or discharges when generally acute problems exist (focused audit).

The **objectives** of a Level C compliance inspection are to:

- review the history of the site's legislative compliance including prior enforcement action and public complaints
- review the site's statutory licences/development approvals (e.g. whether they are correct and current)

- review whether conditions of statutory licences/development approvals are SMART (specific, measurable, achievable, relevant and time-specific)
- review whether all conditions of statutory licences/development approvals are being complied with by the site
- review other regulatory requirements (for example, waste tracking, National Pollutant Inventory reporting, contaminated land site-based management plans and the general environmental duty)
- assess regulatory system effectiveness across an industry, including consistency, validity, relevance, achievability, enforceability, and degree of protection
- review the site's ability to meet future standards
- review the site's management and operating practices including:
 - staff training
 - public relations policies
 - processes for the minimisation of risks (e.g. emergency response procedures, handling/storage and transfer of hazardous materials)
 - encroaching residential areas or conflicting industries
 - maintenance procedures
 - sustainable practices (e.g. source of raw materials, minimise/ reuse/recycle materials, disposal of wastes) and
 - the adequacy of applicable financial assurance.

The **methodology** for conducting a Level C inspection includes:

- carrying out high-level planning and record-keeping
- using objective evidence to verify compliance (in relation to monitoring, for example, verification and assurance that the monitoring is being carried out, that the results are within acceptable limits or to recognise where they exceed and that monitoring will continue within the parameters set by the permits)
- using a multidisciplinary team
- taking samples and
- conducting the inspection over a specified period of time (e.g. a number of days).

The inspection process

The inspection process involves different tasks which are sub-divided into the following:

1. pre-inspection activities
2. on-site inspection activities and
3. post-site activities.

An inspection is not restricted to the site visit and it is essential for officers to carry out careful and thorough planning before conducting on-site activities, particularly for Level B and C inspections. Priority should also be given to the post-inspection evaluation and report, which are as vital to the improvement of environmental performance as the site visit itself.

Officers should consult with their managers and exercise discretion when deciding upon a timeframe (e.g. for issuing a notice for an inspection, sending a follow-up compliance letter or finalising the inspection report). The following time-frames are best practice guidelines, however the circumstances will determine when these actions are achieved.

Pre- inspection activities

Good planning and preparation are vital to a successful inspection. Departmental officers need to have thorough knowledge of the applicable legislation as well as obtaining and studying any development conditions, site-based management plans, policies, standards or codes that apply.

Step 1 - Collect and review background information

The purpose of obtaining and reviewing background information is to assemble relevant information that can be used to meet the objectives of the compliance inspection. The collection and review will enable the inspection team to become familiar with the client's operations, the statutory requirements and other regulations or standards that may apply. The **compliance inspections toolkit** is located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet and provides a template to record preliminary information, which includes:

- **Part A - general information** (company name, development approval/environmental approval number, description of the ERA etc)
- **Part B - pre-inspection considerations** (environmental risk of the site, history of the activity carried out at the site, industry specific hazards (i.e. need for personal protective equipment or site inductions).

Other types of information that could be collected or reviewed include:

- site details, such as maps, aerial photographs and process descriptions
- operating standards, site-based management plans and procedures
- company environmental policies, guidelines and technical information about the process and operations carried out on site
- monitoring data relevant to the inspection
- annual reports and other statutory requirements
- main environmental issues that relate to the client's industry and any community concerns
- technical information about the processes and operations
- industry best practice and relevant standards and
- the client's working language in the event that an interpreter may be needed..

Step 2 – Determine the objectives and scope of the site inspection

Officers should be clear on the objectives of the inspection and what they are hoping to achieve. Objectives could include assessing compliance with approval conditions, checking compliance with a statutory notice (such as an environmental protection order) or responding to a complaint.

The scope of the inspection defines the extent and boundaries of the inspection, including:

- the physical location of the inspection (for example, a particular site or part of a site)
- organisational units, activities or processes to be inspected and
- whether any samples will be taken.

The scope and objectives should be recorded in **Part C** of the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet).

Step 3 - Determine the inspection agenda and timetable

The inspection timetable should include:

- the date(s) and locations of on-site activities to be carried out during the inspection (such as meetings or taking samples)
- the expected time and duration of each activity.

This information should be recorded in **Part C** of the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet).

Step 4 – Determine the roles and responsibilities of the inspection team

Generally a minimum of two officers should undertake an inspection. The size of the team should be scaled up or down depending upon the level of inspection, complexity of the activity and experience of the inspection team. For more complex Level B and C inspections the team members may include:

- inspection leader
- team members
- technical specialists and
- officers from other relevant agencies.

The inspection leader must be an authorised person under s445 of the Act, and must be confident in his or her abilities to exercise the powers of an authorised person lawfully and ethically.

The inspection leader should determine whether other personnel should be involved in the inspection process. Other officers who have a working knowledge of the site should be involved in the process from the outset to help with inspection planning, provide background information, and if necessary, attend the inspection. Team members may assist with inspection evaluations, comment on draft reports and provide input to the follow-up action required. Inspection team members are not required to be authorised persons.

It is important that the roles and responsibilities of the officers who will be taking part in the inspection are clearly defined and are understood by everyone. Roles and responsibilities should be documented as part of the pre-inspection checklist, and discussed during the pre-inspection briefing. If necessary, a pre-inspection briefing should be held to make sure that everyone understands their role.

Technical experts may be called in to provide specialist knowledge. They may accompany the team on the inspection if required or be referred to when necessary.

The inspection leader should be mindful that the Department is not the only regulatory authority. It may be appropriate where possible to run the compliance inspection in association with other regulatory authorities, for example Work Place Health and Safety, Hazardous Industries Chemicals Branch (HICB)), Queensland Health and Local Government.

The inspection leader should be fully knowledgeable of the inspection scope and criteria, lead the site inspection and be the main point of contact between the site operator and the inspection team on the day.

This information should be recorded in **Part C** of the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet).

Step 5 - Identify the conditions for assessment

Part D of the **compliance inspections toolkit** breaks down the conditions of any development approvals, authorities or other permits into their elements. This ensures that all aspects of each condition are dealt with during the inspection. It is a tool that helps the inspection team to assess whether any of the conditions have been breached.

It is important to remember that checklists are designed to help the inspection team complete the inspection thoroughly. They should not be applied rigidly, and something found during an inspection should not be ignored just because it is not on a checklist.

A sample checklist, showing a condition broken down into its elements, is set out below. If it would assist the person conducting the inspection, the elements could also be framed as questions, such as:

- Is there dried sewage sludge on the site?
- Is it stockpiled in a bunded area?
- Is it stockpiled in such a way as to prevent stormwater contamination being released off the site?

During the compliance inspection, observations are made for each element and/or question and recorded in the row below, followed by any options for remediation that are needed in order for the client to achieve compliance with the condition. Breaking down the condition in this way makes it easier to turn attention to all the elements of the condition, and to assess the client's performance against the condition.

When developing a checklist, the inspection leader should consider the experience and knowledge of the officer who will be using it, and also the environmental risks of the site to be inspected. This will enable the inspection leader to select the appropriate level of detail for the checklist. Experienced officers can use a checklist of all the topics to be covered during the course of an inspection without details about how to undertake each one. Less-experienced officers should use a detailed checklist of everything they need to know and do. This allows them to undertake inspections with less supervision from more experienced colleagues.

Sample checklist:

Condition number: 417C	Compliant: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
<i>Dried sewage sludge - must be stockpiled in a bunded area to prevent stormwater contamination from being released off-site.</i>		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		

Step 6 - Consider workplace health and safety

The safety and security of all officers involved in the inspection is paramount. The inspection leader is required to make sure that any workplace health and safety issues that may arise during the inspection are identified and dealt with. This may include speaking with officers who are familiar with the site, and completing a job safety analysis. For information about completing a job safety analysis, refer to the [Procedural guide - Safety and Risk Management - Job Safety Analysis](#).

Each inspection must be assessed to determine whether there are any potential barriers to its successful execution. The inspection leader should be aware of any occupational health and safety requirements for entry to the site and whether appropriate staff will be available or bad weather will significantly hamper the inspection. The inspection leader responsible for the site or area will know about any basic requirements for entry to a site or if there are any other routine operational procedures that may affect the inspection (e.g. hours of operation are limited to weekdays, appropriate personal protective equipment is necessary, etc). The inspection leader must ensure that all officers are equipped with appropriate personal protective equipment (PPE) prior to attending the inspection site.

Step 7 – Provide prior notice of the inspection

Inspections in response to a complaint or incident may be undertaken with little or no notice to the client. However, with planned compliance inspections, prior notification of the inspection is given, generally resulting in the client preparing for the inspection which may involve a cleaning-up of the sites, a positive environmental outcome in itself.

For Level B and C inspections, a pre-inspection letter should be prepared and forwarded to the site operators/owners at least four weeks prior to the inspection. For Level A inspections, a pre-inspection letter should also be sent to the site operators/owners no less than one week prior to the inspection.

A pre-inspection template letter is available on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet. The letter outlines the purpose of the inspection along with the areas to be covered and any information requirements. If the inspection leader has reasonable grounds for believing that providing notice of the intended inspection will jeopardise the effectiveness of the inspection, he or she should discuss the matter with his or her manager and obtain the manager's approval to conduct the inspection without notice. Where an inspection without notice is required because of concerns about the client's performance, or in response to complaints from members of the public, it may be more appropriate to conduct the inspection as a Level A or Level B inspection, rather than a Level C.

On-site inspection activities

Step 8 – Conduct the opening meeting

The objectives of the opening meeting are to meet with the site manager or their representative to:

- explain and confirm the inspection program, outlining the inspection scope, objectives and procedures
- provide a short summary of how the inspection activities will be undertaken and
- allow the site manager or their representative to ask questions.

The opening meeting is an important part of the inspection process and can set the tone for how the inspection will proceed. It is important to remain professional and polite throughout the meeting.

The following information should be conveyed:

- introduce the inspection team and provide identification if required
- explain the purpose of the inspection
- explain the activities to be inspected and criteria (keeping the inspection on track)
- explain the methods and procedures used to conduct the inspection
- explain the steps that will be taken when preparing the inspection report (e.g. all inspection information collected will be assessed, a draft report will be prepared and reviewed by my manager etc)
- explain that a letter will be sent summarising the findings of the inspection and any required follow-up actions
- agree to an inspection timetable to enable the site manager or their representative to arrange for appropriate personnel to be available during the inspection
- arrange a time and location for a closing meeting
- ensure that the resources and facilities needed by the inspection team are available
- determine safety, emergency and security procedures.

You can use **Part C** of the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet) to record information you have discussed in the opening meeting.

Step 9 – Conduct the site inspection

After the opening meeting, the inspection team can start examining, recording and collecting relevant information. Officers can use **Part D** of the **compliance inspections toolkit**, (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet) to assess compliance with any development approval or environmental authority conditions. Officers can use **Part E** of the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet) to record details of any observations made while on site (e.g. waste storage, chemical management and storm water management). Where these overlap with conditions, they can be disregarded.

It is important that the inspection leaders (and the other members of the inspection team who are authorised persons) are familiar with the powers they can exercise during the inspection (in particular s460 of the Act). This will ensure that any information gathered is done so lawfully. By being confident in the powers that they can exercise, officers are also more likely to be able to obtain all of the information that they need. Guidance on exercising powers conferred on authorised persons under the Act can be found in the [Procedural guide - Powers of Officers](#).

Officers should look out for activities on the site that are not authorised under the client's development approval or environmental authority. If unauthorised activities are being carried out, refer to the guide [Procedural guide - Dealing with unlicensed ERAs](#).

At all times during site inspections, officer safety is a priority. If necessary, ensure that a representative of the client who understands the workplace health and safety issues for the site accompanies officers during the inspection. If safety is threatened in any way during the inspection, take action immediately to eliminate the risk to safety, including terminating the inspection and leaving the site if necessary.

If an officer identifies an activity or event that is causing serious or material environmental harm it must immediately be brought to the attention of the inspection leader. The inspection leader should consider

terminating the inspection and informing the site manager or representative and the appropriate Manager, Regional Investigations of the situation immediately.

If necessary, an emergency direction under ss467 or 468 of the Act should be given to the client or their representatives in order to prevent, minimise, or remedy the harm (refer to the procedural guide for emergency directions located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet).

Information can be gathered during an inspection in a number of ways:

- **Photographs**

Photographs can be an important record of the site inspection, and details of any photographs taken (including the time and date the photograph was taken, who took it, and what the photograph shows) should be recorded.

- **Company documents and records**

Some of the information gathered will be in the form of documents, and may include monitoring results, complaints registers, incident report forms, maintenance records for plant and equipment, environmental management system manuals and documents required to be kept by the development approval. Authorised persons may make photocopies of documents in certain circumstances (refer to s460 of the Act). If it is not practical to copy or view all documents that might be relevant, officers may choose to copy or view a representative sample of documents.

All documents sighted during the inspection should be recorded.

- **Inspection notes**

Observations such as what was seen, heard or smelt should be recorded in the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet) or official notebook. It is not necessary for all members of the inspection team to take notes. Other observations made, and significant conversations held, during the inspection should also be recorded in an official notebook (refer to the [Procedural guide - Use of official note books](#)).

- **Environmental sampling**

The aim of sampling is to estimate quality characteristics of one or more of the following:

- A water body – usually surface waters, but occasionally ground waters.
- Wastes released to a water body (or liable to be released).
- Bottom sediments of a water body.
- Specimens of animal or plant life thought to have been affected by a release or by a change in natural conditions.

It is generally expected that sampling will be done for Level B and C inspections. The protocols in the Department's Monitoring and Sampling Manual - Environmental Protection (Water) Policy 2009 should be followed (on Ecosteps at [Technical Manual - Water Quality Sampling Manual](#)), both to ensure that the sample results are accurate and reliable, and to ensure that the sample results will be admissible evidence if legal proceedings result from the inspection. Whether the sample is analysed will be at the discretion of the inspection leader following the inspection, keeping in mind any time limitations on the sample.

Any monitoring or sampling required by the permit must be undertaken by the permit holder and relevant data provided to the Department as required.

Step 10 – Conduct the closing meeting

Once the inspection team have finished the inspection a closing meeting should be held with the site representatives. The following should be considered in this meeting:

- Present the preliminary findings.
- Discuss situations encountered which may affect the reliability of inspection conclusions.
- Consider outlining recommendations for improvements if the inspection team is clear about the proposed response.
- An indication of timeframes for the Department to report on findings. It may be appropriate to advise for example:

“All inspection information collected will be assessed; a draft report will then be prepared and reviewed by my manager. You will receive a letter summarising the findings of the inspection and any required follow-up actions within the next 2 weeks.”

Details of the closing meeting should be recorded in **Part F** of the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet).

Post-inspection activities

Once the site inspection is complete, the important activities of evaluating the information gathered during the inspection, recording the results of the inspection and conducting follow up activities will begin.

Step 11 - Evaluate the inspection information and complete the inspection report

The purpose of evaluating inspection information is to identify any significant observations that are presented as inspection findings. The information collected may include observations made on-site, photographs, samples, records and documentation on files, and documents produced by the site manager or their representative before, during or after the inspection. This information should be regarded as evidence relevant to further compliance action.

A template inspection report may be found here: [Inspection/audit report](#).

Evaluation of the information can include the following activities:

- comparing monitoring data held by the client, or the results of samples obtained during the inspection with requirements of the development approval or other permit, or with best practice standards
- comparing observations and photographs with requirements contained in approvals or best practice standards
- comparing statements made by the client’s representatives with observations, photographs and documents
- identifying any gaps in the information which may require follow-up with the client
- determining whether the information reveals breaches of approvals, permits or statutory requirements
- assessing whether enforcement action may be required

- identifying any shortcomings with approval conditions (for example, identifying that a condition is drafted in a way that makes it difficult to establish that it has been complied with) and
- comparing the information with information obtained from inspections of similar sites to identify any common or systemic problems.

The inspection report is one of the most important parts of the inspection. It records the inspection team's findings:

- on the performance of the client
- the remedial actions that are required by the client and
- any actions that the Department must take to respond to the client's performance.
- on important information needed for future reference, so that any actions taken by the Department can be justified if they are later challenged, and the results can be compared and analysed to see whether there is improvement over time or to identify trends.

The most significant factor in assessing the significance of non-compliance is the actual or potential impact on the environment. Other factors include:

- the nature of the receiving environment
- the seriousness of a potential or actual environment harm
- whether the non-compliance is ongoing or a repeat of a past non-compliance
- how easily the non-compliance is able to be remedied and
- how matters have been managed previously.

For one-off minor or technical non-compliances that have little or no environmental impact, it may be appropriate to issue a verbal warning on the day of the inspection. For other non-compliances it may be appropriate to write to the client outlining the non-compliances and or issues and seeking a report on the corrective action(s) they propose to undertake.

If the inspection reveals more significant non-compliance, it may be necessary to take some form of enforcement action. This can include issuing a warning notice or penalty infringement notice or using a range of statutory tools available under the Act.

Guidance on choosing an appropriate statutory tool can be found in the Department's [Enforcement Guidelines](#) and the [Procedural guide - Choosing the appropriate statutory tool to respond to non-compliance](#).

The inspection leader should aim to have the inspection report finalised within four weeks of the inspection and forwarded to their Manager for endorsement.

Inspection results and recommended actions should be recorded in **Part G** of the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet).

Step 12 – Provide for natural justice and send follow-up letter

Prior to the Department making a decision which may adversely impact on a person (can include an individual or corporation) the Department must:

Notify - Notify the individual that the Department is considering making adverse findings.

Respond - Provide the individual with an opportunity to respond to the allegation.

Consider - Consider any representations made by the affected person before finalising the decision.

The seriousness of the matter will dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers are encouraged to use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. While in some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site inspection or a telephone interview and to take contemporaneous notes, in more serious circumstances a written notification with a specific closing date for submissions should be used.

Regardless of the manner in which natural justice is afforded, any information provided by the affected person is to be documented. The summary of information should include how natural justice was provided as well as any responses provided by the affected person.

Officers should complete **Part H** of the **compliance inspections toolkit** (located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet).

A post-inspection letter should be forwarded to the client within four weeks of the inspection. If the inspection report requires more than four weeks, an acknowledgement letter is to be forwarded to the client advising of when a post-inspection letter will be available. The post-inspection letter should address the following:

- any non-compliances, actual or potential breaches of legislation that were identified during the site inspection
- where non-compliances, actual or potential breaches of legislation have been identified, an invitation for the site's operators/owners to submit to the Department why a specific enforcement tool (e.g. a transitional environmental program or environmental protection order) should not be used (see the 'providing for natural justice' section)
- where compliance action is proposed, any specific timeframes
- any other relevant observations and
- a copy of the inspection report at the manager's discretion.

Both template letters may be located on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet.

Step 13 – Record details of the site inspection in Ecotrack

Officers are required to record all allegations of non-compliance in the Ecotrack system. This includes creating a compliance activity, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measures screen (this includes a decision to take no further action). This information should be recorded at **Part I** of the **compliance inspections toolkit** (located on Ecosteps at on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet). The Department is required to make, and record, an informed decision about all allegations of non-compliance.

Step 14 – Approval

The **compliance inspections toolkit** including recommendations is to be approved by an appropriately delegated officer. The Department's list of delegations can be found at:

<http://insite2.dnr.qld.gov.au/derm/delegations/index.html>

This information should be recorded at **Part J** of the **compliance inspections toolkit**, which may be found on the Environmental Services page at the Compliance Support Materials site on the Departmental intranet.

Compliance inspections toolkit

Compliance inspections (Levels A, B and C)

Checklist, on-site record & inspection report

This toolkit is for internal use to assist Environmental Services officers when conducting Level A, B and C site inspections to record general details of the site being inspected, pre-inspection considerations and planning, on-site observations and to document recommendations and obtain approval for compliance/enforcement action. For Levels B and C, refer to addendum sheets also. This document can be used in hard copy and taken with the officer to be completed on site. The soft copy document can be completed upon return to the office.

Part A. General Information

Company name:	Date of inspection:	Time:
Trading as:	EA/DA number (if applicable):	
Description of business activity/ERAs:	File number:	
Street address:	Real property description (lot on plan):	
Site representative/s:	Position/s:	Contact telephone:
Department's representatives:		
Registered business address:		
Inspection level (check box): Level A <input type="checkbox"/> Level B <input type="checkbox"/> Level C <input type="checkbox"/>		

Part B. Pre-inspection considerations (add or delete lines as necessary)

Environmental risk	(e.g. very low)
Last inspection date	
General description of location and surrounding environment	
History of the activity	
Outstanding issues and/or non-compliances/enforcement (e.g. environmental protection orders)	
Industry specific hazards – consider personal safety	
Engineering	
Light manufacturing	

Food processing	
Waste	
Chemical production	
Health/medical	
Other	
Farming	
Mining	
Quarrying	
Other	
Personal protective equipment (PPE) – consider whether any PPE is required	
Safety helmet	Yes <input type="checkbox"/> No <input type="checkbox"/>
Hearing protection	Yes <input type="checkbox"/> No <input type="checkbox"/>
Eye protection	Yes <input type="checkbox"/> No <input type="checkbox"/>
Protective clothing	Yes <input type="checkbox"/> No <input type="checkbox"/>
Protective footwear	Yes <input type="checkbox"/> No <input type="checkbox"/>
Respiratory protection	Yes <input type="checkbox"/> No <input type="checkbox"/>
Other	Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, describe PPE:
Arrange safety induction training with occupier of site before any work is done	Yes <input type="checkbox"/> No <input type="checkbox"/>

Part C. Inspection plan including opening meeting checklist for Level B and C inspections (add or delete lines as necessary)

Topic	Details	Confirmed in opening meeting
Objectives and scope		Yes <input type="checkbox"/> No <input type="checkbox"/>
Agenda and timeframe		Yes <input type="checkbox"/> No <input type="checkbox"/>
Audit team - roles and responsibilities of team members		Yes <input type="checkbox"/> No <input type="checkbox"/>
Methods and procedures to be used		Yes <input type="checkbox"/> No <input type="checkbox"/>
Onsite staff accompanying audit/inspection team (names and positions)		Yes <input type="checkbox"/> No <input type="checkbox"/>

Part D. Conditions for assessment (Use for Level B or C inspections, add or delete lines as necessary)

Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		
Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		
Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		
Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		

Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		
Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		
Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		
Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		

Condition number:	Compliant: Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>	Photos taken Y/N
Element/question		
Observations (include name and relevant comments made by any on-site staff)		
Options for remediation		

Part E. On-site observation – general items (add more lines if necessary)

1. Raw materials/final products			
Issue	Details (if applicable) (include name and relevant comments made by any on-site staff)	Photos taken Y/N	Satisfactory
What types of raw or final product materials are on the site?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
What are the approximate volumes?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
What is the location of these materials on site?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Other?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
2. Waste storage/treatment and disposal			
Issue	Details (if applicable) (include name and relevant comments made by any on-site staff)	Photos taken Y/N	Satisfactory
What types of waste materials (general/regulated) are on site?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>

What are the approximate volumes?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
What is the location of these materials on site (include details of containment system, proximity to waters, etc)?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Is there any evidence of spills/leaks/other emissions?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Does the facility discharge to a sewer (and does the facility have a Trade Waste Agreement)?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Does the facility have waste tracking certificates to record the movement of regulated wastes offsite?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Who does the facility use to collect waste (waste contractor)?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Other (e.g. recycling details)?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>

3. Chemical management

Issue	Details (if applicable) (include name and relevant comments made by any on-site staff)	Photos taken Y/N	Satisfactory
Are flammable/combustible materials stored on-site (and does the facility have an appropriate licence)?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Are bunds in poor condition (e.g. filled with rainwater, overflowing, stained, damaged or cracked)?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Are chemical containers or drums unsafely stacked, stored outside, or stored in close			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/>

proximity to stormwater drains?			Not inspected <input type="checkbox"/>
Are there containers without lids or unsealed bags?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Is there diesel or oil staining around refuelling areas?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Are there unlabelled or wrongly labelled chemical containers?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Is there an inappropriate, inaccessible, or no spill kit on site or available to the site?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
4. Stormwater management			
Issue	Details (if applicable) (include name and relevant comments made by any on-site staff)	Photos taken Y/N	Satisfactory
Describe the stormwater controls (e.g. bunding, sediment trap, grates, first flush, oil water separator, etc).			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Is there any evidence of contamination (e.g. staining, sedimentation, litter, etc)?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Have any samples been taken (by the facility or the Department)?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Are there untidy and dirty yards, carparks and outside surfaces?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Are there overflowing or blocked oil interceptors, grease traps, grates, drains or treatment systems?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Are containers being washed down within reach of stormwater			Yes <input type="checkbox"/> No <input type="checkbox"/>

drains?			TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Are there any outdoor bunds with open or unsecured stormwater valves?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>
Do wash bay facilities have access to stormwater drains and if so, are they dirty?			Yes <input type="checkbox"/> No <input type="checkbox"/> TBA <input type="checkbox"/> Not inspected <input type="checkbox"/>

5. Other issues identified	
Issue	Details (if applicable)
Are there issues with dust/odour/noise/contaminated land etc?	
Are there any unregistered ERAs?	
Is a follow-up inspection required (including date)?	
Are any enforcement actions required?	
Other?	

Part F. Closing meeting

Discuss preliminary findings, non-compliances, observations, further items to be provided, timing and any other matters (list names of all persons present).

Part G. Inspection results summary (NB: Refer to parts D – F where relevant)

1. Overall findings

General observation/s	
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Compliance level	<input type="checkbox"/> Environmental nuisance/minor non-compliance <input type="checkbox"/> Actual or risk of material harm/repeat non-compliance <input type="checkbox"/> Actual or risk of serious harm <input type="checkbox"/> Compliant <input type="checkbox"/> Fully compliant/best practice
Environmental risk	<input type="checkbox"/> (1) Very low <input type="checkbox"/> (2) Low <input type="checkbox"/> (3) Moderate <input type="checkbox"/> (4) High <input type="checkbox"/> (5) Very high

2. Client action/s required (from information in Part D)

Non-Compliances

Condition number & requirement legislation reference	Observations	Recommended action (Officers should document the evidence supporting the recommendation)	Client agreement
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>

Further observations (issues)

Condition number & requirement legislation reference	Observations	Recommended action (Officers should document the evidence supporting the recommendation)	Client agreement
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>
			Yes <input type="checkbox"/> No <input type="checkbox"/> TBD <input type="checkbox"/>

3. The Department's actions taken/recommended (complete where relevant)

Enforcement measure/s taken during inspection	Date issued:	Type:	Next due date:
Further enforcement measures recommended (Note: Refer to relevant client action items listed above)			
Justification	Actions required must be specific, measurable, achievable, relevant to the non-compliance identified and time-specific. In order to ensure the actions required are reasonable, officers are required to provide justification for the inclusion of this action		
Further enforcement measures recommended (Note: Refer to relevant client action items listed above)			
Justification	Actions required must be specific, measurable, achievable, relevant to the non-		

	compliance identified and time-specific. In order to ensure the actions required are reasonable, officers are required to provide justification for the inclusion of this action
Other recommendations (e.g. permit amendments)	
Next inspection date	

Part H. Natural justice

- The person has been provided with the opportunity to put their side of the story forward.
Describe how this was achieved.
- List any information and/or defences provided.
Describe any information or defences provided.
- The Department has considered the information or defences provided.
Describe the consideration given and what conclusions have been formed by the Department.
- The decision-maker and environmental officer are free from bias or the perception of bias.

Part I. Ecotrack

Ecotrack case number	
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Activity	Time (hours)	Comments
Planning		
Inspection		
Reporting		
Total		

Part J. Approval

Environmental officer	Supervisor

Name:	Name:
Date:	Date:

Delegated decision-maker	Approve/reject recommendation (circle one)
<p>Reasons for decision</p> <p>For example: I approve this recommendation based upon the information set out above.</p> <p>For example: I reject the above recommendation as I consider it more appropriate for the Department to take an alternative approach to this breach. The alternatives that should be considered in this case are 12345 and my reasons for this are 12345.</p>	
Name:	
Date:	

Form

Compliance

Compliance program - audit report

This report is to be completed for every compliance inspection/audit undertaken (including site inspection and desktop review). The information in this report is to be used to update the relevant record/s in Ecotrack, and to obtain approval for compliance/enforcement action.

INSPECTING OFFICER SIGN OFF

Officer Name:	Signature:	Date:
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Administration

Ecotrack Case No.	CARMS File No.
ACP project name (where relevant)	
Supervisor	Recommendations Approved: Yes Comment:

GENERAL INFORMATION

Person and location details

Person/ organisation/ development name (where relevant)	
Location (incl. street address, lot/plan, tenure, estate, LGA where relevant)	
Inspection focus/ agency interest	

Description of activity and permit

Type of activity (eg. ERA, park visitor activity)	
Permitting body	
Permit No.	
Permit effective date	
Permit Act/type (e.g. EP Act / registration certificate)	

Client (Permit holder, if DERM is permitting body)

Permit holder name	
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Client (On-site Representative)

Name	
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(if any)	
Position title	
Phone/Fax No.	
Registered business address	
Responsibility	

Position title	
Phone/Fax No.	
Other contact details	
Responsibility	

PRE-INSPECTION INFORMATION (N.B. refer to audit plan where relevant)

Environmental risk	1/Very Low
Last inspection date	
General description of location and surrounding environment	
History of the activity	
Description of activity (e.g. major industrial processes)	
Outstanding issues and/or non-compliances (e.g. EPO's)	
Current enforcement measures	

INSPECTION RESULTS SUMMARY (NB: refer to audit/inspection checklist where relevant)

Inspection Overview

Date of inspection	
Inspection days	
Inspection trigger	Reactive
Inspection type	Preliminary
Inspection level (refer to appendix for definitions)	A/Basic Inspection
Inspection focus	Water Issues
Further info (e.g. lab analysis, photos, drawings, interviews, official notebook)	

Inspection Attendees

DERM officer/s (who undertook site inspection or desktop review)	
Client representative/s	
Other parties	

Overall Findings

General observation/s	
Compliance level	Enviro Nuisance/minor non-compliance
Environmental risk	1/Very Low
Compliance behaviour	Intentional non-compliance

Client Action/s Required

Condition No. /Legislation reference				
Agency interest				
Observations				
Compliant	Yes	Yes	No	Yes
Requirement				
Due date				
Previous due date				
Client agreement	Yes	Yes	Yes	Yes

DERM Actions Taken/Recommended (N.B. refer to PCAR/guidelines where relevant)

Enforcement measure/s taken during inspection	Date issued:	Type:	Next due date:
Further enforcement measures recommended (NB: refer to relevant client action items listed above)			
Other recommendations (e.g. permit amendments)			
Next inspection date			

Appendix 1

INSTRUCTIONS FOR COMPLETING COMPLIANCE INSPECTION REPORT

Inspection Days

This estimate (to the nearest 0.1 day) includes the cumulative effort of all participating inspectors; any effort for laboratory analyses, testing, and remote sensing; and the billed payroll time for travel and pre and post inspection preparation.

Inspection Trigger

- Reactive – e.g. complaint, incident
- Routine – e.g. ERA, Mining, Coastal, Contaminated Land
- ACP Project – e.g. Activity
- Data – e.g. Annual Return, Waste Tracking, NPI
- Permit Dealing – e.g. surrender

Inspection Type

- Preliminary
- Compliance Assessment (e.g. compliance with conditions of approval)
- Potential Enforcement Measurement
- Compliance Progress Check (e.g. follow up inspection or compliance with issued enforcement measure)

Inspection Focus/Agency Interest

Biodiversity	rare and threatened species and ecosystems, vegetation clearing, marine systems, sustainable use of wildlife, riparian buffer zones, wild river area
National & International	world heritage, Ramsar listed wetlands, migratory species, national estate, commonwealth marine areas, radioactive materials
Resource Allocation	mining, dredging, occupancy of marine lands (marinas etc), activities on protected areas and marine parks, allocation of public resources (eg. physical and natural resources environmental capacity), national competition policy
Tenure Issues	protected areas, native title interests, offshore jurisdiction, commonwealth jurisdiction, inter-state jurisdiction
Water Issues	quality, discharges, stream flows (effects on ecology), waterway management, hydrology, impact on freshwater and marine systems, groundwater
Air Issues	air shed management, pollution, health, nuisance, ecological impacts
Noise Issues	community noise, transportation noise, industrial noise, ground vibration, air blast overpressure
Waste Issues	solid waste, liquid waste, gaseous waste, dredge spoil disposal, energy, best practice environmental management
Land Issues	contaminated land, acid sulphate soils, erosion/stability, landscapes, effects on hydrology, sustainable use, clearing, land use history, compliance with planning schemes, rehabilitation and subsequent use
Heritage Issues	Aboriginal and Torres Strait Islander cultural sites, historic buildings and locations, designated landscape areas
Coastal Issues	erosion, structures, reclamation, state/regional/strategic planning
Impacts on Surrounds Issues	transportation, visual impacts, compatibility with surrounding uses and activities, neighbours opinions
Social Issues	amenity, displacement of use, community views, public safety, politics/policy

Compliance Level

- Fully compliant and evidence of best practice
- Compliant
- Evidence of environmental nuisance or minor non-compliance
- Evidence of actual or significant risk of material environmental harm or repeated minor non-compliance
- Evidence of actual or significant risk of serious environmental harm

Compliance Behaviour

<p>Intentional non-compliance <i>Knowingly breaking the law</i></p>	<p>Economic motivations Low risk of detection Frustration – complexity/delays Anger and resistance Lack of acceptance of science</p>
<p>Opportunistic non-compliance <i>People will break the law if they think they can</i></p>	<p>Small number of investigations Others getting away with non-compliance Penalties not advertised Belief that investigations do not occur Belief that law breaking is not penalised</p>
<p>Accidental non-compliance <i>People who would normally comply, but who make mistakes or don't understand their obligations</i></p>	<p>Lack of understanding of obligations/procedures Lack of access to information/advice Lack of access to tools/technology</p>

Inspection Level

DESCRIPTOR	TYPES OF COMPLIANCE ASSESSMENT INSPECTIONS		
	Level A	Level B	Level C
Label	Basic Inspection	Condition Review	Compliance Audit
Brief Outline	<i>A basic inspection requiring minimal planning. Focussing on a specific issue typically as a result of a public report or service request, industry self-reporting, follow-up of a previous inspection, or to assess more generally the risk posed by a site and need/extent for further compliance inspections.</i>	<i>The most common level of inspection undertaken; this is an assessment of compliance with regulations, licences and standards. Formulation of an opinion about compliance is based primarily on professional judgement, or an expression of negative assurance. The effectiveness of our regulatory systems may also be assessed during the inspection.</i>	<i>An audit of high risk licensed premises requiring detailed planning. It is a systematic examination involving analysis, tests and confirmation of procedures and practices, to verify compliance with legal requirements and the presence/absence of impacts; and may consider additional factors such as management practices and the ability to meet future standards.</i>
Site Type	<ul style="list-style-type: none"> non-licensed, pre-licensed or licensed low, medium or high risk degree of compliance often unknown 	<ul style="list-style-type: none"> non-licensed or licensed medium or high risk unknown or fair degree of compliance usually exhibited 	<ul style="list-style-type: none"> licensed medium or high risk poor degree of compliance has been exhibited in past
Trigger/Scope	<ul style="list-style-type: none"> initial response to a public report or service request, or industry self-reporting. (eg. determining source of impacts beyond boundary or if ERA being conducted, emergency incident response excluding cleanup, validating aspects of annual returns or permit applications) 	<ul style="list-style-type: none"> usually associated with proactive monitoring programs and related follow-up (eg. industrial estate, water catchment, or industry sector inspection programs) <ul style="list-style-type: none"> review focuses only on the specific processes or discharges that relate to the monitoring program to physically verify that corrective actions have been carried out (eg. in response to a complex enforcement tool) 	<ul style="list-style-type: none"> usually associated with proactive maintenance inspections of high risk sites or after a catastrophic event audit focuses on either: <ul style="list-style-type: none"> all activities, processes and discharges when generally chronic issues exist ('comprehensive audit'); or specific processes or discharges when generally acute problems exist ('focussed audit')
Objective	<ul style="list-style-type: none"> to physically verify that corrective actions have been carried out (eg. in response to a simple enforcement tool) to assess risk and determine need/extent for further compliance inspections 	<ol style="list-style-type: none"> compliance with regulations, licences and standards <ul style="list-style-type: none"> review history of legislative compliance including prior enforcement action and public complaints review statutory licences – held, correct and current – are conditions valid, achievable, relevant and being complied with, including required monitoring programs review other regulatory requirements – eg. waste tracking, NPI reporting, contaminated land SMPs, GED could also assess regulatory system effectiveness across an industry – including consistency, validity, relevance, achievability, enforceability, degree of protection. 	In addition to the Level B objectives, a Level C inspection may: <ol style="list-style-type: none"> review ability to meet future standards review management and operating practices <ul style="list-style-type: none"> staff training and responsibilities and public relation policies minimisation of risks (eg. emergency response procedures, handling/storage and transfer of hazardous materials, encroaching residential areas or conflicting industries, maintenance procedures) sustainable practices (eg. source of raw materials, minimise/reuse/recycle materials, disposal of wastes) review adequacy of financial assurance
Methodology	<ul style="list-style-type: none"> low-level planning and record keeping required cursory/visual examination, possibly just a drive-by pre-inspection – desktop analysis inspection – undertaken within a few hours, easily undertaken by 1 or 2 officers, simple enforcement 	<ul style="list-style-type: none"> medium-level planning and record keeping required professional judgement used to assess compliance (review consists primarily of observations, inquiry, and analytical procedures and discussion related to information supplied by the operator with the limited objective of assessing if the information is plausible) pre-inspection – desktop analysis, inspection checklists inspection – can take up to a day, usually undertaken by multiple officers, simple enforcement action could be taken 	<ul style="list-style-type: none"> high-level planning and record keeping required objective evidence used to verify compliance (in relation to monitoring for example – verification and assurance that the monitoring is being carried out, that the results are within acceptable limits (or recognise where they exceed), and that monitoring will continue within the parameters set by the permits) pre-inspection - desktop analysis, audit plan (particularly for comprehensive audits), inspection checklists inspection – opening/closing meetings and interviews, collection

	<p>action could be taken onsite</p> <ul style="list-style-type: none"> • post-inspection – Ecotrack updated with degree of compliance found, client thankyou/non-conformance letter sent 	<p>onsite in addition to further followup action</p> <ul style="list-style-type: none"> • post-inspection – Ecotrack updated with degree of compliance found, written compliance report, client thankyou/non-conformance letter sent 	<p>of data; can take more than a day, undertaken by multiple officers; can include desktop/site assessment by other disciplines</p> <ul style="list-style-type: none"> • post-inspection – Ecotrack updated with degree of compliance and risks found, further desktop analysis often required, written compliance report, client thankyou/non-conformance letter sent
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Notice

Environmental Protection Act

Conduct or commission an environmental evaluation¹

This statutory notice is issued by the administering authority pursuant to <PICK FROM LIST> of the Environmental Protection Act 1994, to advise you of a decision to require <PICK FROM LIST> <PICK FROM LIST>

Your reference : <INSERT reference>

Our reference : <INSERT reference>

<INSERT recipient's name>

<INSERT street address>

<INSERT suburb, state and postal code>

Attention: <INSERT principal contact>,

Re: Environmental audit required for <INSERT activity> on land described as Lot <INSERT Lot> on Plan <INSERT Plan>, located at <INSERT street address>.

Under section <PICK FROM LIST> of the *Environmental Protection Act 1994* (the Act) this notice requires you to <PICK FROM LIST>. The grounds for requiring <PICK FROM LIST> are <INSERT grounds from section 322(1) for an audit or section 323(1) for an investigation>. The facts and circumstances forming the basis for these grounds are:

<INSERT details of the basis for the grounds>.

The <PICK FROM LIST> must address the following matters:

<INSERT matters to be addressed>

<PICK FROM LIST> must be submitted by <INSERT date required> to the Department of Environment and Resource Management at <INSERT postal address>. <PICK FROM LIST> audit must complete <PICK FROM LIST>

You are responsible for the costs of meeting the requirements of this Notice.

You may apply to the Department of Environment and Resource Management for a review of this decision within 10 business days of receiving this Notice. You may also appeal against this decision to the Planning and Environment Court.

Information outlining the review and appeal processes under the *Environmental Protection Act 1994* is included with this notice. This information is intended as a guide only. You may have other legal rights and obligations.

Should you have any queries in relation to this notice, <INSERT contact officer's name> of the Department of Environment and Resource Management on telephone <INSERT phone number> would be happy to assist you.

¹ An environmental evaluation may be either an environmental audit under section 322 or an environmental investigation under section 323.

Conduct or commission an environmental evaluation

Signature

Date

<INSERT delegate's name>
<INSERT delegate's position>
Delegate of Administering Authority
Environmental Protection Act 1994

Enquiries:

<INSERT Permit and Licence Management
or local office details>

Ph. <INSERT 1300 130 372 or local no.>

Fax. <INSERT (07) 3896 3342 or local no.>

Assessment report

Environmental Protection Act 1994
Environmental evaluation

Part 2 – Considering and acting on environmental reports

This document is intended for internal use to assist Environmental Services officers to record the information considered by the Department when reviewing and considering environmental reports and deciding what further action should be taken.

Identifying details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If applicable
File number	File number
Applicant Number	Number
Trading As	Trading as details
Registered Business address	Address
Date report received:	<p>Date</p> <p>Note: The Department has 20 business days in which to make a decision whether or not to accept the environmental report.</p> <p>Within eight business days after deciding to require another environmental evaluation, or additional relevant information, the Department must give the person an information notice about the decision. This requirement may be met by issuing the relevant notice within the eight business day period.</p>

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be endorsed by the investigating officer, supervisor (where possible) and the delegated decision maker.

Environmental evaluation part 2 - Considering and acting on environmental reports

The legislative provisions in regard to environmental evaluations may be found in ss321 to 329 of the *Environmental Protection Act 1994* (the Act).

After receiving an environmental report from a person who has received a notice to conduct or commission an environmental evaluation, the Department has 20 business days to consider the report and decide whether or not to accept it. If the report is accepted, it is not necessary to complete this assessment report. Consider if another tool should be used, and if so, refer to the appropriate procedural guide and assessment report for that tool.

If the Department does not accept the environmental report, officers should consider whether to:

- reject the report and require another environmental evaluation to be completed and a further environmental report submitted **OR**
- require additional relevant information to be provided **OR**
- accept the report – skip to section 9 of this assessment report.

1. Grounds for issuing a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information

Identify the relevant grounds upon which the decision whether to use a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information is based.

1.1 Grounds for issuing a notice to conduct or commission another environmental investigation

- The report does not adequately address the relevant matters for the environmental evaluation to which the report relates.

If another environmental evaluation is required, the appropriate type is an:

- environmental audit (s322) **OR**
- environmental investigation (s323)

1.2 Grounds for issuing a notice requiring additional relevant information

- The Department is satisfied additional relevant information is required.

2. Expand upon the grounds

The next step is to expand upon the grounds identified for issuing a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information.

In the case of a notice to conduct or commission another environmental evaluation, refer to the requirements in the original notice and list the relevant matters for the environmental evaluation which have not been adequately addressed in the report.

For a notice requiring additional relevant information, consider what further information is required to enable the Department to ascertain the source, cause or extent of environmental harm being caused or likely to be caused and/or to decide whether a transitional environmental program (TEP) for the activity or event is required.

Each ground should be listed independently and be allocated a separate number.

Number	Specific ground
1	<i>Example: The report does not adequately address the relevant matters for the environmental evaluation because it does not contain an assessment of affected soils and comparison with unaffected soils as required by the original notice.</i>
2	<i>Example: The report does not adequately address the relevant matters for the environmental evaluation because it does not contain an analysis of groundwater potentially affected by the activities of ABC Pty Ltd as required by the original notice.</i>

3	<i>Example:</i>
4	<i>Example:</i>
5	<i>Example:</i>
6	<i>Example:</i>

3. Brief history of the matter

Briefly outline any historical information relevant to this decision in chronological order.

Briefly outline the historical information in chronological order.

4. Detail the matters that were not adequately addressed in the initial environmental evaluation and report or what further information is required

Refer to the original notice to conduct or commission an environmental evaluation and list in the table below any matters that were included in the original notice but have not been adequately addressed by the environmental evaluation and the environmental report. Explain why you consider that these matters were not addressed properly in the original environmental evaluation and report. If the Department requires additional relevant information, outline the information that will be listed in the notice requiring additional relevant information and explain why the information is required.

<p>Elements of the grounds for issuing the notice</p> <p><i>List the elements of the grounds for issuing the notice (i.e. the requirements listed in the original notice to conduct or commission an environmental evaluation that were not addressed or the additional relevant information required).</i></p>	<p>Matters that were not adequately addressed in the original environmental evaluation report or additional relevant information required</p> <p><i>Detail the facts and circumstances that support the Department's decision to issue a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information. (i.e. explain how the matters in the original notice have not been addressed).</i></p>
<p>Number 1</p>	
<p>1 September 2010</p>	<p>Environmental report was submitted to the Department by ABC Pty Ltd on 1 September 2010.</p>
<p>The original notice required the recipient to provide an assessment of affected soils and comparison to unaffected soils which addressed the following matters:</p> <p>(i) an analysis of affected soils, and comparable unaffected soils, for a range of analytes sufficient to</p>	<p>The recipient of the original notice has provided adequate information in the environmental report in respect to items (ii) and (iii).</p> <p>However, the recipient did not arrange for adequate analysis to be carried out of the affected soils and comparable unaffected soils to ascertain any</p>

<p>identify any impacts that may have resulted from the irrigation of effluent on ABC Pty Ltd and</p> <p>(ii) a description of the contaminants contained in the effluent irrigated and sludges applied on the ABC Pty Ltd site, including the results of a recent analysis of effluent and sludge for analytes found at elevated levels in soils from the affected area and</p> <p>(iii) the date, quality and quantity of effluent and sludge applied for each irrigation run in the area known as Lot 123 on RP 45678 from 1 June 2008 to 1 June 2010 and an analysis of rainfall records and soil moisture records at the times of irrigation for the same period and</p> <p>(iv) an assessment of the quantity of contaminants applied per hectare in the area known as Lot 123 on RP 45678 from 1 June 2008 to 1 June 2010.</p>	<p>environmental impacts resulting from effluent irrigation carried out at the premises of ABC Pty Ltd as required by item (i). Consequently, this matter has not been addressed in the environmental report.</p> <p>Further, the recipient has not provided an assessment of the quantity of contaminants applied per hectare in the area known as Lot 123 on RP 45678 from 1 June 2008 to 1 June 2010 as required by item (iv).</p> <p>Without the above information the Department will be unable to fully ascertain the source, cause or extent of the environmental harm being caused.</p>
Number 2	
<p>The original notice to conduct or commission an environmental evaluation required the recipient to carry out an assessment of groundwater potentially affected by the activities of ABC Pty Ltd which would include (among other things) an assessment of the stratigraphy in the area and its relationship to hydrogeological conditions.</p>	<p>Some assessment of the groundwater was carried out during the environmental evaluation, but the report did not contain the results of the required assessment of the stratigraphy in the area and its relationship to hydrogeological conditions. This information is required to ascertain the source, cause or extent of environmental harm being caused, or likely to be caused, by the activity (effluent irrigation).</p>
	<p>The officer who has carriage of this matter has come to the conclusion that another environmental evaluation and report are required for this information to be obtained.</p>
Number 3	

Number 4	

5. Natural justice

Officers are required to notify the affected person that the Department is considering issuing a notice to conduct or commission another environmental evaluation, or a notice requiring additional relevant information, and that the individual is welcome to make representation to the Department as to why this action should not be taken. Any information provided by the affected person is to be documented and considered.

- The person has been provided with the opportunity to put their side of the story forward.
Please describe how this was achieved.
- All information provided has been considered.
Please describe any information or defences provided.
- The Department has considered the information.
What consideration was provided and what conclusions have the Department formed?
- The decision-maker and environmental officer are free from bias or the perception of bias.

6. Relevant matters for the environmental evaluation or required additional relevant information

If appropriate, please list any relevant matters for the new environmental evaluation – that is, the matters that the recipient is required to investigate or audit that were not adequately addressed in the original report. Or, if additional relevant information is necessary, list the information required.

The relevant matters must be SMART: specific, measureable, achievable, relevant and time specific. Refer to the [Writing effective and enforceable conditions procedural guide](#) for more information on writing conditions and/or requirements.

To ensure the relevant matters are reasonable officers are required to provide justification for their inclusion.

Proposed requirement	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification

information required	
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification
Proposed relevant matter or additional relevant information required	Justification

7. Recommendation

Officers are required to make a recommendation in relation to issuing a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information.

Recommendation

8. Approval

Environmental Officer	Supervisor (where appropriate/available)
Print name:	Print name:
Date:	Date:

Delegate decision maker	Approve / reject recommendation (circle one)
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Reasons for decision <i>For example:</i> <i>I endorse this recommendation based upon the information set out above.</i> <i>Or, I endorse this decision for the reasons set out above and I note Mr Rodgers has previously received a warning letter in relation to this matter.</i> <i>Or, I reject the above recommendation as I consider it more appropriate for the Department to take an educational approach to this breach.</i>
Print name:
Date:

Procedural guide

Environmental Protection Act 1994 Environmental evaluation

Part 2 – Considering and acting on environmental reports

This document is intended for internal use to assist Environmental Services officers to consider and act on environmental reports under s2326 to 329 of the Environmental Protection Act 1994.

When do I consider and act upon an environmental report (s326)?

When a notice to conduct or commission an environmental evaluation has been issued, s326 of the *Environmental Protection Act 1994* (the Act) provides that the recipient of the notice must submit an environmental report to the Department on or before the specified date.

After receiving the report the Department has 20 business days in which to consider the report and decide whether to accept or reject it, unless it decides to extend the time required to make a decision by written notice (s328).

If the Department fails to make a decision whether or not to accept an environmental report within 20 business days, it is taken to be a decision by the Department to refuse to accept the report (s329).

What are the Department's options after it receives an environmental report?

The Department has the following options:

- (a) accept the report or
- (b) reject the report and require another environmental evaluation to be completed and a further environmental report submitted or
- (c) require additional relevant information to be provided.

(a) Accept the report – s326(2)

If the Department is satisfied with the environmental report, it may do one or more of the following things—

- Require the recipient to prepare and submit a transitional environmental program (TEP) to the Department. Information in regard to TEPs may be found here: [\[LINK\]](#)
- If the recipient holds an environmental authority, amend the conditions of the authority. Information in regard to amending an environmental authority may be found here: [Amending an environmental authority \(chapter 5A activities\)](#)
- If the recipient is a registered operator for a development approval, add, change or cancel a development condition of the development approval pursuant to s73C of the Act.
- Serve an environmental protection order (EPO) on the person. Information about issuing an EPO may be found here: [\[LINK\]](#)
- Take any further action it considers appropriate.

If the Department is satisfied with the environmental report and intends to use one of the alternatives listed above, officers will need to refer to the appropriate procedural guide for that tool for further instructions.

(b) Reject the report and require another environmental evaluation – s326(3)

If the environmental report does not address the relevant matters to the satisfaction of the Department as set out in the original notice to conduct or commission an environmental evaluation, the Department may, by giving written notice, require the recipient of the original notice to conduct or commission another environmental evaluation and submit a report on that evaluation.

(c) Require additional relevant information – s326(4)

If the Department requires additional relevant information, it may require the recipient to provide the information by giving written notice to the recipient.

How do I know if the environmental report is satisfactory?

The original notice to conduct or commission an environmental evaluation lists the Department's requirements. Look at each requirement in the notice one by one and consider whether the environmental evaluation carried out is appropriate and whether the environmental report has adequately addressed each requirement.

To assist in deciding whether the environmental evaluation and report are adequate, look at the original breach or non-compliance which led to the use of the environmental evaluation tool. Consider the following factors:

(i) Sufficiency of information

Does the report provide sufficient information to ascertain the source, cause and extent of the environmental harm being caused, or the extent of the harm likely to be caused, by the activity or event? Alternatively, does the report provide enough information to determine whether a condition of an environmental authority or development authority has been breached or whether there has been a contravention of a regulation, environmental protection policy or transitional environmental program?

(ii) Inform future actions

Is there enough information in the environmental report to enable the selection and use of appropriate tools to stop the environmental harm or prevent further environmental harm? In the alternative, is there enough information to prevent further breaches of an environmental or development authority, or further contraventions of a regulation, environmental protection policy or transitional environmental program?

(iii) Comprehensiveness

When considering the environmental report, identify if the report—

- includes statutory declarations as required by the legislation from the recipient of the notice and the individual commissioned to perform the environmental evaluation
- adequately reports on the matters relating to the environmental evaluation
- contains sufficient information and detail to meet all of the requirements listed in the notice to conduct or commission an environmental evaluation
- addresses all of the relevant matters for the environmental evaluation to which the report relates.

(iv) Make a decision and record the reasons

Officers are required to determine whether the Department accepts or rejects the environmental report, what further action is required and to record the reasoning behind the decision.

If the Department decides to accept the environmental report, it will not be necessary to complete the assessment report for this tool. If another tool is to be used in response to an accepted environmental report, officers should refer to the relevant procedural guide for that tool and to the Department's [Enforcement Guidelines](#).

What happens if the Department does not accept the environmental report (ss326(3) and 326(4))?

If the Department does not accept the environmental report, it may require the person to conduct or commission another environmental evaluation. Officers should consider whether requiring another environmental evaluation is the best course of action, given that the initial notice did not produce a satisfactory report. Officers should take into account that the recipient must meet the cost of conducting or commissioning the environmental evaluation and report and consider the cost and inconvenience to the person and the possible impacts on their business activities.

The purpose of an environmental evaluation is to ascertain the source, cause or extent of environmental harm being caused and to decide whether or not a transitional environmental program (TEP) is required. The issuing of a notice to conduct or commission another environmental evaluation should not be used as a punitive measure against the recipient. If the original environmental report does not adequately address all of the relevant matters, it may be that the required information could be obtained by using other means. Examples are a requirement for additional further information under s326(4), or a notice requiring relevant information issued under s451 of the Act.

What happens if further information is required (s326(4))?

If the Department is satisfied that additional relevant information is necessary it may, by giving written notice, require the recipient to provide the information.

Extension of time for decisions on submission of environmental reports (s328)

The Department may decide to extend the time it requires to decide whether or not to accept an environmental report if—

- it has required additional relevant information about the report or
- there are special circumstances for extending the time.

Before the extension starts the Department must give the recipient an information notice about the decision to make the extension that states—

- the decision and
- the reasons for the decision and
- the review or appeal details.

The Department should also advise the recipient of the new time frame for deciding whether or not to accept the environmental report.

If the Department has required the recipient to provide additional relevant information about the environmental report, it is likely that the Department will need to extend the time required to decide whether or not to accept the report.

The Act is silent regarding the maximum period the Department may extend the time it requires to make a decision about the report. Accordingly, officers must use their discretion when deciding how long the extension of time should be. Factors to be taken into account include the period of time allowed for the recipient to provide the additional relevant information and how much extra time the Department will require to consider that information and to decide whether or not to accept the environmental report. Any extension of time should be reasonable and should not affect the Department taking any further action.

How do I successfully issue a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information?

Officers must complete an assessment report to document the decision as well as completing a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information.

Step 1 - Complete the assessment report

Before completing a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information, officers are required to complete an assessment report which sets out the facts and circumstances relating to the matter and documents the decision-making process used by the Department in determining to issue the notice.

The following sections of the procedural guide are a guide to completing the assessment report. The numbering and headings of the sections in the procedural guide correlate with those in the assessment report for ease of reference.

The assessment report is not intended to replicate the departmental file. Rather it is designed to capture all critical aspects that have led to the Department's decision. Accordingly, officers are encouraged to limit the information included to relevant points only. A template assessment report is attached: [\[LINK\]](#)

What follows is what is needed to assess:

1. Grounds for issuing a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information

The legislation specifies that the notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information can only be used in certain circumstances. Officers are required to identify the relevant situation or 'grounds' upon to which the decision to use the notice is based.

1.1 Grounds for issuing a notice to conduct or commission another environmental evaluation

If the environmental report does not address the relevant matters for the environmental evaluation to which the report relates, officers may issue a notice to conduct or commission another environmental evaluation. An environmental evaluation can be either an—

- environmental audit or
- environmental investigation.

If a notice to conduct or commission another environmental evaluation is required, the evaluation must be of the same type as the original evaluation.

1.2 Grounds for issuing a notice requiring additional relevant information

If the Department is satisfied that additional relevant information is required, it may require the recipient to give it the information.

2. Expand upon the grounds

The purpose of this section is to clearly identify what the Department must 'prove' before deciding to use a notice to conduct or commission another environmental evaluation or a notice to provide additional relevant information and should be used to expand upon the grounds which have previously been identified.

Each ground (or requirement that has not been adequately addressed) should be allocated a separate number.

In the case of the notice to conduct or commission another environmental evaluation, officers should refer to the original notice to conduct or commission an environmental evaluation to ascertain the relevant matters that should have been addressed in the environmental report. If any relevant matters have not been adequately addressed by the report, details of these should be listed.

If the Department requires additional relevant information, the information required should be listed.

3. Brief history of the matter

Please briefly outline any historical information relevant to this decision. This information should be presented in succinct chronological dot points and should include how the Department became aware of the alleged breach.

4. Detail the matters considered

The purpose of the table in the assessment report is to link the elements of the breach to the evidence gathered and the conclusions formed. This is achieved by identifying: the elements of any specific breach or allegation, the evidence which has been considered for each element, and the conclusion that has been reached by the officer after considering the information sourced.

When documenting the evidence considered, limit the information to relevant points only. This can include (but is not limited to):

- notes recorded in an officer's official notebook
- samples collected for analysis and any subsequent lab reports
- photographs and copies of documents and
- any observed actions and direct testimony received from individuals.

When developing the facts and circumstances, consider the accuracy and relevance of available evidence, historical details, professional expertise and the weight attributed to any direct testimony provided.

5. Provide for natural justice

Prior to the Department making a decision which may adversely impact on an individual or group the Department must:

- **Notify** - Notify the individual that the Department is considering making adverse findings

- **Respond** - Provide the individual with an opportunity to respond to the allegation and
- **Consider** - Consider any representations made by the affected person before finalising the decision.

The seriousness of the matter will dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers are encouraged to use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. While in some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site inspection or a telephone interview and to take contemporaneous notes, in more serious circumstances a written notification which includes a specific closing date for submissions should be used.

Regardless of the manner in which natural justice is afforded, any information provided by the affected person is to be documented. The summary of information should include how natural justice was provided as well as any responses provided by the affected person.

6. Relevant matters for the evaluation

The notice must set out the relevant matters for the additional environmental evaluation – that is, the issues that the recipient is to investigate or audit, or the information that is to be provided. As the recipient of the notice may be able to seek a review of the notice, officers must provide justification for the inclusion of each of the relevant matters.

The relevant matters must be specific, measureable, achievable, time specific and relevant to the breach or reason why the notice to conduct or commission an environmental evaluation is being issued. For example:

On or before 5.00pm on 24 July 2010, ABC Pty Ltd will have carried out an assessment of affected soils and comparison with unaffected soils that addresses at least the following matters:

- (i) an analysis of affected soils, and comparable unaffected soils, for a range of analytes sufficient to identify any impacts that may have resulted from the irrigation of effluent on ABC Pty Ltd and*
- (ii) a description of the contaminants contained in the effluent irrigated and sludges applied on the ABC Pty Ltd site, including the results of a recent analysis of effluent and sludge for analytes found at elevated levels in soils from the affected area and*
- (iii) the date, quality and quantity of effluent and sludge applied for each irrigation run in the area known as xxx from 1 June 2008 to 1 June 2010 and an analysis of rainfall records and soil moisture records at the times of irrigation for the same period and*
- (iv) an assessment of the quantity of contaminants applied per hectare in the area known as Lot 123 on RP 45678 from 1 June 2008 to 1 June 2010.*

A copy of the assessment must be provided to the Department on or before 5.00pm on 24 July 2010.

7. Recommendation

Officers are required to make a recommendation in relation to the alleged breach. For example:

It is the opinion of the Department that ABC Pty Ltd failed to comply with its development conditions by allowing storm water to leave 24 Jones Road and enter Murphy Creek. A notice to conduct or commission an environmental evaluation (environmental audit) was issued to Mr JP Citizen, proprietor of ABC Pty Ltd and a report on the environmental evaluation was provided. The Department has considered the report and is satisfied that it does not adequately address the matters relevant to the environmental evaluation to which it relates. The

failure is of a serious nature and in the absence of the information; the Department is unable to make an informed decision. The Department considers that a request for additional relevant information would not meet the Department's requirements.

Accordingly, it is recommended that a notice to conduct or commission another environmental evaluation be issued.

Officers are encouraged to consider alternative actions/tools, Departmental enforcement guidelines, details of any consultations including site visit details and discussions with the ERA contact officer. The reasonableness of proposed timeframes for the completion of requirements should be taken into account.

8. Approval

The assessment report is to be approved by an appropriately delegated officer.

The Department's list of delegations can be found at: <http://insite2.dnr.qld.gov.au/derm/delegations/>.

Step 2 - Complete the notice

Notice to conduct or commission another environmental evaluation or require additional information

The notice must meet a number of legislative requirements in order to be legally binding. Section 326(6) of the Act provides that a notice to conduct or commission another environmental evaluation or a notice requiring additional relevant information must—

- state the grounds on which the requirement is made and
- outline the facts and circumstances forming the basis for the grounds and
- state the relevant matter for the environmental evaluation or the information required and
- state the day (at least a reasonable period after the notice is given) by which the report or information must be given to the Department and
- state the review or appeal details.

Information notice

Sections 322(2) and 323(2) of the Act state that within eight business days after making a decision to require a person to conduct or commission an environmental audit or environmental investigation, the Department must give the person an information notice about the decision. The information notice must be in writing and must state the following—

- the decision and
- the reasons for the decision and
- the review or appeal details.

In order to meet these legislative requirements and to ensure the notice is readily understood by the recipient, the information required to be provided in the information notice has been included in the template notice to conduct or commission another environmental evaluation (audit or investigation) and the template notice requiring additional relevant information. Officers should ensure that the appropriate notice is served upon the

recipient within eight business days. If this is not possible, an information notice must be sent to the recipient within the eight business day period.

While it is not a legislative requirement to provide an information notice to a recipient of a notice requiring additional relevant information, it is considered best practice to provide this information by issuing this notice within eight business days after deciding to make the requirement, or if this is not possible, to give the recipient an information notice containing the information listed above.

A template notice to conduct or commission an environmental evaluation and a template notice requiring additional relevant information are attached [\[LINK\]](#)

The notice should be signed by the decision-maker in conjunction with the assessment report which records the formal decision.

Complete the statutory declarations

When an environmental report is submitted to the Department, it must be accompanied by a statutory declaration by the recipient of the notice to conduct or commission an environmental evaluation and a statutory declaration by the person who carried out the environmental evaluation. The legislative requirements in respect to the drafting of the statutory declarations may be found in s325 of the Act. Copies of the template statutory declarations should be provided to the recipient of a notice to conduct or commission an environmental evaluation along with the notice itself. Template statutory declarations are attached: [\[LINK\]](#)

Service of the notice

Service means delivery to the party who will be responsible for actioning the notice. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the recipient in question. Methods of service are provided for in ss39 and 39A of the *Acts Interpretation Act 1954* (AI Act).

For the purposes of any Act that requires a document to be served on (which includes 'given' or 'sent to') a person, the document may be served:

- on a person:
 - by delivering it to the person personally, or
 - by leaving at, or by sending it by post, facsimile or similar facility (e.g. email) to the person's last known place of residence or business or
- on a body corporate - by leaving it at, or sending it by post, facsimile or similar facility (e.g. email) to the head office, a registered office or a principal office of the body corporate.

The date time and method of service should be documented by contemporaneous notes, a file note, any receipts arising from the postage or any facsimile or email confirmations.

What follow-up is required?

It is important that the matter is appropriately followed up to make sure that the person to whom the notice to conduct or commission another environmental evaluation or notice to provide additional relevant information is issued, is complying with any requirements imposed. Follow-up is to be scheduled by the relevant officer and confirmed with the business area manager. The relevant manager is responsible for ensuring follow-up is undertaken within the agreed time frame.

This is usually achieved by checking that the environmental report or additional relevant information has been received by the Department by the due date, followed by a site inspection to be conducted one week after the

time period nominated in the notice has expired. Officers are encouraged to use tools such as diary reminders to ensure the matter is followed up in a timely manner.

If the recipient of the notice fails to provide the environmental report or additional relevant information by the due date, or the follow up site visit uncovers further problems, officers must consider what further action should be taken. This may include enforcement action or the use of an alternative compliance tool, such as an environmental protection order (EPO) for example.

What are my record keeping responsibilities?

Officers are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measures screen (this includes a decision to take no further action). A hard copy of the notice to conduct or commission another environmental evaluation or the notice requiring additional relevant information, the signed assessment report and any accompanying documents must be placed on the paper file. The Department is required to make, and record, an informed decision about all allegations of non-compliance.

It is important that officers adequately report and respond to all inquiries in order to assist in building a comprehensive compliance history.

Amendments to an issued notice or a notice requiring additional relevant information

If minor changes to the notice to conduct or commission another environmental evaluation or the notice requiring additional relevant information, or an extension of time are required, the recipient of the notice should be notified in writing.

If significant changes are required, officers should, in order to avoid confusion, repeal (revoke) the original notice, and issue a fresh one on the same grounds with the necessary changes. It is important to note that the recipient will have a fresh appeal rights and should be advised accordingly.

The repeal and issue of a fresh notice should be carried out in the same way, and subject to the same conditions as the issuing of the original notice. Accordingly, a new assessment report should be completed and endorsed by the appropriate delegate.

It is preferable if the decision is made by the original decision-maker. If this is not possible the decision should be made by a person with the appropriate delegation who holds a position equal to or higher than that of the original decision-maker.

Officers should also update and record the changes or the decision to repeal and reissue the notice in EcoTrack and place hard copies of any documentation on the paper file.

Review of decisions and appeals (ss519 to 539 of the Act)

The provisions regarding review of decisions and appeals may be found in ss519 to 539 of the Act.

The Act specifies that a person who is dissatisfied by a decision by the Department in respect to a notice requiring additional relevant information may apply for a review of an original decision by submitting an application on the approved form to the Department within:

- 10 business days after the day on which the person received notice of the original decision or the date when the Department is taken to have made the decision (the “review date”) or
- such longer period as allowed by the Department if there are special circumstances.

An approved form for the review of an original decision may be found at: [Application form - Review of Original Decision](#)

If the person is dissatisfied with the review decision, the person may appeal to the Planning and Environment Court by filing written notice with the court within 22 business days after the person receives notice of the review decision, unless this time period is extended by the court.

Officers should be aware that although the decision to issue a notice requiring further relevant information is an original decision for the purposes of ss519 to 539 of the Act, the decision to require another environmental evaluation is not. Accordingly, there is no provision under the Act for review or appeal of a decision to issue a notice to conduct or commission another environmental evaluation.

A person aggrieved by a decision to issue a notice to conduct or commission another environmental evaluation may be able to seek statutory order of review or request a statement of reasons for the decision pursuant to the Judicial Review Act 1991.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

What penalties exist for non-compliance with a notice?

There is no penalty for failing to comply with s326 of the Act. However, there are penalties under ss322 and 323 for failing to comply with an original requirement to conduct or commission an environmental audit (s322) or an environmental investigation (s323).

Assessment Report

Environmental Protection Act 1994
Transitional environmental program (TEP)

Part 2 - Considering and making a decision about a draft TEP

This document is for internal use to assist users in critically evaluating the content of a draft TEP and making a decision to either approve (with or without conditions) or refuse a draft TEP.

Identifying details	
Compliance activity number	Compliance activity number
Ecotrack number	Ecotrack number
Permit number	Permit number
File number	File number
Applicant name	Applicant name
Registered office or place of business	Registered office or place of business
Date draft TEP received.	Date <i>Note: The department has 20 business days after the application date in which to make a decision in relation to the draft TEP.</i>

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be signed by the investigating officer, supervisor and the delegated decision-maker.

Considering and making a decision about a draft TEP

The legislative provisions in regard to transitional environmental programs (TEPs) are found in Chapter 7, Part 3 of the *Environmental Protection Act 1994* (the Act).

A person or public authority may submit a draft TEP to the Department for consideration, either voluntarily under s333 of the Act or pursuant to a notice requiring a draft TEP issued by the Department under s332 of the Act. Once a draft TEP is received, the Department must consider it and decide whether or not to approve it within 20 business days after the application date or, if public notice is required under s335, within 20 business days of the day stated in the notice as the day by which submissions must be made to the Department. Detailed below are the matters that the Department must consider when making a decision about a draft TEP.

TEP Part 2 – Considering and making a decision about a draft TEP

1. Brief history of the matter

Briefly outline any historical information relevant to this decision.

Provide historical information relating to the matter in succinct, dot point form.

2. Matters that must be considered when making a decision about the draft TEP

Achieving compliance with the Act (s330)

Identify how, if approved, the draft TEP will achieve compliance with the *Environmental Protection Act 1994* (the Act) by doing one or more of the following things—

- reducing environmental harm caused by the activity
- detailing the transition of the activity to an environmental standard
- detailing the transition of the activity to comply with:
 - a condition, including a standard environmental condition, or an environmental authority or code of environmental compliance or
 - a development condition.

Content of the TEP (s331)

To be approved, the draft TEP, for the activity to which it relates, must accomplish the following—

(a) Objectives to be achieved and maintained under the TEP

- The draft TEP clearly sets out the objectives to be achieved and maintained under the TEP (i.e. what the draft TEP is trying to achieve).

Provide a brief summary of the objectives to be achieved and maintained under the TEP.

(b) State the particular actions

- The draft TEP states the particular actions required to achieve the objectives, and the date by which each action must be completed.

Briefly state the actions required to achieve the objectives and the dates by which each action must be completed.

- When stating the required actions, the draft TEP takes into account—
 - the best practice environmental management for the activity and
Provide brief notes about how, when stating the required actions, the draft TEP takes into account the best practice environmental management for the activity.
 - the risks of environmental harm being caused by the activity.
Provide brief notes about how, when stating the required actions, the draft TEP takes into account the risks of environmental harm being caused by the activity.

(c) Prevention and minimisation of environmental harm

- The draft TEP states how any environmental harm that may be caused by the activity will be prevented or minimised, including any interim measures that are to be implemented.

TEP Part 2 – Considering and making a decision about a draft TEP

Briefly describe how any environmental harm that may be caused by the activity will be prevented or minimised, including any interim measures that are to be implemented.

(d) Transition to an environmental standard

- If an objective of the draft TEP is for the activity to transition to an environmental standard, the draft TEP states—
- details of the standard and
 - how the activity is to transition to the standard before the TEP ends.

Provide details of the standard and briefly describe how the activity is to transition to the standard before the TEP ends.

OR

- It is not an objective of the draft TEP for the activity to transition to an environmental standard.

(e) Transition to comply with a condition of an environmental authority or code of environmental compliance, or a development condition

- If an objective of the draft TEP is for an activity to transition to comply with a condition of an environmental authority or code of environmental compliance, or a development condition, the draft TEP states—
- details of the condition and how the activity does not comply with it and
 - how compliance will be achieved before the end of the TEP.

Provide details of the relevant condition and how the activity does not comply with it, and describe briefly how compliance will be achieved before the end of the TEP.

OR

- It is not an objective of the draft TEP for the activity to transition to compliance with an environmental authority, or code of environmental compliance or a development condition.

(f) Period over which TEP is to be carried out

- The draft TEP states the period over which the TEP is to be carried out.

State the period over which the TEP is to be carried out.

(g) Performance indicators

- The draft TEP states appropriate performance indicators at intervals of not more than 6 months.

Provide brief details of the performance indicators.

(h) Monitoring and reporting

- The draft TEP adequately provides for monitoring and reporting on compliance with the program.

Briefly describe how the draft TEP provides for monitoring and reporting on compliance with the program.

If the Department has issued a notice under s332 requiring a person to prepare and submit a draft TEP to it for approval

- If the draft TEP was submitted in response to a written notice issued by the Department under s322 of the Act, the draft TEP has addressed all of the requirements stated in the notice.

TEP Part 2 – Considering and making a decision about a draft TEP

If the draft TEP was submitted in response to a written notice under s322, and it does not address all of the matters required to be addressed, provide details of the matters that the draft TEP does not adequately address.

OR

- The draft TEP was not submitted in response to a written notice issued under s322 of the Act.

Regulatory requirements (s338(1)(a))

Chapter 4, Part 1 (ss46-64) of the *Environmental Protection Regulation 2008* (the Regulation), sets out the regulatory requirements that the Department is required to comply with when making a decision whether to accept (with or without conditions) or reject a draft TEP.

- When deciding whether accept (with or without conditions) or reject the draft TEP, the Department has complied with all relevant regulatory requirements stipulated in ss46-64 of the Regulation.

Briefly describe the relevant sections of the Regulation that were considered and how they relate to the draft TEP.

Note that regulatory requirements may also be contained in environmental protection policies.

- All relevant regulatory requirements contained in environmental protection policies have been considered by the Department.

If applicable, briefly describe any regulatory requirements contained in environmental protection policies and how they relate to the draft TEP.

OR

- There are no applicable regulatory requirements contained in environmental protection policies.

Standard criteria (s338(1)(b)(i))

- The Department has considered all relevant matters in the standard criteria.

Provide brief details in the table below of each relevant standard criterion and how it relates to the Department's consideration of the draft TEP. If a particular criterion is not applicable, write 'N/A'.

Standard criterion	Details
Ecologically sustainable development	
Environmental protection policies (EPPs)	
Plans, standards or agreements	
Environmental impact study, assessment or report	
Receiving environment	
Submissions made by the applicant and submitters	
Best practice environmental management	

TEP Part 2 – Considering and making a decision about a draft TEP

Financial implications	
Public interest	
Site management plan	
Environmental management systems (IEMS)	

Additional information (s338(1)(b)(ii))

The Department has considered additional information (if any) given in relation to the draft TEP.

If applicable, briefly describe the additional information provided.

OR

No additional information has been provided.

Views expressed at a conference (s338(1)(b)(iii))

If a conference has been held in relation to the draft TEP, the Department has considered the views expressed at the conference.

If applicable, provide brief notes of the views expressed at the conference and the consideration given to those views.

OR

No conference has been held.

Consistency with development conditions of a development approval (s338(2))

If the draft TEP has been prepared because of a development condition of a development approval, the draft TEP is consistent with other conditions of the development approval.

If applicable, describe how the draft TEP is not consistent with the other conditions of the development approval.

OR

The draft TEP has not been prepared because of a development condition of a development approval.

Public notice of submission of draft TEP (s337(2)) and substantial compliance with the Act (s342)

If public notice is required to be given at the submission of the draft TEP, the Department is satisfied that the public notice has been properly given.

OR

The Department is not satisfied that the required public notice has been properly given, but is satisfied that there has been substantial compliance with the Act and will accept this as compliance.

Provide brief details of how the public notice has not been properly given and why the Department is satisfied that there has been substantial compliance with the Act which it will accept as compliance.

OR

Public notice is not required.

TEP Part 2 – Considering and making a decision about a draft TEP

Is the Department satisfied with the draft TEP?

For the draft TEP to be approved, at least one box should be checked next to each of the above matters for consideration. If any of the matters remain unchecked, then the draft TEP can not be approved.

- If a box has been checked next to each requirement - Proceed to section 3.
- If a box has not been checked next to each requirement - Proceed to section 4.

3. Request for further information and/or amendments to a draft TEP

If the draft TEP substantially addresses all of the relevant matters listed in s331 of the Act, but cannot be approved unless further information is provided or some amendments are made, the Department may request that the person or public authority provide further information or an amended TEP. Note that if there are significant problems with the draft TEP and it will require major changes or re-writing before it can be approved, the Department should refuse to approve it.

If it is appropriate that further information or a request for amendments be made, officers should consider the following alternatives—

- Further information is required.
Officers are to list the further information required about the draft TEP and suspend the assessment report process while waiting for the further information to provided.
- Minor amendments are required.
Officers are to list the minor amendments required and suspend the assessment report process while waiting for the person to provide the amended TEP.
- More substantial amendments are required.
Officers are to list the more substantial amendments required and present them to the Delegate for approval.

4. Approval of the draft TEP

Prior to making a recommendation to issue a notice of decision approving the draft TEP (with or without conditions), it is important to take into account that the Act stipulates that a TEP is a program that achieves compliance with the Act for the activity to which it relates.

If the draft TEP does **not** meet the requirements of the Act it must be refused. Whilst the Act does make provision for the approval to be subject to conditions, the conditions should address relatively minor issues only. Conditions stated in a notice of decision must not be used to rectify significant issues with a draft TEP.

A notice of decision must be issued within 8 business days of making the decision to approve the TEP. If the approval is subject to conditions, the notice of decision must be an information notice.

- The notice of decision identifies the documents forming the approved TEP, including any amendments under section 339(1)(a)(ii).
- The notice of decision sets out any conditions imposed on the approval by the Department.
- The notice of decision states the day the approval ends.

TEP Part 2 – Considering and making a decision about a draft TEP

- If conditions have been imposed on the approval, the notice of decision is in the form of an information notice.

If the notice is in the form of an information notice, it must include:

- the decision and
- the reasons for the decision and
- any available rights of internal and external review.

5. Refusal to approve a draft TEP

The draft TEP cannot be approved unless at least one checkbox has been checked beside each of the matters required to be addressed by the draft TEP. If the draft TEP does not meet all of the requirements, and any deficiencies will not be addressed by a request for further information and/or amendments to the draft TEP, then the Department should refuse to approve the draft TEP.

If the Department refuses to approve the TEP, the notice of decision must be an information notice.

Consequently, the notice of decision must include:

- the decision and
- the reasons for the decision and
- any available rights of internal and external review.

6. Provide for natural justice

In order to provide natural justice, the Department must advise the person that submitted the draft TEP if it intends to do one of the following things—

- request further information about the draft TEP and/or
- request amendments to the draft TEP or
- refuse to approve the draft TEP.

The Department must also provide the person with the opportunity to make submissions in response to the Department's intentions.

- The person has been provided with the opportunity to put their side of the story forward.
Describe how this was achieved. |
- All information provided has been considered.
Describe any information or submissions provided. |
- The Department has considered the information.
What consideration was provided and what conclusions have the Department formed? |
- The decision-maker and environmental officer are free from bias or the perception of bias.

TEP Part 2 – Considering and making a decision about a draft TEP

6. Recommendation

The environmental officer is required to make a recommendation in relation to the draft TEP.

Recommendation:

For example, "I recommend that the draft TEP be approved OR I recommend that the draft TEP be approved with the amendments agreed in the letter to the company dated XXX OR I recommend that the draft TEP be refused.

7. Approval

Environmental officer	Supervisor
Print name:	Print name:
Date:	Date:

Delegated decision-maker	Approve / Reject recommendation (circle one)
Reasons for decision. 	
Print name:	
Date:	

Procedural guide

Environmental Protection Act 1994 Transitional environmental program (TEP)

Part 2 - Considering and making a decision about a draft TEP

This document is designed to assist users to critically evaluate the content of a draft TEP and assess whether or not the proposed objectives and actions meet the legislative requirements.

Consideration of a draft TEP submitted by a person or public authority

If a person submits a draft TEP to the Department of Environment and Resource Management (the Department), the Department is required to consider the draft TEP and make a decision whether to approve or refuse the draft TEP, or to approve it with conditions.

Section 337 of the *Environmental Protection Act 1994* (the Act) provides that the Department must make its decision within 20 business days after—

- if a public notice is required under s335—the day stated in the notice as the day by which public submissions may be made to the Department or
- otherwise—the application date.

The terms *application date* and *person* are defined below.

Application date (s552)

The *application date* is important because many actions in relation to a draft TEP must be made within a certain number of days from the application date. Subsection 552(2) of the Act states that the application date relating to a draft TEP is 10 business days after the day it has been submitted to the Department.

However, if the Department requires additional information about the draft TEP within 8 business days after the day it has been submitted, the application date is the day the Department states in a written notice to the applicant as being the application date (s552(3)). This day must not be earlier than two business days after the person has received the written notice (s552(6)).

If, within 8 business days after a person submits a draft TEP, the Department advises the person who made the submission that the TEP (or proposed amended TEP) does not contain or provide for a matter mentioned in s331 (content of a program), and the person is required by the Department to amend the submission so that the TEP (or proposed amended TEP) is compliant with s331 and to resubmit the submission to the Department, the application date is the day that is 10 business days after the day the amended TEP is submitted to the Department.

Or, if the Department requires additional information about the amended TEP within 8 business days after the day the amended TEP is submitted to the Department, the application date is the day the Department states in a written notice to the applicant as being the application date (s552(5)). This day must not be earlier than 2 business days after the person has received the written notice (s552(6)).

Person

The term *person* includes an individual, public authority or corporation.

Fee for consideration of a draft TEP (s334)

A person that submits a draft TEP to the Department for consideration and approval must pay to the Department the fee prescribed by regulation. See: [Operational policy - Transitional Environmental Program \(TEP\) fees](#)

An invoice for the fees incurred should be issued to the person that has submitted the draft TEP for approval at the time when the notice stating the Department's decision is issued.

What must be included in the content of a draft TEP? (s331)

Section 331 of the Act requires that a draft TEP must, for the activity to which it relates—

- (a) state the objectives to be achieved and maintained under the TEP for the activity and
- (b) state the particular actions required to achieve the objectives, and the day by which each action must be carried out, taking into account:
 - (i) the best practice environmental management for the activity and
 - (ii) the risks of environmental harm being caused by the activity and
- (c) state how any environmental harm that may be caused by the activity will be prevented or minimised, including any interim measures that are to be implemented and
- (d) if the activity is to transition to an environmental standard, state:
 - (i) details of the standard and
 - (ii) how the activity is to transition to the standard before the TEP ends and
- (e) if the activity is to transition to comply with a condition of an environmental authority or code of environmental compliance, or a development condition, state:
 - (i) details of the condition and how the activity does not comply with it and
 - (ii) how compliance with the condition will be achieved before the TEP ends and
- (f) state the period over which the TEP is to be carried out and
- (g) state appropriate performance indicators at intervals of not more than six months and
- (h) provide for monitoring and reporting on compliance with the program.

Is public notice required? (s335)

Public notice is required where the person submits a draft TEP for approval that states the TEP is to be carried out over a period of longer than three years. Within 2 business days after the application date, the person must give public notice of the submission by:

- an advertisement published in a newspaper circulating generally in the area in which the activity to which the draft program relates is, or is proposed to be, carried out and
- if the program relates to premises, a notice must also be placed on the premises and served on the occupiers of all adjoining premises

TEP Part 2 – Considering and making a decision about a draft TEP

- invite submissions on the draft TEP (s335(3)(b)) and state the day (at least 10 business days after the advertisement and service of notice) nominated by the Department as the day by which submissions may be made to the Department.

The notice must meet the requirements of the Act,

In what circumstances may the Department call a Conference? (s336)

The Department may invite the person that has submitted a draft TEP, and another person that has made a submission under section 335 about the TEP, to a conference to help it decide whether or not to approve the draft TEP. See section 336 of the Act for details of notice and other requirements regarding conferences.

Other consultation and considerations

Depending on the content of the draft TEP, officers may need to consult with other business units or Departments in order to ensure that the risks from, and effects of, the draft TEP have been fully understood. For example, if the draft TEP involves releases of water, Queensland Health and/or the Office of the Water Supply Regulator should be consulted. Releases to air may also require consultation with Queensland Health.

Officers should consider whether a formal risk assessment should be undertaken to ensure that any risks from approving the draft TEP are identified and adequately managed.

Consideration of draft TEPs (s337)

The Department must decide whether to approve a draft TEP submitted to it within 20 business days after the application date. Or, if a public notice is required under s335, the Department must make a decision 20 business days after the day stated in the notice as the day by which submissions may be made to the Department. If public notice of the submission of the draft TEP is required to be given, the Department must be satisfied that public notice has been properly given before making a decision (s337(2)).

If the Department fails to decide whether to approve or refuse a TEP within the time it is required to make a decision, the failure is taken to be a decision by the Department to refuse to approve the program at the end of the time (s343).

What must be taken into consideration? (s338)

When deciding whether or not to approve the draft TEP or the conditions (if any) of the approval, the Department—

- must comply with any relevant regulatory requirement and
- subject to the above, must also consider the following:
 - the standard criteria
 - additional information given in relation to the draft TEP and
 - the views expressed at a conference held in relation to the draft TEP.

If the draft TEP is prepared because of a requirement of a development condition of a development approval, the Department may approve the draft TEP only if it is not inconsistent with other conditions of the approval.

Decision about draft TEP (s339)

Section 339 of the Act provides that the Department may—

- approve a draft TEP as submitted or
- approve a draft TEP as amended at the request, or with the agreement, of the Department or
- refuse to approve a draft TEP.

If the Department approves the draft TEP it may impose—

- any conditions the Department must impose under a regulatory requirement and
- any other conditions considered appropriate by the Department.

If the draft TEP is approved, the approval remains in force for the period stated in the notice of the approval given pursuant to s340 of the Act.

How does an officer successfully consider and make a decision about a draft TEP?

Officers must complete an assessment report to document the decision whether to accept the draft TEP (with or without conditions), to require amendments to the draft TEP or to reject the draft TEP. If the draft TEP is accepted (with or without conditions) or rejected, a notice of decision must be issued under s340 of the Act.

Step 1 - Complete the assessment report

Before issuing a notice of decision under s340 of the Act, officers are required to complete an assessment report which sets out the facts and circumstances relating to the matter and documents the decision-making process used in determining whether to approve or refuse the draft TEP (with or without conditions).

The assessment report lists all the matters that must be considered by officers during the decision-making process. This includes the criteria by which the TEP must be assessed, the matters that must be addressed by the draft TEP and the matters that officers must consider when making a decision about the draft TEP. Each matter has checkboxes beside it, as well as text fields for officers to provide further information if necessary. The text fields contain explanatory notes indicating the types of information that is to be provided. Officers should check the relevant checkboxes to indicate that the particular matter has either been adequately addressed or is not applicable to that particular draft TEP. If a matter is applicable, but has not been adequately addressed, the checkbox should not be checked, and details as to how the particular matter has not been adequately addressed should be inserted in the text field provided.

The following sections of the procedural guide are a guide to completing the assessment report. The numbering and headings of the sections in the procedural guide correlate with those in the assessment report for ease of reference. Officers should refer to the procedural guide for information while completing the assessment report.

The assessment report is not intended to replicate the Departmental file. Rather, it is designed to capture all critical aspects that have led to the Department's decision. Accordingly, officers should limit the information included to relevant points only.

A template assessment report may be accessed at the Compliance Support Materials site on the DERM intranet.

1. Brief history of the matter

Briefly outline any historical information relevant to this decision. This information should be presented in succinct, chronological dot points and should include the reasons why a draft TEP is now being considered, for example, as a result of a program notice, voluntary submission or in response to a notice requesting the submission of a TEP.

2. Matters that must be considered when making a decision about the draft TEP (s338)

A significant amount of care should go into checking and considering the potential effects of the draft TEP, because by approving the draft TEP, the officer is authorising everything it permits.

Accordingly, the assessment criteria are an instrumental part of the decision-making process. Firstly, they establish the critical objectives that the draft TEP must achieve and how the content of the draft TEP will deliver on these objectives. Secondly, from the view of compliance and enforceability, and to establish that the draft TEP passes the *SMART* test, the requirements must be specific, measurable, achievable, relevant and time-specific. These are vital considerations given that in future, the Department may have to establish beyond a reasonable doubt that the TEP has not been complied with in order to take action against the person for failure to comply with the TEP. For this reason, the contents of the draft TEP must be clearly drafted, unambiguous and easily auditable.

More information about drafting SMART requirements and conditions may be found in the [Procedural guide - Writing effective and enforceable conditions](#)

Achieving compliance with the Act (s330)

A TEP should, for the activity to which it is concerned, achieve compliance with the Act by doing one or more of the following things—

- reducing environmental harm caused by the activity
- detailing the transition of the activity to an environmental standard
- detailing the transition of the activity to comply with:
 - a condition, including a standard environmental condition, of an environmental authority or code of environmental compliance or
 - a development condition.

The term *environmental standard* is defined as being:

- an environmental standard (however called) set out, or otherwise provided for, in a regulation under the Act or
- an outcome or objective that is directed at protecting or enhancing environmental values set out in an environmental protection policy.

A *standard environmental condition* for an environmental authority or code of environmental compliance means a standard environmental condition approved by the Minister pursuant to s549 of the Act.

A *development condition* of a development approval means a condition of the approval imposed by, or because of a requirement of, the Department if it is the assessment manager or concurrence agency for the application for the approval.

The draft TEP must set out how the activity is currently in non-compliance with the Act and how the person proposes to make the activity compliant. If it is not clear from the information provided in the draft TEP that by

TEP Part 2 – Considering and making a decision about a draft TEP

doing one or more of these things compliance with the Act will be achieved by the end of the operative period of the TEP, the draft TEP must not be approved.

Content of the TEP (s331)

A TEP, for the activity to which it relates, must include the following—

(a) Objectives to be achieved and maintained under the TEP

A draft TEP must clearly set out what it is trying to achieve. For example:

EXAMPLE 1

To bring the operator into compliance with conditions G12 and H5 of development approval 123456

EXAMPLE 2

To prevent or minimise environmental harm caused by the migration of landfill gas.

The objectives should be as specific and clear as possible so that, if the draft TEP is approved, the Department can assess whether the objectives have been met.

(b) State the particular actions

The draft TEP must set out the actions that the person will carry out in order to achieve the objectives. It is important that the actions are as definite, specific and as clear as possible. If they are vague or uncertain, it will be difficult for the Department to assess whether the person is doing what they have said they will do, which may prevent the Department from taking enforcement action in future. Each action must have a due date by which it will be completed, and must comply with the SMART principles.

Progress reporting dates and final reporting dates should be included in the actions.

In stating the particular actions required to achieve the objectives, the draft TEP must take into account best practice environmental management. Officers should refer to s21 of the Act for a definition of *best practice environmental management*.

(c) Prevention and minimisation of environmental harm

The risks of environmental harm being caused by the activity should also be taken into account. The draft TEP must state how any environmental harm that may be caused by the activity will be prevented or minimised, including any interim measures that are to be implemented.

(d) Transition to an environmental standard

If the objective of the draft TEP is to transition to meet an environmental standard, the draft TEP must provide details of the standard and set out how the activity is to transition to the standard before the operative period of the TEP comes to an end. Please see 'Achieving compliance with the Act' above for a definition of *environmental standard*.

(e) Transition to comply with a condition of an environmental authority or code of environmental compliance, or a development condition

If the objective of the draft TEP is for an activity to transition to comply with a condition of an environmental authority or code of environmental compliance, or a development condition, the draft TEP must set out each condition and detail how the activity does not comply with the condition. The draft TEP must also state how compliance with the condition will be achieved before the end of the operative period of the TEP.

(f) Period over which the TEP is to be carried out

To be approved, the draft TEP must state the period over which the TEP is to be carried out. If the person has submitted for approval a draft TEP that states it will be carried out over a period longer than three years, the person must give public notice of the submission within 2 business days after the application date in accordance with s335 of the Act.

(g) Performance indicators

The draft TEP must state appropriate performance indicators at intervals of not more than 6 months. The performance indicators must show how the applicant is progressing in achieving the objectives of the TEP. The indicators must also be capable of being measured and be specific enough to enable the Department to assess with certainty whether or not they have been met. The date on which each performance indicator will be met must be set out in the TEP.

(h) Monitoring and reporting

The draft TEP must provide for sufficient monitoring and reporting on compliance with the program. It should provide for the person to monitor and report on—

- the carrying out of the actions
- whether or not the objectives are being achieved
- whether or not the required time-frames are being met and
- any environmental and scientific testing.

The draft TEP should also allow for the person to provide—

- reports on progress with the TEP, including any failure to carry out prescribed actions by the stipulated dates
- reports on any environmental monitoring requirements (including interpretation) and
- a final report to the Department demonstrating that compliance with the Act has been achieved.

Regulatory requirements (s338(1)(a))

Sections 46-64 of the *Environmental Protection Regulation 2008* specify the matters that must be considered when the Department is making environmental management decisions. An *environmental management decision* is a decision under the Act for which the Department is required to comply with regulatory requirements. All matters relevant to the draft TEP must be considered when making a decision about it, for example, if there are certain matters specified where release of water to land is contemplated.

Standard criteria (s338(1)(b)(i))

As stated above, the Department **must** consider the standard criteria, set out below, before deciding whether or not to approve the draft TEP—

- **The principles of ecologically sustainable development as set out in the ‘National Strategy for Ecologically Sustainable Development (ESD)’**

Consider the following guiding principles:

- Has the decision effectively integrated long- and short-term economic, environmental, social, and equity considerations?

TEP Part 2 – Considering and making a decision about a draft TEP

- Has due regard been given to the precautionary principle? In other words, where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- Does the decision have due regard to the global dimensions of environmental impacts and policies?
- Does the decision assist in the development of a strong, growing and diversified economy, which can enhance the capacity for environmental protection?
- Has the need to maintain and enhance international competitiveness in an environmentally sound manner been considered when making the decision?
- Have cost effectiveness and flexible policy instruments (for example, improved valuation, pricing and incentive mechanisms) been adopted?
- Does the decision/action allow for broad community involvement on issues that affect them?
- **Any applicable Environmental Protection Policies (EPPs)**
 - Is the draft TEP consistent with the EPPs on water, air, noise and waste (where relevant)?
- **Any applicable Commonwealth, State or local government plans, standards, agreements or requirements**
 - Consider guidelines such as the State and Regional Coastal Plan, National Health and Medical Research Council (NHMRC) and the Australian and New Zealand Environment and Conservation Council (ANZECC) Guidelines.
- **Any applicable environmental impact study, assessment or report**
 - Consider any findings or recommendations that are relevant to the draft TEP.
- **The character, resilience and values of the receiving environment**
 - Does the draft TEP have regard to the environmental values of the receiving environment?
 - What is the impact on the values of the actions contained in the draft TEP?
- **All submissions made by the applicant and submitters**
 - Consider any submissions made by the applicant and anyone who properly makes a submission about the draft TEP.
- **Best practice environmental management for the activity to which the draft TEP relates**
 - Analyse how approving the draft TEP with or without conditions will ensure that best practice environmental management is achieved.
- **The financial implications of the requirements**
 - Explore the financial implications for the client in complying with conditions of the TEP. Are they reasonable in the particular circumstances?
- **The public interest**
 - Is it in the interest of the community that the draft TEP be approved?
- **Any applicable site management plan**
 - If there is a site management plan for contaminated land (approved under Chapter 7, Part 8 of the Act), and is the draft TEP consistent with the site management plan? If not, is the inconsistency necessary for addressing the matters in the draft TEP? How will any inconsistency be reconciled?

TEP Part 2 – Considering and making a decision about a draft TEP

Consult with the Contaminated Land Unit as early as possible when there are any contaminated land issues.

- **Any relevant integrated environmental management system or proposed integrated environmental management system (IEMS)**
 - Is the draft TEP consistent with the IEMS? If not, is the inconsistency necessary for addressing the matters in the draft TEP? How will any inconsistency be reconciled?
- **Any other matter prescribed by a regulation**
 - See 'regulatory requirements' above.

Additional information (s338(1)(b)(ii))

The Department must consider any additional information given in relation to the draft TEP. Has all supporting information provided by the applicant been considered? Having considered the draft TEP and any supporting information, is it clear that the draft TEP achieves compliance with the Act?

Views expressed at a conference (s338(1)(b)(iii))

If a conference has been held as part of a public notice process, the views expressed at that conference in relation to the draft TEP must be considered and the reasons for having regard to, or not having regard to, those views must be recorded.

Consistency with development conditions of a development approval (s338(2))

If the draft TEP is prepared because of a development condition of a development approval, the Department must not approve the draft TEP unless it is consistent with other conditions of the development approval.

Public notice of submission of draft TEP (s337(2)) and substantial compliance with the Act (s342)

If public notice is required, before approving the draft TEP, ensure that the person or public authority submitting the draft TEP has properly given public notice and complied with the requirements of s335 of the Act.

The Department must be satisfied that the public notice has been properly given before making a decision (s337 of the Act). If the Department is not satisfied that public notice has been properly given, it may consider and decide whether to approve the draft program if it is satisfied there has been substantial compliance with the public notice requirements of the Act (s342).

See 'Is public notice required?' above for further information regarding public notice.

Satisfaction that the draft TEP meets the requirements of the Act

Having considered all of the above matters, officers completing the assessment report must decide whether they are satisfied the draft TEP adequately addresses all of the relevant matters. If any of the issues in the assessment report were answered 'no', officers should proceed to section 4. Otherwise, proceed to section 3.

3. Request for further information and/or amendments to the draft TEP

In some cases the draft TEP may substantially address the required matters, but cannot be approved because some matters have not been adequately addressed. In this situation, the Department may request that further information be provided or that particular amendments be made to the draft TEP. It is important to recognise that if there are major problems with the draft TEP, or a large number of matters that have not been addressed by the draft TEP, officers should recommend to the Delegate that it not be approved and a notice of decision should be sent to the person or public authority that submitted the draft TEP advising of this decision.

TEP Part 2 – Considering and making a decision about a draft TEP

However, if it is likely that the draft TEP would be approved if further information is provided or some changes are made, it is preferable for the Department to write to the person submitting the draft TEP and request the further information and/or amendments, rather than approve the TEP subject to conditions, owing to the fact that conditions may be difficult to enforce. See 'Key considerations regarding conditions' below for further information.

Officers should consult with their supervisor when considering whether to request further information or amendments to the draft TEP, and in formulating the amendments required to be made (if any). A request for amendments to a draft TEP should be made in writing. If, after the draft TEP is amended, it is approved, the amended TEP will form part of the approved TEP.

It is highly recommended that a request for amendments be made within 8 business days after the draft TEP is submitted to the Department, as this means that the application date will then be 10 business days after the date that the amended TEP is submitted to the Department. Consequently, the Department will have additional time to consider the amended TEP and make a decision whether or not to approve it.

Time-frames

For information regarding a change in time-frames if further information is sought or the Department requests amendments to the draft TEP, see the section 'Application date' above.

Minor amendments and/or further information

If only very minor amendments are necessary, officers should consider suspending the decision-making process, so as to provide the opportunity to the person submitting the draft TEP to make the requested amendments. If the requested amendments are made, the assessment report can then be completed to reflect the amendments. Then, if all relevant matters have been adequately addressed, officers may recommend that the Delegate approve the draft TEP.

More significant amendments

If the amendments required are more significant or complicated, officers should list the requested amendments in the assessment report and recommend that the Delegate approve a request for the required amendments. Then, if the amendments are provided by the person submitting the draft TEP, officers must complete a fresh assessment report and provide a new recommendation to the Delegate.

4. Approval of the draft TEP

The assessment report lists all the matters that must be considered by officers during the decision-making process, with checkboxes beside each matter. At least one checkbox must be checked beside each matter before a decision can be made to approve the draft TEP.

Key considerations regarding conditions

The Act does make provision for an approval of a draft TEP to be subject to conditions the Department considers appropriate. However, the enforceability of conditions placed on a TEP is unclear. Accordingly, conditions should not be imposed except for minor matters. Conditions must not be used to alter the terms of the TEP itself. If the TEP is not satisfactory, it must be refused or amendments sought from the applicant. Conditions in the notice of decision should not be used as a quasi-development approval, or to alter or amend the TEP to meet the requirements of the Act.

TEP Part 2 – Considering and making a decision about a draft TEP

Financial assurance conditions (ss364-367)

Under s364 of the Act, the Department may, by condition of an approval of a TEP, require the holder of the approval to give the Department financial assurance as security for—

- compliance with any conditions of the TEP and
- costs or expenses, or likely costs or expenses, that the Department incurs, or might reasonably incur, in taking action to:
 - prevent or minimise environmental harm or rehabilitate or restore the environment, in relation to the carrying out of an activity under a TEP approval or
 - secure compliance with the TEP, or any conditions of the TEP, for which financial assurance has been given.

However, under s364(2) the Department may impose a condition requiring a financial assurance to be given only if it is satisfied that the condition is justified, having regard to—

- the degree of risk of environmental harm being caused, or that might reasonably be expected to be caused, by the activity carried out, or to be carried out, under the program and
- the likelihood of action being required to rehabilitate or restore and protect the environment because of environmental harm being caused by the activity and
- the environmental record of the holder.

Section 365 of the Act provides that before approving a draft TEP subject to the condition that financial assurance be given, the Department must give the person who submitted the draft TEP a written notice that must –

- state the grounds for the condition and
- state the form and extent of the financial assurance and
- invite the person to make representations to the Department to show why the approval of the draft TEP should not be subject to the condition and
- state the period (at least 22 business days after the notice is given to the person) within which the representations may be made and
- the representations must be made in writing (s365(3)).

Within 20 business days after the end of the period stated in the notice (s365(4)), the Department must—

- consider the representations properly made by the person and
- if the Department gives the approval subject to the condition that the holder of the approval give financial assurance—the Department must give written notice to the person giving reasons for imposing the condition.

5. Refusal to approve a draft TEP

The draft TEP cannot be approved unless a checkbox has been checked next to each matter listed on the assessment report, either to confirm the matter has been adequately addressed, or to indicate that the matter is not applicable to the draft TEP. If a checkbox has not been checked next to a matter, officers are to provide details in the text field provided.

TEP Part 2 – Considering and making a decision about a draft TEP

If any of the required matters are not addressed in the draft TEP, officers should either recommend a refusal of the draft TEP, or seek further information or amendments to the draft TEP from the person that submitted it. (See 'Request for further information and/or amendments to the draft TEP' above). If the deficiencies in the draft TEP are too serious to be addressed by further information and amendments, the Department should refuse to approve the draft TEP.

6. Provide for natural justice

The Department must ensure that decisions are made in a fair and consistent manner. This includes ensuring that the affected individual is provided with 'natural justice' (that they are given an opportunity to make their case for why the decision should go in their favour) and that people involved in making the decision are free from bias or the perception of bias.

Any submissions made by the applicant that have not already been considered earlier in the assessment report process must be documented in section 5 of the assessment report.

7. Recommendation

Officers are required to make a recommendation as to whether or not the draft TEP should be approved (with or without conditions) or refused.

8. Approval

An officer with the appropriate delegation must consider the contents of the assessment report and the recommendation and make a decision about whether to approve (with or without conditions) or refuse the draft TEP. The Department's list of delegations can be found on the Department's intranet at <http://insite2.dnr.qld.gov.au/derm/delegations/>.

Step 2 – Complete the notice of decision

Section 240 of the Act provides that within 8 business days of making a decision under s339, the Department must give the person or public authority that submitted the draft TEP a written notice of the decision (the notice of decision).

If the delegate approves the draft TEP, the notice of decision must—

- identify the documents forming the approved TEP, including any amendments under s339(1)(a)(ii) and
- state any conditions imposed on the approval by the Department and
- state the day the approval ends.

If the draft TEP is approved, the approval remains in force for the period stated in the notice of decision (s339(3)).

Content of approved program (s341)

An approved TEP consists of the following—

- the draft program submitted under section 332 or 333, as amended at the request, or with the agreement of the Department

TEP Part 2 – Considering and making a decision about a draft TEP

- any conditions imposed on the program by the Department.

Information notice

If the Department refuses to approve the draft TEP, or approves it with conditions, the notice of decision given to the person or public authority that submitted the program must be an information notice (s340(3)).

An *information notice* means a written notice stating—

- the decision and
- the reasons for the decision and
- the review and appeal details.

Officers must issue an invoice for the fees for consideration of the draft TEP to the person or public authority that has submitted the draft TEP for approval at the time when the notice stating the Department's decision is issued. See: [Operational policy - Transitional Environmental Program \(TEP\) fees](#)

What is the effect of compliance with the approved TEP? (s346)

An approved TEP protects the holder, or a person acting under the approval, from enforcement action for non-compliance with the relevant—

- regulation or
- environment protection policy (EPP) or
- environmental authority (EA) held by the holder or
- development condition of a development approval (DA) or
- standard environmental condition of a code of environmental compliance for a chapter 4 activity or
- accredited environmental risk management plan (ERMP) under the Great Barrier Reef protection measures.

What follow-up is required?

It is an offence for the holder of an approved TEP to contravene the program. Officers should diarise all performance indicator requirements listed in the program or conditions and ensure they are monitored for compliance.

Officers are encouraged to use tools such as reminders in Microsoft outlook to ensure the matter is followed up in a timely manner.

Review of decisions and appeals

The provisions regarding review of decisions and appeals may be found in Chapter 11, Part 3 of the Act.

The Act specifies that a person who is dissatisfied by a decision made by the Department about a draft TEP, may apply for a review of an original decision by submitting an application on the approved form to the Department—

- within 10 business days after the day on which the person received notice of the original decision or the Department is taken to have made the decision, or

TEP Part 2 – Considering and making a decision about a draft TEP

- if there are special circumstances, whatever longer period the Department allows.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#)

A person who has made an application for review of an original decision may immediately apply to the Planning and Environment Court for a stay of the decision.

If the person is dissatisfied with the review decision, the person may appeal against that decision to the Planning and Environment Court by filing written notice of appeal with the registrar of the Court within 22 business days after the day the person receives notice of the decision or the decision is taken to have been made, unless the Court extends the period for filing the notice of appeal.

The court may grant a stay of a decision appealed against until such time the appeal is decided. An appeal against a decision does not affect the operation or the carrying-out of a decision unless the decision is stayed.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

What penalties exist for a contravention of a requirement of a TEP (s432)?

The holder of an approval of a TEP, or a person acting under a TEP, must not wilfully contravene a requirement of the program.

Maximum penalty—1665 penalty units (\$166,500.00) or 2 years imprisonment.

The holder of an approval of a TEP, or a person acting under a TEP, must not contravene the program.

Maximum penalty—835 penalty units (\$83,500.00).

The maximum penalty for a corporation is five times the penalty for an individual.

What penalties exist for contravention of a condition of approval (s432A)?

A person must not, without reasonable excuse, contravene a condition of an approval of a transitional environmental program.

Maximum penalty—835 penalty units (\$83,500.00)

The maximum penalty for a corporation is five times the penalty for an individual.

Assessment report

Environmental Protection Act 1994

Cost recovery notice

This document is intended for internal use to assist Environmental Services officers to record the information considered by the Department when deciding to issue a cost recovery notice.

Identifying details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If applicable
File number	File number
Applicant number	Number
Trading as	Trading as details
Registered business address	Registered business address

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be approved by the responsible officer, supervisor, and the delegated decision-maker.

1. Brief history of the matter

Please briefly outline any historical information relevant to this decision.

Provide brief outline of the historical information.

2. Grounds for use of a cost recovery notice

The grounds for use of a cost recovery notice can be found in s363N of the *Environmental Protection Act 1994* (the Act). Officers are required to identify the relevant grounds upon which the decision to use a cost recovery notice applies.

- The prescribed person has been identified.

If a clean-up notice has been issued

- The recipient has failed to comply with the notice and an authorised person or contractor has carried out any of the actions stated in the clean-up notice (s363K).

OR

- The decision to issue the clean-up notice has been stayed by the court and, during the period of the stay, an authorised person or contractor carried out the actions stated in the clean up notice (s363K), and:
- the appeal has ended without an appeal decision being made by the court **OR**
 - the appeal decision confirms the decision to issue the clean-up notice and required the recipient to take the clean up action

AND

- the Department has reasonably incurred costs and expenses for taking an action stated in the cleanup notice or monitoring compliance with the clean-up notice

OR

- the Department has reasonably incurred costs and expenses in monitoring compliance by the recipient with the clean-up notice.

If a clean up notice has not been issued

- The intended recipient of the cost recovery notice is a person whom the Department reasonably believes to be a prescribed person for a contamination incident

AND

- an authorised person has taken action under the Department's emergency powers (s467 of the Act) in relation to serious or material environmental harm caused or likely to be caused by the incident

AND

- the Department has reasonably incurred costs and expenses for taking action under s467.

Ensure that the costs and expenses incurred will be payable

Subsection 363N(5) of the Act lists the circumstances where the costs incurred are not payable by the recipient.

- None of the circumstances specified in s363N(5) where the costs incurred will not be payable by the recipient apply to this situation.

3. Expand upon the grounds

Expand upon the grounds identified for issuing the cost recovery notice.

If a clean-up notice has been issued, officers will need to link the actions taken by the authorised person or contractor and the costs claimed by the Department with the requirements set out in the clean-up notice, and provide reasons to justify why the Department had to carry out the actions in place of the recipient of the clean-up notice.

If an authorised person has acted under the emergency powers pursuant to s467 of the Act, officers must provide an explanation as to why and how the actions were taken, the costs were incurred, the urgency of the situation and provide justification for the dollar value claimed.

Each ground should be listed independently and be allocated a separate number.

Number	Specific ground
1	ABC Pty Ltd failed to comply with the clean-up notice issued on 11th February 2009 and actions stated in the clean-up notice were carried out by XYZ Pty Ltd.
2	

4. Detail the matters considered

The purpose of the following table is to ensure that there is evidence to support all of the grounds for using the tool. This is achieved by linking the elements of the grounds to the information gathered and the conclusions formed. This section should also record how the Department has met any statutory requirements associated with the use of the tool.

When analysing information or developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of the information available, historical details, professional expertise and the weight attributed to any direct testimony provided.

Elements of the offence or legislative requirements	Evidence	Facts and circumstances
<i>List the elements of any alleged offence or (for grounds which are not offences) list the legislative requirement to be met by the Department.</i>	<i>Identify the information considered which is relevant to the elements or requirement (i.e. statements, photographs, and recordings).</i>	<i>Detail the facts and circumstance that support the Department's findings.</i>
Number 1 (Number taken from Section 2)		
10 July 2010: The recipient of a clean-up notice.....	A clean-up notice was issued to Mr JP Citizen, sole director/secretary of ABC Pty Ltd on 10 July 2010.	The clean up notice required Mr Citizen to take action to clean up toxic sludge leaking from ponds at the site of ABC Pty Ltd by 10 August 2010.
Has failed to comply with the clean-up notice.....	A site inspection was carried out by senior environmental officer Mr Jack Green at 123 Creek Road, Greendale on 12 August 2010.	The site inspection revealed that Mr Citizen had not carried out the actions set out the clean-up notice in the required time frame.
An authorised person or person acting under the	The department authorised contractor XYZ Pty Ltd to carry out the actions	XYZ Pty Ltd was engaged by the department to clean up the toxic

direction of an authorised person (the contractor) has taken the actions stated in the clean up notice.....	stated in the clean-up notice on 15 August 2010.	sludge leaking from ponds owned by ABC Pty Ltd.
The Department incurred reasonable costs and expenses.....	XYZ Pty Ltd has issued an invoice to the Department for the clean-up work carried out.(Copy attached to this assessment report).	XYZ Pty Ltd has invoiced the Department for the amount of \$20,000.00 which is the cost to the Department reasonably incurred when carrying out the actions stated in the clean-up notice that the recipient failed to carry out.

5. Calculate the monetary value

Officers are required to identify the monetary amount being sought and show the calculations used to determine this amount. Costs and expenses claimed must be defensible and reasonable in the circumstances. They can include labour, equipment and administrative costs and expenses.

Costs claimed	Monetary value
For example: Cost of consultant	For example: Engaged for 20 hours @ \$330.00 per hour (including GST) = \$6,600.00
For example: Cost of full time equivalents (FTEs)	For example: \$10,000.00
For example: Cost of sampling/monitoring	For example: \$5,000.00
For example: Cost of works	For example: Contractors engaged for 18 hours @ \$1,100.00 per hour = \$19,800.00
For example: The total amount being sought by the State	For example: \$41,400.00

A copy of the relevant documentation for each cost claimed must be attached to the assessment report.

To ensure the costs claimed are reasonable, officers are required to provide justification for the inclusion of the cost.

Costs claimed	Justification
For example: Cost of consultant	For example: It was necessary to hire a consultant to perform scientific testing to ascertain the nature and extent of the environmental damage.
Cost claimed	Justification

6. Natural justice

The investigating officer is required to notify the affected person that the Department is considering issuing a cost recovery notice and that the individual is welcome to make representation to the Department as to why this action should not be taken. Any information provided by the affected person is to be documented and considered.

- The person has been provided with the opportunity to put their side of the story forward.
Please describe how this was achieved.
- All information and/or defences provided were considered.
Please describe any information or defences provided.
- The Department has considered the information or defences provided.
What consideration was given and what conclusions has the Department formed?
- The decision-maker and responsible officer are free from bias or the perception of bias.

7. Recommended decision

The responsible officer is required to make a recommendation in relation to the allegation.

Recommendation.

8. Approval

Responsible officer	Supervisor

Print name:	Print name:
Date:	Date:

Delegate decision-maker	Approve/reject recommendation (circle one)
<p>Reasons for decision</p> <p><i>I endorse this recommendation based upon the information set out above.</i></p> <p><i>Or, I endorse this decision for the reasons set out above and I note Mr JP Citizen has previously received a warning letter in relation to this matter.</i></p> <p><i>Or, I reject the above recommendation as I consider it more appropriate for the Department to take an educational approach to this breach.</i></p>	
Print name:	
Date:	

Cost recovery notice

This document is intended for internal use to assist Environmental Services officers to issue a cost recovery notice.

What is a cost recovery notice?

A cost recovery notice is a written notice which may be issued by the Department of Environment and Resource Management (the Department) to a person reasonably believed to be a prescribed person for a contamination incident, to recover costs reasonably incurred by the Department in—

- if a clean-up notice has been issued:
 - taking an action stated in the clean-up notice if the recipient has failed to comply with the clean-up notice or
 - monitoring the recipient's compliance with the clean-up notice or
- otherwise, taking action under the Department's emergency powers in s467 of the Act.

The issuing of cost recovery notices is governed by Chapter 7, Part 5C (ss363M to 363O) of the *Environmental Protection Act 1994* (the Act).

Who is a prescribed person?

A *prescribed person* for a contamination incident includes the following (s363M):

- a person who caused or permitted the incident to happen
- a person who at the time of the contamination incident was the occupier of the place where the incident occurred
- the person who owns, or is in control of, a contaminant involved in the incident
- if a cost recovery notice is issued to a corporation (the first corporation) and it fails to pay the amount claimed by the notice
 - a parent corporation of the first corporation and
 - an executive officer of the first corporation.

Who can use a cost recovery notice?

Cost recovery notices can only be issued by someone who has delegated authority. As the individual (or position) that holds the delegation changes regularly, officers are encouraged to review the Department's list of delegations at: <http://insite2.dnr.qld.gov.au/derm/delegations>

When should I use a cost recovery notice (s363N(1))?

The legislation specifies that the cost recovery notice can be used in each of the following circumstances—

- if a person who has been given a clean-up notice fails to comply with it and a person or contractor authorised by the Department carries out the actions stated in the clean-up notice or
- if a decision to issue a clean-up notice is stayed whilst the recipient appeals the decision, and during the period of the stay an authorised person or contractor carries out the actions stated in the clean-up notice, and either the appeal ends without an appeal decision or the decision confirms the decision to issue the clean-up notice or
- if an authorised person acts under the Department's emergency powers (s467) to take action regarding environmental harm caused by a contamination incident.

When a cost recovery notice has been issued to the recipient, the costs claimed in the notice must be linked to the actions that have been carried out by an authorised person or contractor. Any cost claimed must be defensible.

If an authorised person, or a person authorised by an authorised person, has taken action under the Department's emergency powers provided for in s467 of the Act, the Department will need to show what action was taken and why and provide justification for the costs incurred.

What can be claimed in a cost recovery notice (s363N(2))?

A cost recovery notice may claim a stated amount for costs or expenses reasonably incurred—

- When a notice is issued to a person who has been given a clean-up notice:
 - for taking an action stated in the clean-up notice or
 - for monitoring compliance with the clean-up notice.

OR

- When an authorised person has taken action under the Department's emergency powers (s467).

The Department will need to explain how it formulated the dollar value it is claiming and provide evidence of the costs reasonably incurred. This can be done by providing an itemised list of costs incurred which is substantiated by the appropriate invoices. All relevant invoices, receipts and other documents that establish amounts paid should be kept as evidence of the expenses. If time spent by department officers in taking any of the actions in a clean-up notice, or in taking action under the emergency powers in s467 of the Act, is to be claimed, a detailed account of the actions taken and time spent must be recorded.

When the costs incurred will not be payable

There are certain circumstances when the amount claimed is not payable, as specified in s363N(5) of the Act. These include—

- if the recipient of the cost recovery notice is not a prescribed person or
- if the contamination incident was caused by a natural disaster or
- if the contamination incident was caused by a terrorist act or other deliberate act of sabotage by someone other than the recipient and, taking all of the circumstances into account, the recipient had taken all reasonable measures to prevent the incident.

In some cases, the amount claimed may also not be payable if the cost recovery notice is issued to a corporation that fails to pay the amount claimed in the notice and the prescribed person is an executive officer of the corporation.

If this instance, the amount will not be payable if:

- the executive officer took all reasonable steps to make sure the corporation paid the amount claimed in the notice or
- the executive officer was not in a position to influence the corporation in regard to paying the costs claimed in the notice.

Prior to issuing a cost recovery notice, it is important to consider whether any of the above circumstances apply. In particular, officers should ensure that the intended recipient of the notice is the prescribed person for the contamination incident.

How do I successfully issue a cost recovery notice?

Officers must complete an assessment report to document the decision as well as completing the cost recovery notice.

Step 1 - Complete the assessment report

Before completing the cost recovery notice, officers are required to complete an assessment report that sets out the facts and circumstances relating to the matter and documents the decision-making process used by the Department in determining to issue a cost recovery notice.

The following sections of the procedural guide are a guide to completing the assessment report. The numbering and headings of the sections in the procedural guide correlate with those in the assessment report for ease of reference.

The assessment report is not intended to replicate the Departmental file. Rather it is designed to capture all critical aspects that have led to the Department's decision. Accordingly, officers are encouraged to limit the information included to relevant points only. A template assessment report is attached [\[LINK\]](#)

1. Brief history of the matter

Briefly outline any historical information relevant to this decision. This information should be presented in succinct, chronological dot points and should include how the Department came to carry out the actions that incurred the costs that are being claimed.

2. Grounds for issuing a cost recovery notice

Section 363N(1) of the Act provides that a cost recovery notice can only be issued in the following circumstances:

A cost recovery notice may be given to the recipient of a clean-up notice if—

- the recipient has failed to comply with the clean-up notice and
- an authorised person or contractor takes any of the actions stated in the clean-up notice.

OR

- the recipient has appealed the decision to issue a clean-up notice and the operation of the decision is stayed and
- an authorised person or contractor carries out the actions stated in the clean-up notice during the period of the stay and

- the appeal ends without an appeal decision or the decision confirms the decision to issue the clean-up notice.

A cost recovery notice may also be given to a prescribed person for a contamination incident if an authorised person acts under the Department's emergency powers (s467) to take action in regard to the environmental harm caused or likely to be caused by the contamination incident.

3. Expand upon the grounds

The purpose of this section is to clearly identify what the Department must 'prove' before deciding to use a cost recovery notice and should be used to expand upon the abovementioned grounds.

4. Detail the matters considered

The purpose of the table in the assessment report is to link the grounds to the information gathered and the conclusions formed. This is achieved by identifying: the specific ground, the information which has been considered and the conclusion that has been reached by the officer after considering the information sourced.

When documenting the information considered, officers are encouraged to limit the information to relevant points only. This can include (but is not limited to):

- receipts for costs incurred
- notes recorded in an officer's official notebook
- photographs
- copies of relevant documents and
- any observed actions and direct testimony received from individuals.

When developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of available information or evidence, historical details, professional expertise and the weight attributed to any direct testimony provided.

A copy of any relevant supporting documents must be attached to the assessment report for this tool. For example:

- a copy of the assessment report recording the decision to issue the clean-up notice
- a copy of the written notice of a direction given under the emergency powers in s467.
- any relevant invoices provided by contractors to the Department
- if the cost of Departmental officer salaries is to be included in the cost recovery notice, a log of Departmental officer time spent.

5. Calculate the monetary value

Officers are required to identify the monetary amount being sought and show the calculations used to determine this amount. Costs and expenses claimed must be defensible and reasonable in the circumstances. They can include labour, equipment and administrative costs and expenses. All amounts claimed must be recorded in the table in the assessment report and a copy of the relevant documentation for each cost claimed must be attached.

6. Provide for natural justice

Prior to the Department making a decision which may adversely impact on an individual or group the Department must:

- **Notify** - Notify the individual that the Department is considering making adverse findings
- **Respond** - Provide the individual with an opportunity to respond to any possible negative findings and
- **Consider** - Consider any representations that are made before finalising the decision.

The seriousness of the matter will largely dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers are encouraged to use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. While in some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site inspection or a telephone interview and to take contemporaneous notes, in more serious circumstances a written notification which includes a specific closing date for submissions should be used.

Regardless of the manner in which natural justice is afforded, any information provided by the affected person is to be documented. The summary of information should include how natural justice was provided as well as any responses provided by the affected person.

7. Recommendation

The investigating officer is required to make a recommendation in relation to the alleged breach. For example:

The Department is of the opinion that Mr JP Citizen failed to comply with the clean-up notice issued on 1 August 2010. Accordingly, a contractor was hired by the Department to carry out the actions stated in the clean-up notice. In order for the Department to recover monies spent due to Mr Citizen's failure to comply with the clean-up notice, it is recommended that a cost-recovery notice be issued.

Administrative decisions are made based upon the balance of probabilities. This means that the decision-maker must be able to determine whether, based upon the information available, it was more probable than not that the event occurred.

8. Endorsement

The assessment report is to be endorsed by an appropriately delegated officer. The Department's list of delegations can be found at: <http://insite2.dnr.qld.gov.au/derm/delegations>

Step 2 - Draft the cost recovery notice

The tool must meet a number of legislative requirements in order to be legally binding. Section 363N(3) of the Act provides that a cost recovery notice must include the following information—

- the name of the recipient
- a description of the contamination incident

- the place at or from which the Department is satisfied the incident happened
- the amount claimed
- a description of costs and expenses giving rise to the claimed amount
- that, if the recipient does not pay the amount to the administering authority within 30 days after the day the notice is issued, the administering authority may claim the amount from the recipient as a debt
- the name, address and contact details of the Department and
- the review or appeal details.

With regard to issuing the cost recovery notice, the Department is also required to notify individuals of the following in a timely manner:

- any decisions made against them
- the reasons for the decision (these are the facts and circumstances identified in section 4 of the assessment report).

This information must be included in the cost recovery notice. A template cost recovery notice is attached:

[\[LINK\]](#)

The cost recovery notice must be signed by the decision maker in conjunction with the assessment report which records the formal decision.

Review or appeal details

The legislation (s363N(h)) specifies that the notice must include the review or appeal details. Basic information regarding the review and appeal process is included in the template notice. As well, a copy of the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#) should be attached to the cost recovery notice.

Multiple recipients

If a cost recovery notice is issued to two or more recipients (s360O)—

- a copy of the notice must be given to each recipient and
- the amount claimed in the notice is payable by the recipients jointly and severally.

The fact that the notice is payable by the recipients *jointly and severally* means that the Department may collect the entire amount payable from any one of the recipients or collect various amounts from any or all of them.

Service of a cost recovery notice

Service means delivery to the party who will be affected by the notice. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the recipient in question. Methods of service are provided for in ss39 and 39A of the *Acts Interpretation Act 1954* (AI Act).

For the purposes of any Act that requires a document to be served on (which includes 'given' or 'sent to') a person, the document may be served—

- on a person:
 - by delivering it to the person personally or
 - by leaving it at, or by sending it by post, facsimile or similar facility (e.g. email) to the place of residence or business of the person or
- on a body corporate – by leaving it, or sending it by post, facsimile or similar facility (e.g. email) to the head office, a registered office or a principal office of the body corporate.

If a cost recovery notice is issued to two or more recipients, a copy of the notice must be given to each recipient.

The date, time and method of service should be documented by contemporaneous notes, a file note, postage receipts or any facsimile or email confirmations.

What follow-up is required?

It is important that the matter is appropriately followed-up to make sure that the person to whom the cost recovery notice is issued has paid the amount claimed in the notice. Follow-up is to be scheduled by the relevant officer and confirmed with the business area manager. The business area manager is responsible for ensuring follow-up is undertaken within the agreed timeframe.

The recipient of a cost recovery notice must pay the amount claimed to the department within 30 days after the day the notice is issued, or the department may claim the amount from the recipient as a debt. At the end of the 30-day period officers should check whether the amount has been paid or not. If not, appropriate steps should be taken to recover the debt.

Information in regard to accounts receivable and the debt recovery process may be found in the [Financial Management Practice Manual \(FMPM\)](#)

Officers are encouraged to use tools such as diary reminders to ensure the matter is followed up in a timely manner.

What are my record-keeping responsibilities?

Officers are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with a commentary on actions and recording any decisions made on the enforcement measure screen (this includes a decision to take no further action). A hard copy of the cost recovery notice, the signed assessment report and any accompanying documents must be placed on the paper file. The Department is required to make, and record, an informed decision about all allegations of non-compliance.

It is important that officers adequately respond to and report on all inquiries in order to assist in building a comprehensive compliance history.

Amendments to an issued cost recovery notice

If minor changes to the cost recovery notice or an extension of time are required, the recipient of the notice should be notified in writing.

If significant changes are required, officers should, in order to avoid confusion, repeal (revoke) the original notice, and issue a fresh one on the same grounds with the necessary changes. It is important to note that the recipient will have a fresh appeal rights and should be advised accordingly.

The repeal and issue of a fresh cost recovery notice should be carried out in the same way, and subject to the same conditions as the issuing of the original notice. Accordingly, a new assessment report should be completed and endorsed by the appropriate delegate.

It is preferable if the decision is made by the original decision-maker. If this is not possible the decision should be made by a person with the appropriate delegation who holds a position equal to or higher than that of the original decision-maker.

Officers should also update and record the changes or the decision to repeal and reissue the notice in EcoTrack and place hard copies of any documentation on the paper file.

Review of decisions and appeals

The provisions regarding review of decisions and appeals may be found in Chapter 11, part 3 of the Act.

The Act specifies that a person who is dissatisfied by a decision made by the Department in respect to a cost recovery notice may apply for a review of an original decision by submitting an application on the approved form to the Department—

- within 10 business days after the day on which the person received notice of the original decision or the Department is taken to have made the decision, or
- if there are special circumstances, whatever longer period the Department allows.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#)

A person who has made an application for review of an original decision may immediately apply to the court for a stay of the decision.

If the person is dissatisfied with the review decision, the person may appeal against that decision to the Planning and Environment Court by filing written notice of the appeal with the registrar of the court within 22 business days after the day the person receives notice of the decision or the decision is taken to have been made, unless the court extends the period for filing the notice of appeal.

The court may grant a stay of a decision appealed against until such time the appeal is decided. An appeal against a decision does not affect the operation or the carrying out of a decision unless the decision is stayed.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

What penalties exist for non-compliance with a cost recovery notice?

The legislation does not provide a penalty for non-compliance with the cost recovery notice. However, s363N(4) provides that, subject to s363N(5) (situations where the amount is not payable), if the recipient does not pay the amount in the cost recovery notice within 30 days after the notice is issued, the Department may claim the amount from the recipient as a debt.

Notice

Environmental Protection Act 1994

Cost recovery notice

This cost recovery notice is issued by the administering authority pursuant to s363N of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and postal code

Your reference: Your reference

Our reference: Our reference

TAKE NOTICE that under the *Environmental Protection Act 1994* (the Act) a cost recovery notice is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department).

A. Grounds

The cost recovery notice is issued on the following grounds:

- a clean-up notice was issued to you on date.
- you failed to comply with the clean-up notice by not carrying out the following actions:
 - State the actions in the clean-up notice the recipient did not carry out.
 - State the actions in the clean-up notice the recipient did not carry out.
 - State the actions in the clean-up notice the recipient did not carry out.
 - State the actions in the clean-up notice the recipient did not carry out.
- [as a result of your non-compliance an authorised person or contractor has taken the actions stated in the clean-up notice pursuant to s363K of the Act] OR [as a result of your non-compliance the Department has had to monitor your compliance with the clean-up notice]
- [the department has reasonably incurred costs in taking the action/s stated in the clean-up notice due to your non-compliance] OR [the Department has reasonably incurred costs in monitoring your compliance with the clean-up notice].

The facts and circumstances forming the basis for these grounds are:

- The notice MUST state the name of the recipient.
- The notice MUST describe the contamination incident.
- The notice MUST state the place at or from which the Department is satisfied the incident happened.
- The notice MUST state the amount claimed by the Department.
- The notice should state any other relevant facts and circumstances.

B. Costs and expenses claimed

The Department claims the following reasonably incurred costs or expenses:

Costs claimed	Monetary value
For example: Cost of consultant	For example: Engaged for 20 hours @ \$330.00 per hour (including GST) = \$6,600.00
For example: Cost of full time equivalents (FTEs)	For example: \$10,000.00
For example: Cost of sampling/monitoring	For example: \$5,000.00
For example: Cost of works	For example: Contractors engaged for 18 hours @ \$1,100.00 per hour = \$19,800.00
For example: The total amount being sought by the State	For example: \$41,400.00

C. Requirements

You are required to pay the Department the amount of \$ amount.

TAKE NOTICE that if you do not pay the amount of \$ amount to the Department within 30 days after the day this cost recovery notice is issued the Department may claim the amount from you as a debt.

D. Appeal rights

If you are dissatisfied with the decision to issue this cost recovery notice, you may apply to the Department for a review of this decision within ten business days of the service of the notice. You may also apply to the Court for a stay of the decision to issue the cost recovery notice.

If you are dissatisfied with the review decision, you may appeal against this decision to the Planning and Environment Court. Further information about the review and appeal process is attached to this notice.

The information outlining the review and appeal process under the *Environmental Protection Act 1994* should be considered as a guide only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

Should you have any queries in relation to this notice, please contact name of officer of the Department on telephone number telephone number.

Signature:

Date: Date

Name of delegate

Position of delegate

Delegate of administering authority

Environmental Protection Act 1994

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Dealing with aggressive and abusive behaviour

The purpose of this guideline is to provide guidance and options for officers when confronted with aggressive and abusive behaviour.

Essential points

- Staff safety is of paramount concern when a Department of Environment and Resource Management (DERM) officer is confronted with aggressive or abusive behaviour. All staff have the right to leave a situation if they face a personal risk.
- If an officer knows there is likely to be aggressive or abusive behaviour, they should consider whether another officer should be brought in to assist.
- In extreme situations, officers should consider enlisting the support of the police.
- Where an officer has faced aggressive or abusive behaviour, they should document the events surrounding this as soon as possible after the event.
- Officers should consider whether to take action following an event of aggressive or abusive behaviour in consultation with their District Manager.

Principles

- Staff safety is paramount. If a DERM officer is in a situation where there is any likelihood of physical danger, staff should leave the situation as quickly as possible. Officers should then seek the advice from their manager as to what steps to take next.
- All DERM staff have the right to work in a safe and healthy work environment free of harassment such as unreasonable abuse.
- Unreasonable abuse should be determined on the basis of the reasonable expectations of an ordinary person. Unreasonable abuse is generally behaviour that staff find personally threatening, offensive, humiliating or intimidating in some way. Behaviour that is considered unreasonable abuse will depend upon the circumstances and the tolerance levels of the staff involved.
- If an officer thinks it is likely they may be faced with aggressive or abusive behaviour, they should consider whether to enlist the support of a colleague and ensure there are two officers present. There are a number of advantages including the ability of both officers to corroborate each other's evidence should an assault or other offence occur.
- Staff should always conduct themselves in a professional manner in the face of unreasonable behaviour from customers and use their interpersonal skills to attempt to move back to a more productive discussion. For example, an officer can often diffuse a situation by explaining the reasons behind a decision or course of action. It can also be helpful to point out the appeal mechanisms available to the customer. If this is unsuccessful, it may be appropriate to politely caution the customer that the discussion will be terminated should the abuse continue.

Dealing with aggressive and abusive behaviour

- Officers should consider whether they require any further communication or interpersonal skills training to better equip them to deal with these situations. Contact the Principal Advisor (Workforce Capability) on (07) 3239 3187.
- If the unreasonable abuse continues after the appropriate caution, an officer may terminate the discussion. If this occurs on DERM premises, an officer may politely but assertively request that the customer leave the premises. Where such action is necessary, the assistance of a more senior officer should be sought. Where the discussion occurs on other public or private property, an officer may leave the premises immediately if the abuse continues.
- In extreme situations, officers should consider requesting the assistance of the police.
- If a discussion with a customer deteriorates into unreasonably abusive behaviour, and the discussion is terminated for this reason, the officer should document what happened and forward it to their immediate manager or the District Manager as soon as possible.
- DERM staff should undertake every reasonable effort to provide a service to all customers.
- Officers who have been the subject of abusive, aggressive or threatening behaviour should consider using the DERM counselling services.
- Threats or actual harm to DERM staff will not be tolerated. Where such action breaches the law, DERM will consider all options for further action including prosecution.

Options for further action

Where an officer has been subject to threatening or abusive behaviour, and the situation is sufficiently serious to warrant further action and cannot be resolved at the time, there are a number of options available including:

- Alternative dispute resolution;
- Prosecution by DERM for obstructing an officer on duty;
- Prosecution by the Police for assault.

Alternative dispute resolution

The Department of Justice and Attorney General runs the dispute resolution centre, which provides dispute resolution, and mediation services throughout Queensland. Dispute resolution services have the potential to resolve differences between DERM and abusive and aggressive customers without the need for costly court cases. Dispute resolution can be an effective and confidential means of voluntarily settling a dispute. The following website provides the contact details for the dispute resolution centre www.justice.qld.gov.au/justice-services/dispute-resolution.

Prosecution by DERM for obstructing an officer on duty

DERM administers a number of pieces of legislation. Some of these pieces of legislation contain specific offences for the obstruction of an officer carrying out their duties. Depending upon the circumstances and the evidence gathered, DERM may consider it appropriate to take action for these offences.

Prosecution by the Police for assault

The other option available to staff is to make a complaint to the Police for assault. Depending upon the evidence and circumstances, the Police may choose one of a number of offences. Three possible offences the Police may consider vary in seriousness and include sections 335, 339 and 340(e) of the *Criminal Code Act 1899*.

Factors to consider in deciding what action to take

Some of the factors to consider when considering further action:

Is there likely to be a solution? – if it is likely that both parties could come to some agreement about the issue, the matter might be resolved without any further action or it might be worth considering alternative dispute resolution.

How serious is the offence? – the offences administered by the Police tend to have higher penalties and therefore complaints about more serious matters should be forwarded to the Police. For example, if a DERM officer was assaulted and significantly injured, the more serious offences such as assault with bodily harm and serious assault under the Criminal Code should be considered.

Should a proposed compliance action report be completed? – if an officer decides to recommend further action that constitutes a potentially significant legal compliance action, they should complete the 'Proposed compliance action report' (PCAR) <http://wwwhost.env.qld.gov.au/steps/reflaunch.cfm?nw=true&ref=2163>.

This report should describe the circumstances and make a recommendation as to whether the matter should be dealt with by the Police or DERM, together with the reasons for the recommendation.

Disclaimer:

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved by:

Jon Womersley
Director, Regulatory Support and Practice
Department of Environment and Resource Management

Enquiries:

Permit and Licence Management
Ph: **1300 130 372**
Fax: (07) 3896 3342
Email: palm@derm.qld.gov.au

Date: 21 January, 2011

Assessment report

Environmental Protection Act 1994

Direction notice

This document is for internal use to assist Environmental Services officers to document the information considered when forming the decision to issue a direction notice pursuant to Chapter 7, Part 5A of the Environmental Protection Act 1994.

Identifying details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If applicable
File number	File number
Applicant number	Number
Trading as	Trading as details
Registered business address	Address

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be endorsed by the investigating officer, supervisory review and the delegated decision maker.

1. Brief history of the matter

Briefly outline any historical information relevant to this decision.

Outline the history of the matter in succinct dot point form.

2. Grounds for use of direction notice

The grounds for issuing a direction notice are found in s363B of the *Environmental Protection Act 1994* (the Act).

Officers are required to identify the relevant grounds upon which the decision whether to use a direction notice is based.

A person—

is contravening a prescribed provision

OR

has contravened a prescribed provision in circumstances that make it likely the contravention will continue or be repeated

AND

a matter relating to the contravention can be remedied

AND

it is appropriate to give the person an opportunity to remedy the matter.

3. Expand upon the grounds

Use this section to expand upon the grounds identified for issuing the direction notice. This should include identifying the alleged contravention and all statutory requirements which must be met prior to the department issuing a direction notice. If the direction notice relates to particular emissions, the matters listed in s363C must also be considered before issuing the direction notice.

The person has contravened the following prescribed provision—

Section 440 – Offence of causing environmental nuisance.

The person has wilfully and unlawfully caused an environmental nuisance

OR

the person has unlawfully caused an environmental nuisance.

The type of environmental nuisance caused is:

Describe the type of environmental nuisance caused by the person.

If the contravention of s440 involves an emission of aerosols, fumes, light, noise, odour, particles or smoke—the general emission criteria set out in subsection 363C(3) of the Act have been considered.

If the contravention of s440 involves the emission of noise—both the general emission criteria set out in subsection 363C(3) of the Act and the noise emission criteria set out in subsection 363C(4) of the Act have been considered.

Having given regard to the relevant criteria and considered whether to first try to resolve the matter in another way, it is appropriate in the circumstances to issue the direction notice.

The environmental nuisance caused is not one of the particular types of environmental nuisance listed in Schedule 1 of the Act that are excluded from s440.

Section 440Q – Offence of contravening a noise standard.

The person has unlawfully contravened a noise standard.

The person has breached the following noise standard:

State which noise standard has been contravened. The default noise standards are set out in ss440R to 440ZC of the Act.

- The noise standard that has been contravened is not one of the particular types of environmental nuisance listed in Schedule 1, Part 1 of the Act which are excluded from s440Q.

Details of the contravention of the noise standard are as follows:

Describe how the noise standard has been contravened.

- Section 440ZG – Depositing prescribed water contaminants in waters and related matters.**

The person has unlawfully deposited a prescribed water contaminant—

- in waters or
- in a roadside gutter or stormwater drainage or
- at another place, and in a way, so that the contaminant could reasonably be expected to wash, blow, fall, or otherwise move into waters a roadside gutter or stormwater drainage or

OR

- The person has unlawfully released stormwater run-off into waters, a roadside gutter or stormwater drainage that results in the build-up of earth in waters, a roadside gutter or stormwater drainage.

Details of the contravention are as follows:

Identify the prescribed contaminant (if applicable) and describe how the person has unlawfully deposited a prescribed water contaminant or released stormwater into waters or another place.

- A provision of an accredited environmental risk management plan (ERMP) for an agricultural environmentally relevant activity (ERA)**

- The person contravening the provision is the person carrying out the agricultural ERA.
- There person is not authorised by a transitional environmental plan (TEP) to do the thing which would otherwise be a contravention of the accredited ERMP.

Describe the breach of the provision of the accredited ERMP for an agricultural ERA and the circumstances surrounding it.

4. Detail the matters considered

The purpose of the following table is to ensure that there is evidence to support each of the elements of the grounds for using the statutory tool. This is achieved by linking the elements of the breach to the evidence gathered and the conclusions formed. This section should also record how the department has met any statutory requirements associated with the use of the statutory tool.

When analysing evidence or developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of the information available, historical details, professional expertise and the weight attributed to any direct testimony provided.

Elements of the offence or legislative requirement <i>List the elements of any alleged offence or (for grounds which are not offences) list the legislative requirement to be met by the department</i>	Evidence <i>Identify the information considered which is relevant to the elements or requirement (i.e. statements, photographs, and recordings)</i>	Facts and circumstances <i>Detail the facts and circumstance that support the department's findings.</i>
Number 1 (Number taken from Section 2)		
Time	Unknown	Unknown
Date - 1 July 2010	Notes from phone call from Mrs JP Citizen reporting the incident in file no: 987	The department received a noise complaint from Mrs JP Citizen regarding the site adjacent to her property.
Place - 123 Creek Road, Murphyville.	Officer notes dated 2 July 2010 from site inspection.	Confirmed adjacent site is owned by a government entity.
Person - Murphy Shire Council	Officer notes dated 2 July 2010 from site inspection.	Confirmed construction crew is employed by Murphy Shire Council.
Contravention - Murphy Shire Council Contravened Noise Standards	Site inspection and noise testing conducted	Noise testing conducted on site and on properties adjacent to site. Results indicated that the level of noise exceeds relevant standard.
Number 2		
Likely that the contravention will continue	Officer notes from meeting with Murphy Shire Council Engineer	Notes indicate there is a lack of clarity between Council and the on-site subcontractor regarding responsibility for adherence to the relevant noise standards. In this context the department considers it likely that the contravention of the noise standard is likely to continue.
Number 3		
Number 4		

5. Natural justice

The investigating officer is required to notify the affected person that the department is considering issuing a direction notice and that the individual is welcome to make representations to the department as to why this action should not be taken. Any information provided by the affected person is to be documented and considered.

- The person has been provided with the opportunity to put their side of the story forward.
Describe how this was achieved.
- All information and/or defences provided were considered.
Describe any information or defences provided.
- The department has considered the information or defences provided.
What consideration was given and what conclusions has the department formed?
- The decision maker and investigator are free from bias or the perception of bias.

6. Reasonable steps

The direction notice may state the reasonable steps the authorised person considers necessary to remedy the contravention, or avoid further contravention, of the prescribed provision. If appropriate, please list any reasonable steps below.

In order to ensure actions are enforceable, they should be SMART, specific, measureable, achievable, relevant and time specific. Refer to the writing effective and enforceable conditions procedural guide for more information on writing conditions and actions: <http://wwwhost.env.qld.gov.au/steps/reflaunch.cfm?nw=true&ref=2417>.

To ensure the required steps are reasonable officers are required to provide justification for the inclusion of the action.

Reasonable steps	Justification
Reasonable step	Justification

7. Time frame

The authorised person has had regard to—

- the action required to remedy the contravention and
- the risk to human health or the natural environment, or risk of loss or damage to property, posed by the contravention and
- how long the person has been aware of the contravention, for example, because an authorised person has previously made an oral requirement that the contravention be remedied.

The time by which the person must remedy the contravention is:

State the time frame by which the person must remedy the contravention.

Justification for the time frame:

Provide justification for the time frame.

8. Recommendation

The authorised person is required to make a recommendation in relation to the direction notice.

Recommendation

9. Approval

Authorised person	Supervisor
Print name:	Print name:
Date:	Date:

Delegate decision maker	Approve/reject recommendation (circle one)

Reasons for decision

I endorse this recommendation based upon the information set out above.

Or, I endorse this decision for the reasons set out above and I note Mr Rodgers has previously received a warning letter in relation to this matter

Or, I reject the above recommendation as I consider it more appropriate for the Department to take an educational approach to this breach.

Print name:

Date:

Assessment report

Environmental Protection Act 1994

Direction notice

This document is for internal use to assist Environmental Services officers to document the information considered when forming the decision to issue a direction notice pursuant to Chapter 7, Part 5A of the Environmental Protection Act 1994.

Identifying details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If applicable
File number	File number
Applicant number	Number
Trading as	Trading as details
Registered business address	Address

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be endorsed by the investigating officer, supervisory review and the delegated decision maker.

1. Brief history of the matter

Briefly outline any historical information relevant to this decision.

Outline the history of the matter in succinct dot point form.

2. Grounds for use of direction notice

The grounds for issuing a direction notice are found in s363B of the *Environmental Protection Act 1994* (the Act).

Officers are required to identify the relevant grounds upon which the decision whether to use a direction notice is based.

A person—

is contravening a prescribed provision

OR

has contravened a prescribed provision in circumstances that make it likely the contravention will continue or be repeated

AND

a matter relating to the contravention can be remedied

AND

it is appropriate to give the person an opportunity to remedy the matter.

3. Expand upon the grounds

Use this section to expand upon the grounds identified for issuing the direction notice. This should include identifying the alleged contravention and all statutory requirements which must be met prior to the department issuing a direction notice. If the direction notice relates to particular emissions, the matters listed in s363C must also be considered before issuing the direction notice.

The person has contravened the following prescribed provision—

Section 440 – Offence of causing environmental nuisance.

The person has wilfully and unlawfully caused an environmental nuisance

OR

the person has unlawfully caused an environmental nuisance.

The type of environmental nuisance caused is:

Describe the type of environmental nuisance caused by the person.

If the contravention of s440 involves an emission of aerosols, fumes, light, noise, odour, particles or smoke—the general emission criteria set out in subsection 363C(3) of the Act have been considered.

If the contravention of s440 involves the emission of noise—both the general emission criteria set out in subsection 363C(3) of the Act and the noise emission criteria set out in subsection 363C(4) of the Act have been considered.

Having given regard to the relevant criteria and considered whether to first try to resolve the matter in another way, it is appropriate in the circumstances to issue the direction notice.

The environmental nuisance caused is not one of the particular types of environmental nuisance listed in Schedule 1 of the Act that are excluded from s440.

Section 440Q – Offence of contravening a noise standard.

The person has unlawfully contravened a noise standard.

The person has breached the following noise standard:

State which noise standard has been contravened. The default noise standards are set out in ss440R to 440ZC of the Act.

- The noise standard that has been contravened is not one of the particular types of environmental nuisance listed in Schedule 1, Part 1 of the Act which are excluded from s440Q.

Details of the contravention of the noise standard are as follows:

Describe how the noise standard has been contravened.

- Section 440ZG – Depositing prescribed water contaminants in waters and related matters.**

The person has unlawfully deposited a prescribed water contaminant—

- in waters or
- in a roadside gutter or stormwater drainage or
- at another place, and in a way, so that the contaminant could reasonably be expected to wash, blow, fall, or otherwise move into waters a roadside gutter or stormwater drainage or

OR

- The person has unlawfully released stormwater run-off into waters, a roadside gutter or stormwater drainage that results in the build-up of earth in waters, a roadside gutter or stormwater drainage.

Details of the contravention are as follows:

Identify the prescribed contaminant (if applicable) and describe how the person has unlawfully deposited a prescribed water contaminant or released stormwater into waters or another place.

- A provision of an accredited environmental risk management plan (ERMP) for an agricultural environmentally relevant activity (ERA)**

- The person contravening the provision is the person carrying out the agricultural ERA.
- There person is not authorised by a transitional environmental plan (TEP) to do the thing which would otherwise be a contravention of the accredited ERMP.

Describe the breach of the provision of the accredited ERMP for an agricultural ERA and the circumstances surrounding it.

4. Detail the matters considered

The purpose of the following table is to ensure that there is evidence to support each of the elements of the grounds for using the statutory tool. This is achieved by linking the elements of the breach to the evidence gathered and the conclusions formed. This section should also record how the department has met any statutory requirements associated with the use of the statutory tool.

When analysing evidence or developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of the information available, historical details, professional expertise and the weight attributed to any direct testimony provided.

Elements of the offence or legislative requirement <i>List the elements of any alleged offence or (for grounds which are not offences) list the legislative requirement to be met by the department</i>	Evidence <i>Identify the information considered which is relevant to the elements or requirement (i.e. statements, photographs, and recordings)</i>	Facts and circumstances <i>Detail the facts and circumstance that support the department's findings.</i>
Number 1 (Number taken from Section 2)		
Time	Unknown	Unknown
Date - 1 July 2010	Notes from phone call from Mrs JP Citizen reporting the incident in file no: 987	The department received a noise complaint from Mrs JP Citizen regarding the site adjacent to her property.
Place - 123 Creek Road, Murphyville.	Officer notes dated 2 July 2010 from site inspection.	Confirmed adjacent site is owned by a government entity.
Person - Murphy Shire Council	Officer notes dated 2 July 2010 from site inspection.	Confirmed construction crew is employed by Murphy Shire Council.
Contravention - Murphy Shire Council Contravened Noise Standards	Site inspection and noise testing conducted	Noise testing conducted on site and on properties adjacent to site. Results indicated that the level of noise exceeds relevant standard.
Number 2		
Likely that the contravention will continue	Officer notes from meeting with Murphy Shire Council Engineer	Notes indicate there is a lack of clarity between Council and the on-site subcontractor regarding responsibility for adherence to the relevant noise standards. In this context the department considers it likely that the contravention of the noise standard is likely to continue.
Number 3		
Number 4		

5. Natural justice

The investigating officer is required to notify the affected person that the department is considering issuing a direction notice and that the individual is welcome to make representations to the department as to why this action should not be taken. Any information provided by the affected person is to be documented and considered.

- The person has been provided with the opportunity to put their side of the story forward.
Describe how this was achieved.
- All information and/or defences provided were considered.
Describe any information or defences provided.
- The department has considered the information or defences provided.
What consideration was given and what conclusions has the department formed?
- The decision maker and investigator are free from bias or the perception of bias.

6. Reasonable steps

The direction notice may state the reasonable steps the authorised person considers necessary to remedy the contravention, or avoid further contravention, of the prescribed provision. If appropriate, please list any reasonable steps below.

In order to ensure actions are enforceable, they should be SMART, specific, measureable, achievable, relevant and time specific. Refer to the writing effective and enforceable conditions procedural guide for more information on writing conditions and actions: <http://wwwhost.env.qld.gov.au/steps/reflaunch.cfm?nw=true&ref=2417>.

To ensure the required steps are reasonable officers are required to provide justification for the inclusion of the action.

Reasonable steps	Justification
Reasonable step	Justification

7. Time frame

The authorised person has had regard to—

- the action required to remedy the contravention and
- the risk to human health or the natural environment, or risk of loss or damage to property, posed by the contravention and
- how long the person has been aware of the contravention, for example, because an authorised person has previously made an oral requirement that the contravention be remedied.

The time by which the person must remedy the contravention is:

State the time frame by which the person must remedy the contravention.

Justification for the time frame:

Provide justification for the time frame.

8. Recommendation

The authorised person is required to make a recommendation in relation to the direction notice.

Recommendation

9. Approval

Authorised person	Supervisor
Print name:	Print name:
Date:	Date:

Delegate decision maker	Approve/reject recommendation (circle one)

Reasons for decision

I endorse this recommendation based upon the information set out above.

Or, I endorse this decision for the reasons set out above and I note Mr Rodgers has previously received a warning letter in relation to this matter

Or, I reject the above recommendation as I consider it more appropriate for the Department to take an educational approach to this breach.

Print name:

Date:

Procedural guide

Environmental Protection Act 1994

Direction notice

This document is for internal use to assist Environmental Services officers to complete and issue a direction notice pursuant to Chapter 7, Part 5A of the Environmental Protection Act 1994.

What is a direction notice?

A direction notice is a statutory enforcement tool which may be issued by the Department of Environment and Resource Management (the Department) if it is reasonably satisfied that there has been a contravention of certain prescribed provisions of the *Environmental Protection Act 1994* (the Act). A direction notice requires a person contravening one of the prescribed provisions to remedy the contravention.

The purpose of a direction notice is to provide the person receiving it with an opportunity to remedy the situation before any further action is taken. Where a contravention of these prescribed provisions has resulted in serious or material environmental harm, a direction notice is not appropriate and other enforcement tools provided for in the Act should be considered.

The issuing of direction notices is governed by Chapter 7, part 5A of the Act.

Who can use a direction notice?

A direction notice may be issued by an authorised person.

Before issuing a direction notice, officers should check whether their office has any business rules concerning the issue of direction notices. In many cases, responsibility for dealing with environmental nuisance complaints and breaches of noise standards or water contaminant provisions has been devolved to local government. Officers will only be required to issue a direction notice if the prescribed provision has been contravened by State government entity or local government, or in situations where the local government has failed to act in regard to a contravention.

When should I use a direction notice?

A direction notice may be issued for a contravention of any of the following provisions of the Act (each of which is a *prescribed provision*)—

- section 440 – offence of causing an environmental nuisance
- section 440Q – offence of contravening a noise standard
- section 440ZG – depositing prescribed water contaminants in water and related matters
- a provision of an accredited environmental risk management plan (ERMP) for an agricultural environmentally relevant activity (ERA) when the person contravening the provision is the person carrying out the agricultural ERA.

Section 363 provides that an authorised person may issue a written notice (a *direction notice*) to a person, requiring the person to remedy the contravention, if the authorised person is satisfied on reasonable grounds that—

- a person is:
 - contravening a prescribed provision or
 - has contravened a prescribed provision in circumstances that make it likely the contravention will continue or be repeated and
- a matter relating to the contravention can be remedied and
- it is appropriate to give the person an opportunity to remedy the matter.

A direction notice may be given in writing or, if it is not practicable to issue a written notice, the direction may be made orally and confirmed by a written direction notice as soon as practicable.

Making an oral requirement prior to giving a direction notice is relevant to the time by which the person may be required to remedy the contravention, as s363D(2)(c) states that the time period in the notice by which the person must remedy the contravention must be reasonable having regard to, among other things, the length of time the person has been aware of the contravention.

Section 440 – offence of causing environmental nuisance

Under s440 of the Act, it is an offence to wilfully and unlawfully cause an environmental nuisance or to unlawfully cause an environmental nuisance.

Section 15 of the Act defines *environmental nuisance* as being unreasonable interference or likely interference with an environmental value caused by—

- aerosols, fumes, light, noise, odour, particles or smoke or
- an unhealthy, offensive or unsightly condition because of contamination or
- another way prescribed by a regulation.

An *environmental value* is a quality or physical characteristic of the environment that promotes ecological health or public amenity or safety, or another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

Particular types of environmental nuisance listed in Schedule 1, Part 1 of the Act are excluded from s440. These include environmental nuisance caused by certain types of safety and transport noise, government activities and public infrastructure as well as nuisance regulated by other laws. Consult Schedule 1, Part 1 for more detail.

Matters to consider before issuing a direction notice relating to particular emissions

Section 363C states that when there is a contravention of s440 involving an emission of aerosols, fumes, light, noise, odour, particles or smoke, before deciding to issue a direction notice in relation to the contravention the authorised person must do the following—

- consider the general emission criteria set out in subsection 363C(3) of the Act and

- if the emission is of noise, consider the noise emission criteria stated in subsection 363C(4) of the Act and
- taking those criteria into account, consider whether it would be appropriate to issue the direction notice or to first try to resolve the matter in another way.

General emission criteria s363C(3)

The general emission criteria, for a particular emission, are as follows—

- the characteristics or qualities of the emission
- the amount or rate of the emission
- the duration and time of the emission
- whether the emission is continuous or fluctuating
- the nature of the receiving environment
- the impact of the emission on the receiving environment
- in relation to each person affected by the emission:
 - the views of each affected person, including views about the degree of interference caused or likely to be caused by the emission at that person's place of residence
 - the order of occupancy between the person causing the emission and the affected person and
 - any structural or other changes to the place from which the emission is generated and where the affected person lives or any change to the activities carried out at either of those places
- any mitigating measures that have been taken or could reasonably have been taken by the person causing the emission.

Noise emission criteria s363C(4)

If the particular emission under s440 is noise, in addition to the general emission criteria officers must also consider the noise emission criteria, which are as follows—

- any measured sound pressure levels
- the audibility of the noise
- whether the noise is continuous, at a steady level or whether it has a fluctuating, intermittent, tonal or impulsive nature
- whether the noise has vibration components.

Section 440Q – offence of contravening a noise standard

It is an offence under s440Q of the Act to unlawfully contravene a noise standard. However, a person does not contravene a noise standard by causing an environmental nuisance mentioned in Schedule 1, part 1 of the Act.

Application of noise standards

Noise can include vibrations of any frequency, whether emitted through the air or another medium (s12).

The legislation provides that a local government may enact local laws which prescribe a noise standard by prohibiting the making of a stated noise or by stating a section in Chapter 8, Part 3B, Division 3 of the Act. If there is a local law in force for which a section in Division 3 is the nominated section, the local law provision applies as the noise standard.

Default noise standards under Division 3 of the Act will apply only if—

- the local government for the local government area is not the administering authority for this part or
- the local government for the local government area is the administering authority for this part, but there is no local law in force for which the particular section is the nominated section.

The default noise standards are listed in ss440R to 440ZC of the Act and include—

- building work (s440R)
- regulated devices (s440S)
- pumps (s440T)
- air conditioning equipment (s440U)
- refrigeration equipment (s440V)
- indoor venues (s440W)
- open-air events (s440X)
- amplifier devices other than at an indoor venue or open-air event (s440Y)
- power boats sports in a waterway (s440Z)
- operating power boat engines at premises (s440ZA)
- blasting (s440ZB) and
- outdoor shooting ranges (s440ZC).

If a local government prescribed standard exists then the local government of the area is responsible for enforcing that standard.

It is important to note that if the noise standards are complied with, but the noise is still a nuisance, a direction notice may be available for a contravention of s440.

Exclusions relating to environmental nuisance or environmental harm

Some types of environmental nuisance are excluded from s440 and s440Q and from the definitions of environmental harm and environmental nuisance. These exclusions are listed in Schedule 1 of the Act and include environmental nuisance—

- caused by safety and transport noise
- caused by government activities and public infrastructure
- regulated by other laws such as the *Work Place Health and Safety Act 1995* and the *Public Health Act 2005*

- caused by animal noise from a non-domestic animal and
- caused by a domestic cooking odour.

Section 440ZG – depositing prescribed water contaminants in waters etc

A prescribed water contaminant includes earth (defined as sand, soil, silt or mud) or any other contaminant listed under Schedule 9 of the *Environmental Protection Regulation 2008*.

A person must not—

- unlawfully deposit a prescribed water contaminant:
 - in waters or
 - in a roadside gutter or stormwater drain or
 - at another place, and in a way, that the contaminant could reasonably be expected to wash, blow, fall or otherwise move into waters, a roadside gutter or stormwater drainage or
- unlawfully release stormwater run-off into waters, a roadside gutter or stormwater drainage if that release will result in the build-up of earth in waters, a roadside gutter or stormwater drainage.

A person *deposits* a contaminant in waters or at another place if the person drops, places, throws, releases or otherwise causes the contaminant to move into the waters or onto the place. A depositor of a contaminant includes the occupier of a place, or the person who is in control of the contaminant and who does not remove the contaminant within a reasonable time after becoming aware that it has been deposited at the place.

A contravention of a provision of an accredited ERMP for an agricultural ERA

In certain circumstances (see s88 of the Act) a person who carries out an agricultural environmentally relevant activity (ERA) must have an accredited environmental risk management plan (ERMP) for an agricultural ERA. Section 363B provides that a direction notice may be issued for a contravention of a prescribed provision which includes, among other things, a provision of an accredited ERMP for an agricultural ERA. However, a provision of an accredited ERMP is only considered a prescribed provision if the person contravening the provision is the person who is carrying out the agricultural ERA.

If an approved transitional environmental program (TEP) is in place

Section 346 of the Act provides that if a person is authorised to do or not do something under an approved transitional environmental program (TEP), the person may do or not do the thing despite anything in an accredited ERMP. Accordingly, a person will not be in contravention of a provision of an accredited ERMP if the person is doing or not doing something under an approved TEP, so a direction notice may not be issued in these circumstances.

How do I successfully issue a direction notice?

Officers must complete an assessment report to document the decision as well as completing the direction notice.

The following paragraphs of the procedural guide are a guide to the completion of the assessment report. The numbering and headings of the paragraphs in the procedural guide correlate with those in assessment report, and are set out so that the process may be completed step by step.

Step 1 - Complete the assessment report

Before completing the direction notice, officers are required to complete an assessment report which sets out the facts and circumstances relating to the matter and documents the decision making process used by the Department in determining to issue a direction notice. The assessment report is not intended to replicate the departmental file. Rather it is designed to capture all critical aspects that have lead to the Department's decision. Accordingly, officers are encouraged to limit the information included to relevant points only. A template assessment report is attached [\[LINK\]](#).

1. Brief history of the matter

Briefly outline any historical information relevant to this decision. This information should be presented in succinct chronological dot points and should include how the Department became aware of the alleged breach.

2. Grounds for issuing a direction notice

Section 363B of the Act provides that a direction notice can only be issued if the Department is satisfied on reasonable grounds that—

- a person:
 - is contravening a prescribed provision or
 - has contravened a prescribed provision in circumstances that make it likely that the contravention will continue or be repeated and
- the matter relating to the contravention can be remedied and
- it is appropriate to give the person an opportunity to remedy the matter.

Please identify the relevant situation or 'grounds' upon which the decision to use a direction notice is based.

3. Expand upon the grounds

The purpose of this section is to clearly identify what the Department must 'prove' before deciding to use a direction notice and should be used to expand upon the grounds which have previously been identified. This can include identifying the prescribed provision that is being, or has been, contravened. This should also include the abovementioned legislative requirements which must be met by the Department prior to issuing a direction notice.

In instances where there have been multiple contraventions, each contravention should be listed independently and will need to be proven on its own merits.

4. Detail the matters considered

The purpose of the table in the assessment report is to link the elements of the contravention (or grounds) to the evidence gathered and the conclusions formed. This is achieved by identifying: the elements of any specific contravention, the evidence which has been considered for each element, and the conclusion that has been reached by the officer after considering the information sourced.

When documenting the evidence considered officers are encouraged to limit the information to relevant points only. This can include (but is not limited to):

- notes recorded in an officer's official notebook
- samples collected for analysis and any subsequent lab reports
- photographs and copies of documents
- any observed actions and direct testimony received from individuals.

When developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of available evidence, historical details, professional expertise and the weight attributed to any direct testimony provided.

5. Provide for natural justice

Prior to the Department making a decision which may adversely impact on an individual or group the Department must:

- **Notify** - Notify the individual that the Department is considering making adverse findings
- **Respond** - Provide the individual with an opportunity to respond to the allegation and
- **Consider** - Consider any representations made by the affected person before finalising the decision.

The seriousness of the matter will dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers are encouraged to use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. While in some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site inspection or a telephone interview and to take contemporaneous notes, in more serious circumstances a written notification which includes a specific closing date for submissions should be used.

Regardless of the manner in which natural justice is afforded, any information provided by the affected person is to be documented. The summary of information should include how natural justice was provided as well as any responses provided by the affected person.

6. Reasonable steps

The legislation provides that the notice may state the reasonable steps the authorised person considers necessary to remedy the contravention, or avoid further contravention, of the prescribed provision.

The officer is responsible for developing the reasonable steps for consideration by the decision maker. As the recipients are able to seek a review of the Department's decision to impose one or more reasonable steps, it is necessary for officers to provide justification for the inclusion of each step.

The required steps must be specific, measureable, achievable, time specific and relevant to the breach. For example:

<p><i>By 24 July 2011 ABC Construction Pty Ltd must install a sediment fence made from heavy duty geofabric along the southern boundary of the building site at 123 Creek Road, Murphysville to prevent sediment from leaving the site and being deposited into Murphy Creek. All building works must cease until the sediment fence is in place and has been inspected by an authorised person who must be satisfied with its construction.</i></p>	<p><i>ABC Construction Pty Ltd is carrying out building works at a site at 123 Creek Road, Murphysville. Sediment from the building works has been leaving the site and is being washed into Murphy Creek where the sediment is smothering plants and animals that live at the bottom of the creek. ABC Construction Pty Ltd is required to install the sediment fence to prevent further polluting of Murphy Creek and to preserve the habitat of the animals and plants that live there. Building work must be halted on the site until the sediment fence is installed to prevent further environmental harm being caused to Murphy Creek.</i></p>
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7. Time frame

Subsection 363D(2) of the Act provides that the time by which the person must remedy the contravention must be reasonable having regard to—

- the action required to remedy the contravention and
- the risk to human health or the natural environment, or risk of loss or damage to property, posed by the contravention and
- how long the person has been aware of the contravention, for example, because an authorised person has previously made an oral requirement that the contravention be remedied.

Officers must consider these factors carefully when deciding on a time frame.

8. Recommendation

Officers are required to make a recommendation in relation to the matter. For example:

It is the opinion of the Department that sediment is leaving the building site at 123 Creek Road, Murphysville and is being deposited into Murphy Creek in contravention of s440ZG of the Act. It is recommended that a direction notice be issued immediately to ABC Construction Pty Ltd requiring the company to cease all building works on the site until a sediment fence has been installed along the southern boundary of the site.

Administrative decisions are made based upon the balance of probabilities. This means that the decision maker must be able to determine whether, based upon the information available, it was more likely than not that the event occurred.

Officers are encouraged to consider alternative actions/tools, departmental enforcement guidelines, details of any consultations including site visit details and discussions with the ERA contact officer. The reasonableness of proposed timeframes for the completion of requirements should be taken into account (for example, if the location geographically isolated the Department should consider allowing additional time to secure appropriate contractors).

9. Approval

As a direction notice is issued by an authorised person, there is no delegated authority for section 363B of the Act. Accordingly, the assessment report is to be approved and signed by the authorised person's supervisor.

Step 2 - Draft the direction notice

The tool must meet a number of legislative requirements in order to be legally binding. Section 363D of the Act provides that a direction notice must include the following information—

- that the authorised person believes the person:
 - is contravening a prescribed provision or
 - has contravened a prescribed provision in circumstances that make it likely the contravention will continue or be repeated
- the particular prescribed provision that the authorised person believes is being, or has been, contravened
- briefly, how it is believed the prescribed provision is being or has been contravened
- the time by which the person must remedy the contravention
- that it is an offence to fail to comply with the direction notice unless the person has a reasonable excuse
- the maximum penalty for failing to comply with the direction notice and
- review or appeal details

The notice may also state the reasonable steps the authorised person considers necessary to remedy the contravention, or avoid further contravention of the prescribed provision.

The legislation (s363D(g)) specifies that the notice must include the review or appeal details. Basic information regarding the review and appeal process is included in the template direction notice. As well, a copy of the information sheet [\[LINK\] Internal review \(DERM\) and appeal to Planning and Environment Court](#) should be attached to the direction notice.

With regard to issuing the direction notice the Department is also required to notify individuals of the following in a timely manner:

- any decisions made against them:
- the reasons for the decision (these are the facts and circumstances identified in section 4 of the assessment report)

A template direction notice is attached [\[LINK\]](#)

The direction notice should be signed by the decision maker in conjunction with the assessment report which records a formal decision.

Service of a direction notice

Service means delivery to the party who will be affected by the notice. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the recipient in question. The following methods of service are acceptable

- For a person:
 - by delivering it to the person personally or
 - by leaving it at, or by sending it by pre-paid registered post to, the place of residence or business of the person or
- For a body corporate - by leaving it at, or sending it by pre-paid registered post to, the head office, a registered office or a principal office of the body corporate.

The method of service should be documented by contemporaneous notes, a file note, or any receipts arising from the postage. In particular, officers should record the date, time and method of service. Sending the notice by registered post with confirmation of delivery is good practice to ensure that the notice has been delivered to the recipient.

What follow up is required?

It is important that the matter is appropriately followed up to make sure that the person to whom the direction notice is issued is complying with any requirements imposed. Follow up is to be scheduled by the relevant officer and confirmed with the business area manager. The business area manager is responsible for ensuring follow up is undertaken within the agreed timeframe.

This is usually achieved by a follow up by site inspection or telephone call to be conducted one week after the time period nominated in the notice has expired. Officers are encouraged to utilise tools such as diary reminders to ensure the matter is followed up in a timely manner.

If the person does not comply with the requirements of the direction notice, further action to ensure compliance must be taken. This may include enforcement action.

What are my record keeping responsibilities?

Officers are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measure screen (this includes a decision to take no further action). A hard copy of the direction notice, the assessment report and any accompanying documentation should be attached to the paper file. The Department is required to make, and record, an informed decision about all allegations of non-compliance.

Changes to an issued direction notice

If minor changes to the direction notice or an extension of time are required, the person should be notified in writing.

If significant changes are required officers should, in order to avoid confusion, repeal (revoke) the original direction notice, and issue a fresh one on the same grounds with the necessary changes. It is important to note that the recipient will have a fresh appeal rights and should be advised accordingly.

The repeal and issue of a fresh direction notice should be carried out in the same way, and subject to the same conditions as the issuing of the original EPO. Accordingly, a new assessment report should be completed and approved by the authorised person's supervisor.

It is preferable if the decision is made by the original decision-maker. If this is not possible the decision should be made by another authorised person and approved by that person's supervisor.

Officers should also update and record the changes or the decision to repeal and reissue the EPO in EcoTrack

Review of decisions and appeals (s521)

The provisions regarding review of decisions and appeals may be found in Chapter 11, part 3 of the Act.

The Act specifies that a person who is dissatisfied by a decision by the Department in respect to a direction notice may apply for a review of an original decision by submitting an application on the approved form to the Department:

- within 10 business days after the day on which the person received notice of the original decision or the date when the Department is taken to have made the decision (the "review date") or
- if there are special circumstances, whatever longer period the Department allows.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#)

If the person is dissatisfied with the review decision, the person may appeal to the Planning and Environment Court by filing written notice with the court within 22 business days after the person receives notice of the review decision, unless this time period is extended by the court.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

What penalties exist for non-compliance with a direction notice?

It is an offence under s363E of the Act not to comply with a direction notice without reasonable excuse.

If a recipient fails to comply with a direction notice, the department may issue a penalty infringement notice (PIN) for a maximum amount of:

- \$1,000.00 for an individual or
- \$2,000.00 for a corporation.

For further information about issuing PINs, consult the PIN Manual [[LINK](#)].

If a PIN would not be considered sufficient penalty for the contravention, the Department may decide to commence legal proceedings against the recipient.

- The maximum penalty for an individual is \$30,000.00.
- The maximum penalty for a corporation is \$150,000.00.

Notice

Environmental Protection Act 1994

Direction notice

This direction notice is issued by the administering authority pursuant to s363B of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our Reference: Our reference

TAKE NOTICE that under the *Environmental Protection Act 1994* (the Act) a direction notice is issued to you by an authorised person on behalf of the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the department).

The direction notice is issued in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of premises/place (the "said premises").

A. Grounds

The direction notice is issued on the following grounds:

- A person authorised under the Act believes that you [are contravening a prescribed provision] OR [have contravened a prescribed provision in circumstances that make it likely the contravention will continue or be repeated].
- The authorised person believes that you [are contravening] OR [have contravened] [section number] , a prescribed provision under s363A of the Act. The facts and circumstances forming the basis for these grounds are:
 - Briefly state how it is believed the prescribed provision is being, or has been contravened. Only salient factors which directly relate to the decision are to be included.
 - Insert the facts and circumstances that form the factual basis for the grounds.
 - Insert the facts and circumstances that form the factual basis for the grounds.
 - Insert the facts and circumstances that form the factual basis for the grounds.

B. Reasonable steps

The authorised person considers that the following reasonable steps are necessary to [remedy the contravention] OR [avoid further contravention] of the prescribed provision:

- Insert the reasonable steps necessary to remedy the contravention, or avoid further contravention of the prescribed provision.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- Insert the reasonable steps necessary to remedy the contravention, or avoid further contravention of the prescribed provision.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- Insert the reasonable steps necessary to remedy the contravention, or avoid further contravention of the prescribed provision.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- The contravention must be remedied by [insert date]

TAKE NOTE that:

- The requirements of the direction notice take effect immediately upon service of the notice.
- This notice remains in force until further notice from the administering authority.

C. Appeal Rights

You may apply for a review of the decision to issue the direction notice within ten business days of the service of the notice. You may also apply to the court for a stay of the decision to issue the direction notice.

If you are dissatisfied with the review decision, you may appeal against this decision to the Planning and Environment Court. Specific information regarding the process for seeking a review or appeal is attached to this notice.

However, the information outlining the review and appeal process under the *Environmental Protection Act 1994* should be considered as general advice only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

D. Penalties

Section 363E of the Act provides that it is an offence to fail to comply with a direction notice without a reasonable excuse.

The maximum penalty for an individual is \$30,000.00.

The maximum penalty for a corporation is \$150,000.00.

Should you have any queries in relation to this notice, please contact name of officer of the department on telephone number telephone number.

Signature

Date

Name of authorised person

Authorised person

Environmental Protection Act 1994

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Direction

Environmental Protection Act 1994

Emergency direction for the release of a contaminant

This direction for the emergency release of a contaminant is issued by the administering authority pursuant to s468 of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our reference: Our reference

TAKE NOTICE that under the *Environmental Protection Act 1994* (the Act) an emergency direction for the release of a contaminant into the environment is hereby issued to you by an authorised person.

The emergency direction is issued in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of premises/place (the place).

A. Grounds

The direction for the emergency release of a contaminant is issued on the following grounds—

- An authorised person is satisfied that:
 - it is necessary and reasonable to release the contaminant because of an emergency and
 - there is no other practicable alternative to the release.

The facts and circumstances forming the basis for these grounds are—

- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Only salient factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Only salient factors which directly relate to the decision are to be included.

- Insert the facts and circumstances that form the factual basis for the grounds.

B. Conditions

You are directed to do the following—

- Reasonable conditions may be imposed on the direction.
- Ensure the conditions are specific, measurable, attainable, relevant and time specific.
- Reasonable conditions may be imposed on the direction.
- Ensure the conditions are specific, measurable, attainable, relevant and time specific.
- Reasonable conditions may be imposed on the direction.
- Ensure the conditions are specific, measurable, attainable, relevant and time specific.
- Reasonable conditions may be imposed on the direction.
- Ensure the conditions are specific, measurable, attainable, relevant and time specific.

TAKE NOTICE that:

- The requirements of the direction for an emergency release of contaminant take effect immediately upon service of the direction.
- This emergency direction remains in force until [Date] OR [further notice from the authorised person].

C. Penalties

Section 479 of the Act provides that a person to whom an emergency direction is given must comply with the direction (including a condition of a direction), unless the person has a reasonable excuse for not complying with it, and must take all reasonable precautions to prevent or minimise—

- environmental harm being caused and
- the risk of death or injury to humans and animals and
- loss or damage to property.

The maximum penalty for an individual is \$10,000.00.

The maximum penalty for a corporation is \$50,000.00.

Should you have any queries in relation to this direction, please contact name of officer of the department on telephone number telephone number.

Environmental Protection Act 1994
Direction for the emergency release of a contaminant

Signature

Date

Name of delegate

Position of delegate

Delegate of Administering Authority

Environmental Protection Act 1994

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Draft

Assessment report

Environmental Protection Act 1994

Emergency direction to release a contaminant

This document will be used to record the information considered by the Department when forming the decision whether to issue an emergency direction to release a contaminant.

Identifying Details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If applicable
File number	File number
Applicant number	Number
Registered business address	Address

Note:

1. Assessment reports recommending that a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be approved by the responsible officer, supervisor and the delegated decision maker.

1. Brief history of the matter

Please briefly outline any historical information relevant to this decision. This information should be presented in succinct chronological dot points.

Briefly outline how you became aware of the situation and any relevant historical information to exercising powers under s468.

2. Grounds for issuing an emergency direction

The legislation specifies that an emergency direction can only be used in certain circumstances. Please identify the relevant grounds upon which the decision to give an emergency direction is based.

An authorised person is satisfied that:

it is necessary and reasonable to release the contaminant because of an emergency

AND

there is no other practicable alternative to the release.

Emergency direction to release a contaminant (s468)

3. Expand upon the grounds

The next step is to expand upon the grounds identified for giving the emergency direction to release a contaminant into the environment. This can include identifying the emergency and the contaminant that is to be released and stating the reasons why there is no practicable alternative to releasing the contaminant into the environment.

Each ground should be listed independently and be allocated a separate number. For example:

Number	Specific Ground
1	Extremely heavy rains have caused sewage ponds to overflow at ABC Sewage Treatment Pty Ltd. Due to continuing heavy rain and flooding it is reasonable and necessary to allow controlled releases of the sewage into Murphy Creek to protect the town of Murphyville which is under immediate threat of being flooded with raw sewage from the overflowing ponds.
2	Alternatives to the controlled release of the contaminant have been considered, but there is no practicable alternative to the release.
3	
4	

Consider whether there is sufficient information available in relation to each of the risks/impacts identified to allow the department to be able to clearly determine that, under the circumstances, it is necessary and reasonable to release the contaminant into the environment.

Consideration has been given to:

- The nature of the contaminant.
Describe the type of contaminant to be released.
- The risks of releasing the contaminant.
Describe the risks of release.
- The anticipated harm caused to the environment.
Describe the anticipated environmental harm.

State why it is reasonable and necessary to give an emergency direction to release a contaminant and record the evidence you have gathered that has led you to this conclusion.

State the reasons why it is reasonable and necessary to give the emergency direction and list the supporting evidence.

4. Recommended conditions (if applicable)

Consider and identify what conditions, if any, should be included in the emergency direction in order to mitigate or manage the impacts from the release of the contaminant.

List any proposed conditions in the table below. In order to ensure conditions are enforceable, they should be SMART, specific, measurable, achievable, relevant and time specific. Refer to the *Writing effective and*

Emergency direction to release a contaminant (s468)

enforceable conditions procedural guide for more information on writing conditions:

<http://wwwhost.env.qld.gov.au/steps/reflaunch.cfm?nw=true&ref=2417>.

To ensure the conditions are reasonable, officers are required to provide justification for the inclusion of the condition:

Proposed conditions	Justification
Proposed condition	Justification

5. Time frame

An emergency direction will normally be issued for a defined period, which should allow sufficient time for the release of the contaminant in an emergency situation.

Provide details of the proposed time frame and justifications for the period given.

6. Natural justice

Due to the urgent nature of an emergency direction, there is no requirement for the authorised person to specifically ask the recipient of the emergency direction to put their side of the story forward. However, if any information is provided by the recipient it should be documented and/or considered if circumstances allow.

- If the recipient of the emergency direction provided information, it was documented and considered.
- The decision maker and authorised person are free from bias or the perception of bias.

7. Recommended decision/Action taken

If this assessment report is being completed prior to an officer using their emergency powers a recommended decision and the proposed action to be taken is to be recorded. In instances where the assessment report is being completed retrospectively, record the decision made and the action taken.

Recommendation/Action taken

Emergency direction to release a contaminant (s468)

8. Endorsement

Authorised person	Supervisor of authorised person Approve / Reject Recommendation (Circle One)
	Reasons for Decision For example: I [approve this recommendation] OR [support the action taken] based on the information set out above.
Print Name:	Print Name:
Date:	Date:

Procedural guide

Environmental Protection Act 1994

Emergency direction to release a contaminant

This document is for internal use to assist Environmental Services authorised officers to issue an emergency direction to release a contaminant under s468 of the Environmental Protection Act 1994.

What is an emergency direction to release a contaminant (s468)?

An emergency direction is a written direction to release a contaminant into the environment because of an emergency, which may be given to a person or company by an authorised person under the Act.

The legislative provisions relating to emergency directions can be found in s468 of the *Environmental Protection Act 1994* (the Act).

What is an emergency?

The term *emergency* is not defined in the Act. However, according to the Macquarie dictionary, an emergency is 'an unforeseen occurrence; a sudden and urgent occasion for action'. This can include an environmental and 'non-environmental' emergency.

What is a contaminant?

The Act defines a *contaminant* to include a gas, liquid or solid; odour; organism (whether alive or dead), including a virus; or energy, including noise, heat, radioactivity and electromagnetic radiation; or a combination of contaminants.

Who can use an emergency direction?

The legislation specifies that an emergency direction may be given by an authorised person.

When should I use an emergency direction under s468?

An emergency direction may be given by an authorised person if the authorised person is satisfied that—

- it is necessary and reasonable to release the contaminant because of an emergency and
- there is no other practicable alternative to the release.

It is important to note that an emergency direction can only be issued for an emergency that is *actually* occurring. It is not appropriate to issue an emergency direction to deal with an anticipated emergency event.

Legislative requirements when making a decision to issue an emergency direction under s468

An emergency direction will allow environmental harm to occur. Consequently, officers must make sufficient investigation into the facts and circumstances surrounding the situation to justify the decision to issue an emergency direction. When considering whether the legislative requirements have been met, officers should consider the following factors—

- Is the situation an emergency?
 - An emergency is an unforeseen occurrence that may require a sudden or urgent action. It has the potential to impact on the environment, threaten health and safety and cause economic loss and operational disruption to businesses.
 - What is the nature of the emergency? For instance, is there a significant and imminent threat to human life, safety, property and/or environmental values?
- Is the release reasonable and necessary?
 - Consider the risk to the environment versus the consequences of not releasing the contaminant.
 - Substantiate the need for the release. For example, a Queensland Health Officer has identified that the contaminant will create a health risk if not released.
 - Consider the potential short-term and long-term impacts to the environment.
 - Consider the reliability of the information received.
 - Identify and consider the nature of the contaminant, such as volume, mobility and toxicity to humans, livestock and the environment generally.
 - Consider weather factors that may influence the direction/course of the contaminant.
 - What is the location of the release? Officers should consider the environmental values of the surrounding area.
 - Is it necessary to notify other government departments, local councils, residents, businesses, users?
 - What are the risks and potential impacts to users (residential/business) and surrounding areas, e.g. downstream?
- Are you satisfied that there are no other practicable alternatives to the release?
 - Is there an alternative course of action to releasing?
 - What are the risks from the alternative course of action?
 - What impacts would the alternatives have on the receiving environment?
 - Demonstrate that to do nothing is not an option.
- Consider the known impacts of releasing the contaminant. What steps can be taken to mitigate or manage it?

Can I include conditions as part of an emergency direction?

The legislation specifies that an officer may impose reasonable conditions on an emergency direction. The conditions imposed should be definite, specific and clear. For example, a condition regarding the level of monitoring and reporting should be sufficient for the Department to review and assess the long- and short-term impacts of the release on the receiving environment.

How do I successfully issue an emergency direction?

Officers must complete an assessment report to document the reasons for making the decision and also complete the emergency direction. If there is no time to complete the assessment report beforehand, the authorised person may issue an emergency direction without it, but he or she must make notes of the reasons

and evidence and complete the assessment report as soon as possible. It should be noted on the assessment report that it was completed retrospectively.

Step 1 - Complete the assessment report

The assessment report must set out the facts and circumstances relating to the matter and document the decision-making process used by the officer in determining to give an emergency direction.

The assessment report is not intended to replicate the departmental file. Rather it is designed to capture all critical aspects that have led to the officer's decision. Accordingly, officers are encouraged to limit the information included to relevant points only. A template assessment report is attached [LINK](#)

1. Brief history of the matter

Briefly outline any historical information relevant to this decision. This information should be presented in succinct chronological dot points and should include how the Department became aware of the situation.

2. Grounds for issuing an emergency direction

The legislation specifies that an emergency direction can only be given where the authorised person is satisfied that it is necessary and reasonable to release the contaminant because of an emergency and there is no other practicable alternative to the release. Officers must identify the grounds upon which the decision to give an emergency direction is based.

3. Expand upon the grounds

The purpose of this section is to clearly identify what the Department must 'prove' before giving an emergency direction. Sufficient details are to be provided to demonstrate the grounds upon which the decision to use an emergency direction is based. Officers should also provide reasons why there is no other practicable alternative to the release.

4. Proposed conditions

An officer may impose reasonable conditions on the emergency direction. In instances where it is recommended that conditions are imposed, the officer is responsible for developing proposed conditions and providing justification for their inclusion for consideration by the authorised person.

Conditions must be specific, measureable, achievable, relevant and time specific. For example:

Condition:	Justification:
You are required to maintain a record of all quantities and quality of contaminants released and their release location. This information must be made available to the Department on request.	The department requires this information to review and assess the long and short term environmental harm the contaminant may cause to the environment. If the level of environmental harm increases significantly, a decision to allow further releases of the contaminant may need to be considered.

5. Time frame

An emergency direction will normally be for a defined period. The time frame (start and end dates and times) should be clearly stated on the emergency direction. Note the time frame and justifications for the period given in the assessment report.

6. Provide for natural justice

It is likely that an emergency direction under s468 may need to be exercised as a matter of urgency and there will be no time for the authorised person to observe formal natural justice procedures. If possible, the authorised person should document and take into consideration any representations made by a person to whom a direction is given. However, there is no requirement for the authorised person to specifically ask the person to put their side of the story forward.

7. Recommendation

The officer is required to make a recommendation in relation to the situation. For example:

Due to unprecedented heavy rainfall and imminent flash flooding, it is the opinion of the Department that sewage ponds at ABC Sewage Treatment Pty Ltd will overflow within the next 14 days causing sudden and severe contamination to the local environment. It is considered that the environmental harm will be ameliorated by a controlled release of sewage from the ponds into Murphy Creek over a seven-day period. Accordingly, it is recommended that an emergency direction to release a contaminant be issued.

8. Approval

The assessment report and recommended decision/action are to be approved by the authorised person's supervisor.

Step 2 - Complete the emergency direction

The emergency direction must be in writing and must—

- specify accurately to whom the emergency direction is issued
- give details of the circumstances which give rise to the emergency release
- give details of the release point/s
- state any reasonable conditions imposed on the direction
- state the date on which the direction takes effect (e.g. this emergency direction remains current for 14 calendar days from the date of issue)
- state that it is an offence not to comply with an emergency direction, unless the recipient has a reasonable excuse, and provide the penalty for failing to comply with the emergency direction
- state that the person must also take all reasonable and practicable precautions to prevent or minimise environmental harm, the risk of death or injury to humans or animals and loss or damage to property.

It is important to identify the appropriate person to whom the order should be issued (see [Compliance - Procedural guide - Understanding Legal Entities](#) for assistance). To help identify who runs a business, a business name search can be used (see www.abr.gov.au).

A template emergency direction is attached ([LINK](#)). The emergency direction should be signed by the decision maker in conjunction with the assessment report which records the formal decision.

Service of an emergency direction

Service means delivery to the appropriate recipient of the direction. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the nature of the situation and the recipient in question.

It is likely that the emergency direction to release a contaminant under s468 will need to be exercised quickly. If this is the case, the officer should use his or her judgment as to the way in which the emergency direction is served. For example, if urgent, service could be by email, facsimile or hand delivery, and followed up by post, if necessary. If the emergency direction is being served by email it should be signed and put into PDF format. A hard copy should also be placed on the file.

For the purposes of any Act that requires a document to be served on (which includes 'given' or 'sent to') a person, the document may be served:

- on a person:
 - by delivering it to the person personally or
 - by leaving at, or by sending it by pre-paid post to, the place of residence or business of the person or
- on a body corporate - by leaving it at, or sending it by pre-paid registered post to, the head office, a registered office or a principal office of the body corporate.

The date, time and method of service should be documented by contemporaneous notes, a file note, receipts arising from the postage or any confirmation of receipt if the direction is served by email or facsimile.

What follow-up is required?

It is an offence not to comply with the emergency direction (including any conditions). Officers should diarise the date the emergency direction starts and finishes and any time frames regarding conditions. Officers must closely monitor the situation for the duration of time that the notice is in force. Follow-up is to be scheduled by the relevant officer and their manager. The manager is responsible for ensuring follow-up is undertaken.

Officers must liaise with their managers to identify the appropriate internal briefing process.

Officers must closely monitor the situation for the period of time that the notice remains in force. Officers must also assess whether any ongoing monitoring will be required to assess the short-, medium- and long-term impacts to the environment that may be caused by the contaminant.

What are my record keeping responsibilities?

Officers are required to record all actions in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measures screen (this includes a decision to take no further action). The Department is required to make, and record, an informed decision about all allegations of non-compliance. Hard copies of the emergency direction, the signed assessment report and any supporting documents should be placed on the paper file.

What penalties exist for non-compliance with an emergency direction?

A person to whom an emergency direction is given must comply with the direction (including a condition of the direction) unless the person has a reasonable excuse for non-compliance. The person must also take all reasonable and practicable precautions to prevent or minimise—

- environmental harm being caused and
- the risk of death or injury to humans and animals and
- loss or damage to property.

The maximum penalty for an individual is 100 penalty units or \$10,000.00.

The maximum penalty for a corporation is 500 penalty units or \$50,000.00.

Assessment report

Environmental Protection Act 1994

Emergency powers

This document is intended for internal use to assist Environmental Services officers to document the information considered when forming the decision to exercise the emergency powers pursuant to s467 of the Environmental Protection Act 1994.

Identifying details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If Applicable
File number	File Number
Applicant number	Number
Registered business address	Address

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be endorsed by the authorised person, the supervisor and the delegated decision-maker.

Brief history of the matter

Outline briefly any historical information relevant to this decision. This information should be provided in succinct chronological dot points.

Provide details of how you became aware of the situation and any historical information relevant to exercising the powers under s467.

How the powers were/will be exercised

An authorised person may exercise the powers under s467 of the *Environmental Protection Act 1994* (the Act) in different ways. Specify how the emergency powers were exercised or will be exercised:

- A person [was] OR [will be] directed to take specified reasonable action within a specified reasonable time.

Provide details of the direction that [was] OR [will be] given to the person.

OR

- The authorised person [has taken] OR [will take] the action.

Provide details of the action that [has been] OR [will be] taken by the authorised person.

OR

- The authorised person [has authorised] OR [will authorise] another person to take the action.

Provide details of the person who [was] OR [will be] authorised to take the action and specify the action that [was] OR [will be] taken.

What is the environmental harm that has been or is likely to be caused?

Specify the type of environmental harm that [required] OR [will require] the use of the emergency powers.

- Material environmental harm.
 Serious environmental harm.

Advise how you formed the reasonable belief regarding the nature of the harm.

List the evidence upon which the reasonable belief was based.

Why was/is urgent action necessary?

For the emergency powers to be exercised, the authorised person must be satisfied on reasonable grounds that urgent action is necessary to prevent or minimise the harm being caused or to rehabilitate or restore the environment because of the harm. Describe the facts and circumstances surrounding the matter and provide reasons why urgent action is required.

Describe the facts and circumstances that indicate urgent action is necessary.

List any evidence supporting the belief that the matter is urgent.

What action was/is required?

Specify the type of reasonable action that [was] OR [will be] required:

- action to prevent or minimise the harm being caused
 action to rehabilitate or restore the environment.

To ensure the actions are reasonable officers are required to provide justification for the inclusion of the action.

Action taken or direction given	Justification for the action taken or direction given
Action taken or direction given	Justification for the action taken or direction given

Action taken or direction given	Justification for the action taken or direction given
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What is the timeframe for completing the action?

The authorised person must specify a reasonable time for the person to take the specified reasonable action.

Provide details of the time frame given and why it was considered reasonable in the circumstances.

What items, if any, were seized or damaged?

In instances where this assessment report is being completed retrospectively, the authorised person must identify whether any items were seized or damaged.

Particulars must be recorded of all items seized or damaged in the exercise of an emergency power by the authorised person or a person authorised by the authorised person. The authorised person should provide justification for the items seized and/or outline the circumstances surrounding how the damage occurred.

Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances
Items seized or damaged	Justification and circumstances

Was a written notice of the particulars seized or damaged provided immediately?

Pursuant to s486, if an authorised person, or a person authorised by an authorised person, seizes or damages anything in the exercise of the emergency powers, the authorised person must immediately give a written notice of the particulars of the seizure or damage to the person from whom the thing was seized or who appears to be the owner of the damaged item. If this is not practicable, the notice must be left at the place where the seizure or damage took place.

- Written notice of the particulars of the seizure or damage was given to the person OR
- written notice of the particulars of the seizure or damage was left in a secure and conspicuous position at the place where the seizure or damage happened OR
- N/A.

If applicable, provide details of the person to whom the notice was given. If no one was available, provide details of the place the notice was left and whether it was placed in a secure and conspicuous position.

Recommendation/action taken

The authorised person must provide either a recommendation for action to be taken, or an account of action already taken, action for approval by the authorised person’s supervisor.

Recommended approval of [action to be taken] OR [action already taken].

Approval

Authorised person	Supervisor
Print name:	Print name:
Date:	Date:

Notice

Environmental Protection Act 1994

Emergency powers

This notice is issued by an authorised person pursuant to s467 of the Environmental Protection Act 1994 to [advise you of an emergency direction made by an authorised person] OR [confirm an emergency direction given orally] OR [authorise another person to take specified reasonable action].

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our Reference: Our reference

EMERGENCY DIRECTION – Pursuant to section 467 of the *Environmental Protection Act 1994*

A. Grounds

TAKE NOTICE that I, name of authorised person, being an authorised person under the *Environmental Protection Act 1994* (the Act) am satisfied on reasonable grounds that serious or material environmental harm has been, or is likely to be caused, and that urgent action is necessary to prevent or minimise the harm being caused or to rehabilitate or restore the environment because of the harm.

The urgent action is necessary to be taken in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of premises/place (the "said premises").

Accordingly I hereby <PICK FROM LIST> name of person <PICK FROM LIST> pursuant to the emergency powers provided by s467 of the Act.

The facts and circumstances forming the basis for this decision are—

- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.

B. Requirements

I <PICK FROM LIST> name of person to take the following actions:

- List actions directed or authorised to be taken.
- List actions directed or authorised to be taken.
- List actions directed or authorised to be taken.
- List actions directed or authorised to be taken.
- List actions directed or authorised to be taken.
- List actions directed or authorised to be taken.

If [name of person] chooses to take the actions authorised by this emergency direction, [he] OR [she] should be aware of the provisions of the *Environmental Protection Act 1994* that are referred to in section 467(10) of that Act (see Attachment A).

This emergency direction was issued orally by [name of authorised person], an authorised person under the Act, at [time] on [day] to [person to whom direction was issued] of [organisation]. It is now confirmed by this written notice by [name of authorised person], an authorised person under the Act at [time] on [day and date].

TAKE NOTICE that:

- This emergency direction remains in force until further notice from the authorised person.
- The requirements of the emergency direction take effect immediately upon service of the notice.

C. Penalty

You must also do the following:

- comply with this notice, unless you have a reasonable excuse for not complying with it and
- take all reasonable and practicable precautions to prevent or minimise—
 - environmental harm being caused and
 - the risk of death and injury to humans and animals and
 - loss or damage to property.

Maximum penalty—

- for an individual—\$200,000.00
- for a corporation—\$400,000.00

Should you have any queries in relation to this notice, please contact name of officer of the Department on telephone number telephone number.

Signature

Date

Name of Authorised Person

Authorised Person

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Procedural guide

Environmental Protection Act 1994

Emergency powers

This document is for internal use to assist Environmental Services officers to exercise the emergency powers pursuant to s467 of the Environmental Protection Act 1994.

What are emergency powers?

When an environmental emergency arises, authorised persons may need to take immediate, decisive action to prevent or minimise the environmental harm being caused, or harm that is likely to be caused, or to rehabilitate or restore the environment that has been harmed in the incident. In such an emergency, there may not be enough time to adhere to the procedures usually followed by the Department when an administrative decision is made, such as considering the standard criteria when an environmental protection order is issued.

Section 467 of the *Environmental Protection Act 1994* (the Act) provides authorised persons with the power to direct any person to take specified reasonable action, to take the action themselves or to authorise another person to take the action.

Who can use emergency powers?

The legislation specifies that in order to exercise these powers an officer must be an authorised person under the Act.

When should I use the emergency powers under s467?

The legislation specifies that the emergency powers under s467 can only be used if the authorised person is satisfied on reasonable grounds—

- that serious or material environmental harm has been, or is likely to be caused and
- that urgent action is required to prevent or minimise the harm, or rehabilitate or restore the environment because of the harm.

What is material environmental harm?

Section 16 of the Act defines material environmental harm as environmental harm (other than environmental nuisance)—

- that is not trivial or negligible in nature, extent or context or
- that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount (\$5,000), but less than the maximum amount (\$50,000) or
- that results in costs of more than the threshold amount (\$5,000) but less than the maximum amount (\$50,000) being incurred in taking appropriate action to:

- prevent or minimise harm and
- rehabilitate or restore environment to its condition before the harm.

What is serious environmental harm?

Section 17 of the Act defines serious environmental harm as environmental harm (other than environmental nuisance)—

- that is irreversible, of a high impact or widespread or
- caused to an area of high conservation value or special significance or
- that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount (\$50,000) or
- that results in costs of more than the threshold amount (\$50,000) being incurred in taking appropriate action to:
 - prevent or minimise harm
 - rehabilitate or restore the environment to its condition before harm.

What emergency powers are available under s467?

Section 467 of the Act provides that an authorised person may—

- direct any person (orally or in writing) to take specified action within a reasonable time or
- take the action personally or
- authorise another person to take the action

In taking action the authorised person may—

- enter any place without a warrant (other than premises that are used for residential purposes)
- exercise any powers of investigation and enforcement (authorised person powers) under Chapter 9 of the Act
- seize any thing that may provide evidence of the commission of an offence against the Act.

The authorised person may exercise the above powers at any time, with the help and use of force that is reasonable and necessary in the circumstances. This may include engaging the assistance of a police officer to remove a person or thing obstructing the authorised person in the exercise of the emergency powers.

How do I successfully use the emergency powers under s467?

The legislation specifies that the direction may be given verbally or by written notice. However, if the direction is given verbally, it needs to be followed up as soon as practicable with a written notice.

If authorised persons are exercising emergency powers they must ensure that in all circumstances that they do the following—

1. present their identity card for inspection
2. advise the person that the officer is authorised under the provisions of the Act

3. advise the person that the officer is exercising the emergency powers under s467 of the Act and specify the manner in which the power is being exercised
4. advise the person that they must take all reasonable steps and precautions to minimise environmental harm, risk of death or injury to humans and animals and loss or damage to property (s478)
5. never under any circumstances compromise personal safety
6. take all reasonable steps to ensure that as little inconvenience and damage is caused as possible.

In instances where the authorised person is exercising the power by directing a person to take specified reasonable action, the authorised person must carry out the six steps listed above and must also do the following things—

- advise the person being given the direction of the action they are required to take and by when
- ensure the time frame given to carry out the specified action is reasonable having regard to the circumstances and
- advise the person that it is an offence not to comply with the directed action unless they have reasonable excuse (s478).

If the authorised person is authorising another person to take the specified reasonable action, the authorised person must carry out the six steps listed above and must also inform the person, before the person takes the action, of the following—

- the action that the other person is authorised to take
- the person's powers under s467 of the Act and
- in general terms, the provisions of s486 of the Act regarding what the person must do if the person seizes or damages anything while taking the action.

The authorised person must document the details of the authorising of the other person and the specified reasonable action required to be taken.

In all cases, authorised persons must ensure that they clearly identify and record all relevant issues or factors associated with the decision to exercise emergency powers under s467. These notes will be of assistance when completing the assessment report and written notice.

Complete the assessment report

Authorised persons must complete the assessment report to document the facts and circumstances relating to the matter and the decision-making process used in exercising their emergency powers under s467. Where it is not possible to complete the assessment report before giving a direction because of the urgency of the situation, officers may give the direction and then complete the assessment report as soon as practicable afterwards.

The assessment report is not intended to replicate the departmental file. Rather it is designed to capture all critical aspects that have led to the authorised person's decision. Accordingly, authorised persons are encouraged to limit the information included to relevant points only. A template assessment report is attached [\[LINK\]](#).

Provide for natural justice

It is likely that an authorised person will exercise the emergency powers under s467 as a matter of urgency and there will be no time to observe formal natural justice procedures. If possible, the authorised person should document and take into consideration any representations made by a person to whom a direction is given. However, there is no requirement for the authorised person to specifically ask the person to put their side of the story forward.

Complete the written notice

The legislation provides that a direction under s467 may be given orally or by written notice. If the direction is given orally, it must be confirmed as soon as practicable by written notice to the person. In either case, the written notice should—

- state the reasonable grounds the authorised person is relying upon
- state the serious or material environmental harm that the authorised person believes has been caused or is likely to be caused.
- state the specific actions the authorised person is directing the person to perform (or confirmation of the oral directions already given)
- if the authorised person has authorised another person to take action, state the specific action taken by the person
- include the time frame by which the person must take the directed actions (this should be reasonable having regard to all the circumstances)
- state that it is an offence to fail to comply with directed actions unless the person has a reasonable excuse
- state the maximum penalty for failing to comply with the direction.

Service of the written notice

Service means delivery to the party who will be affected by the direction. Authorised persons are encouraged to use their discretion as to the most appropriate form of service, having regard to the nature of the situation and the recipient in question.

For the purposes of any Act that requires a document to be served on (which includes 'given' or 'sent to') a person, the document may be served:

- on a person:
 - by delivering it to the person personally or
 - by leaving it at, or by sending it by post, facsimile or similar facility (e.g. email) to the place of residence or business of the person or
- on a body corporate – by leaving it at, or sending it by post, facsimile or similar facility (e.g. email) to, the head office, a registered office or a principal office of the body corporate.

As the written notice of a direction given under the emergency powers in s467 of the Act will need to be served upon the person as a matter of urgency, it should be sent to the person as soon as possible by facsimile transmission or email.

The date, time and method of service should be documented by contemporaneous notes, a file note, an receipts arising from the postage or any facsimile or email confirmations.

What follow-up is required?

It is important that the matter is appropriately followed up to make sure that the person to whom the notice is issued is complying with any requirements imposed. Follow-up is to be scheduled by the relevant officer and confirmed with the officer's manager. The officer's manager is responsible for ensuring follow-up is undertaken within the agreed timeframe.

Authorised persons are encouraged to use tools such as diary reminders to ensure the matter is followed up in a timely manner.

What are my record keeping responsibilities?

Authorised persons are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the Description field with commentary on actions and recording any decisions made on the Enforcement Measures screen (this includes a decision to take no further action). A hard copy of the signed assessment report, the written notice and any supporting documentation must be placed on the paper file for the matter. The Department is required to make, and record, an informed decision about all allegations of non-compliance.

What penalties exist for non-compliance with an authorised person's direction in an emergency? (s478)

Section 478 of the Act provides that a person must comply with a direction given by an authorised person in an emergency unless the person has a reasonable excuse. A person to whom a notice is given under section 467(2)(a) must also take all reasonable and practicable precautions to prevent or minimise—

- environmental harm being caused and
- the risk of death or injury to humans and animals and
- loss or damage to property.

Maximum penalty—

- for an individual—\$200,000.00
- for a corporation—\$400,000.00.

What happens if something is seized or damaged when exercising emergency powers?

Section 486 of the Act provides that if an officer or another person authorised by an authorised person seizes or damages anything in the exercise of a power (including the power to give direction using the emergency powers

under s467), the authorised person must immediately give written notice of the particulars of the seizure or damage. The notice must be given to the person from whom the thing was seized or the person who appears to be the owner of the thing that was damaged. If this is not possible, the officer or other person authorised to take action must leave the notice at the place where the seizure or damage happened, ensuring that the notice is left in an obvious and secure place.

The authorised person must notify his or her supervisor of the particulars of the items seized or damaged as soon as practicable.

Enforcement Guidelines

Prepared by:

Litigation Unit

Department of Environment and Resource Management

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This document has been prepared with all due diligence and care, based on the best available information at the time of publication. The department holds no responsibility for any errors or omissions within this document. Any decisions made by other parties based on this document are solely the responsibility of those parties. Information contained in this document is from a number of sources and, as such, does not necessarily represent government or departmental policy.

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Contact (07) 322 48412 or email <library@derm.qld.gov.au>

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Overview

Queensland's economic, social and ecological welfare is reliant upon the sustainable management of its environment and use of natural resources.

The Queensland Government is committed to ecologically sustainable development—protecting the ecological processes on which life depends, while allowing for development that improves the total quality of life, both now and in the future.

In seeking to meet the challenge of protecting Queensland's natural assets, legislation has been introduced to ensure sustainable environmental and natural resource management. The Department of Environment and Resource Management (DERM) is the government's lead agency for the administration of this environmental and natural resource legislation. DERM has produced a solid policy platform on which it has built partnerships with the community and industry to encourage greater understanding of the sustainable environmental and natural resource management practices and support for innovation.

Notwithstanding the co-operative approach taken by DERM, it is sometimes in the public interest for DERM to take enforcement action. The effective management and use of natural resources requires DERM to have a clear guideline for the selection of matters for enforcement.

DERM has an established litigation unit, which works in conjunction with specialist investigation teams, to provide a strong and consistent enforcement response to non-compliance.

To the extent possible in the circumstances, it is the goal of DERM's enforcement responses to:

- reinforce the legal obligations required under environmental and natural resource legislation
- achieve good environmental and natural resource outcomes
- deter non-compliant behaviour from others within the general public.

This enforcement guideline aims to foster a corporate and community culture of positive action, consultation and co-operation with DERM. They are general in nature to provide a broad understanding of how DERM will approach enforcement.

1. Introduction

DERM is the lead agency responsible for administering the legislation for the protection of the environment and management of natural resources. The legislation that is commonly the focus of enforcement action by DERM includes:

- *Aboriginal Cultural Heritage Act 2003*
- *Coastal Protection and Management Act 1995*
- *Environmental Protection Act 1994*
- *Forestry Act 1959*
- *Sustainable Planning Act 2009 (with respect to those parts relevant to DERM business)*
- *Land Act 1994*
- *Marine Parks Act 2004*
- *Nature Conservation Act 1992*
- *Place Names Act 1994*
- *Queensland Heritage Act 1992*
- *Recreational Areas Management Act 2006*
- *Survey and Mapping Infrastructure Act 2003*
- *Torres Strait Islander Cultural Heritage Act 2003*
- *Vegetation Management Act 1999*
- *Water Act 2000*
- *Wet Tropics World Heritage Protection and Management Act 1993.*

DERM has focused its attention on compliance and is working with the community and industry to achieve good environmental performance and natural resource management through provision of advice, technical assistance and support of innovation. However, in appropriate cases, DERM will pursue enforcement action against those who ignore their legal obligations with respect to their environmental and natural resource responsibilities.

This guideline explains how DERM determines the enforcement action it will take in any given situation. As far as possible, it provides guidance on what behaviour will result in prosecution or other enforcement action. More specific guidance can be obtained by reference to other guidelines addressing specific pieces of legislation. This guideline has been published to ensure that DERM's enforcement responses are:

- proportionate to the conduct
- consistent with past responses for similar conduct
- occur in a timely fashion.

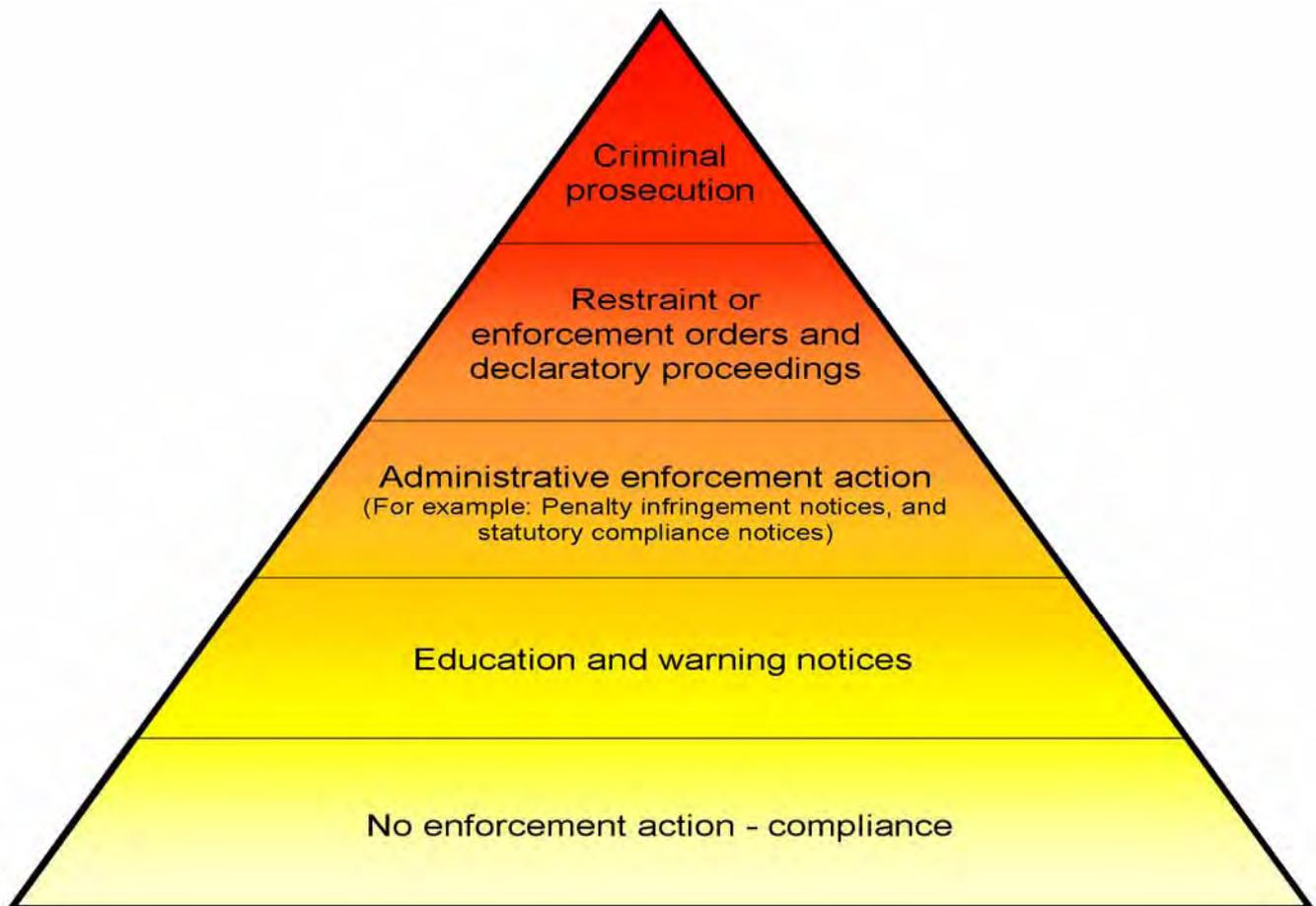
2. Enforcement approach

DERM takes a comprehensive approach to environmental and natural resource regulation. Enforcement is one of the measures used by DERM to achieve the objectives of the legislation it administers. It is not the only tool and will be used with restraint. If an alternative to enforcement action will be more effective in achieving the objectives of the Act being administered, then that alternative will be considered. Sometimes a number of enforcement measures are used in combination. In order to determine whether enforcement action will be taken, DERM will investigate all significant breaches of the law and then exercise its discretion in a consistent and logical fashion.

DERM has a wide range of enforcement measures available to it. Each piece of legislation has its own suite of enforcement measures, but generally they consist of the following:

- encouraging voluntary compliance through education and self regulation
- strategic compliance audits and site impact programs
- working with other agencies
- verbal warnings and warning letters
- infringement notices
- administrative and court orders to stop an activity or to take action to remedy a breach or both
- cancellation, suspension or amendment of licence, lease or other permits
- prosecution.

Rather than focusing on one particular enforcement response, this guideline provides general principles that can be applied to assist in choosing the appropriate enforcement tool in any given situation. The enforcement pyramid below (adapted from the model made famous by Ayers and Braithwaite) demonstrates the path of escalation in the enforcement response that has been adopted by DERM.



From this pyramid, it is clear that prosecution may occur where alternative enforcement measures have not been successful. Consideration needs to be given to whether money is better spent on preventing a problem or remediating the impacts of an unlawful activity rather than undertaking costly prosecution actions. In some cases, DERM may decide to negotiate a prompt and satisfactory environmental or natural resource outcome. However, negotiation does not necessarily suspend investigation. Where DERM is satisfied that negotiation is not leading to a satisfactory and prompt outcome, higher level enforcement tools may be the preferred course of action.

If the impact of the conduct is of a minor or trivial nature, enforcement action from lower down the pyramid is more likely. Higher level enforcement action, such as prosecution, may be the preferred option for unlawful conduct:

- involving dishonesty
- involving an attempt to deceive DERM or the provision of false information to it
- involving intentional, negligent or reckless behaviour
- where that unlawful conduct was motivated wholly or partly by commercial considerations
- where there has been a failure to assess, manage or mitigate risk associated with commercial and industrial activities
- resulting in clear commercial gain
- resulting in severe or irreversible harm to the environment or natural resources
- if the impact is unacceptable or dangerous.

Ultimately, DERM has the discretion to determine the appropriate response to unlawful conduct under the legislation administered by it.

2.1 Public interest considerations

DERM may take into account the following public interest considerations when deciding on an appropriate enforcement response:

- the seriousness, the triviality, or 'technical nature' of the offence
- the harm or potential harm to the environment caused by the offence
- any mitigating or aggravating circumstances
- the degree of culpability of the alleged offender
- the availability and effectiveness of any alternatives to enforcement action
- whether the offender has been dealt with previously without enforcement action and, if so, what level of enforcement action
- whether the breach is a continuing or second offence
- whether the offence is ongoing
- whether the administrative action or court orders are necessary to prevent a recurrence of the offence
- the prevalence of the alleged offence and the need for deterrence of the offence
- the length of time since the alleged offence occurred
- the age and physical or mental health of the offenders
- whether there are counter-productive features of the proposed enforcement tools
- in cases involving Aboriginal and Torres Strait Island cultural heritage issues, the views of the traditional owners of the area or object.

The following are further factors that should be considered specifically in the case of considering prosecution:

- the length and expense of any court hearing
- the likely outcome in the event of a conviction having regard to the sentencing options available to the court
- any precedent which may be set by not instituting proceedings
- whether the consequences of a conviction would be unduly harsh or oppressive

- whether proceedings are to be instituted against others arising out of the same incident
- the sentencing principles set out in the *Penalties and Sentences Act 1992*.

DERM adopts the overriding principle that enforcement tools must not be instituted (or not instituted) for improper purposes. A decision whether or not to use an enforcement tool will not be influenced by:

- any elements of discrimination against the person, such as ethnicity, nationality, political associations, religion, sex or beliefs
- personal feelings towards the offender or, alternatively, the victim
- possible political advantage or disadvantage to a government or any political group or party
- the possible effect of the decision on the personal or professional circumstance of those responsible for the enforcement response decision.

2.2 Determining who is liable for prosecution or other enforcement action

2.2.1 General principles

Some general considerations in determining who is liable to prosecution or other enforcement action are:

- who was primarily responsible for the offence—that is, who committed the act, who formed the intention (if relevant) and who created the material circumstances leading to the breach
- where a person is liable because the law creates strict liability—what was the role of the potential recipient
- the likely effectiveness of the enforcement tool against the potential recipient.

2.2.2 Corporate liability

The law normally makes legal entities and individuals liable for breaches committed by employees, agents or officers in the course of their employment. Where evidence available to DERM indicates an offence was committed with the employer's knowledge, or the employer failed to take adequate steps to avoid the harm, the employer may be the subject of an enforcement response. DERM will also consider the existence and effective implementation of management programs aimed at ensuring the compliance of the corporation to Queensland's environmental and natural resource laws. This is considered in greater detail in the next section.

2.2.3 Liability of employees

Employees cannot use as a defence the fact that they were acting under direction from a supervisor. Acting under orders might, however, be a mitigating factor in determining the appropriate enforcement response. The guiding principle in deciding whether to pursue an employee is the degree of culpability or responsibility involved. Factors to be considered in assessing the degree of culpability include:

- whether the employee knew or should have known that the activity was probably illegal or inappropriate
- whether the employee feared the loss of livelihood if they did not breach, or continue acting in breach, of the legislation
- the seniority of the employee and the scope of the employee's employment duties
- whether, having regard to the employee's seniority and employment duties, the employee had taken reasonable steps to draw to the attention of the employer or any other relevant person the impropriety of the practice
- whether the employee has taken reasonable steps endeavouring to mitigate or prevent any harm (if it was in the employee's power to do so).

Where employees in good faith and without negligence endeavour to follow specific requirements set by legislation or a licence or permit condition, and an offence occurs, they should not be the subject of an enforcement response.

2.2.4 Liability of directors and executive officers

When determining whether to institute any enforcement response against executive officers, in accordance with a provision that creates executive officer liability, the crucial issue will be whether the person had actual control or influence over the conduct of the corporation.

As a general policy, DERM will institute proceedings under the executive officer liability provisions only where evidence links the person with the corporation's illegal activity. That linkage needs to show:

- intent to engage in the unlawful conduct
- that the action or omission was negligent or reckless
- there was a failure to monitor or periodically assess and manage risks associated with the corporation's relevant activities or review supporting systems and programs
- there was intent to defraud.

The general legislative exceptions to executive officer liability are:

- the executive officer was not in a position to influence the corporation's conduct
- the officer took all reasonable steps to ensure that the corporation complied with the law.

DERM may take the view that reasonable steps were taken if executive officers ensured that:

- the corporation had an effective environmental or natural resource risk management system in place, which was aimed at ensuring compliance with relevant legislative requirements
- all staff were aware of the system
- the system had been effectively implemented throughout the corporation
- the system was under regular review and was amended when necessary.

The better the corporation's documentary evidence of these matters, the stronger the executive officer(s)'s defence.

2.2.5 Liability of lenders, liquidators and trustees

Although there are few situations in which lending institutions might attract liability under the law for an offence, the guiding principle for DERM is the culpability of potential recipients of an enforcement response in relation to an offence. Legal liability is necessary as a pre-requisite to any statutory enforcement response.

DERM acknowledges that in framing the law the intention was not to restrict legitimate commercial activities of lending institutions. DERM takes the view that if the lender did no more than lend money to the corporation under normal commercial processes, and did nothing that led to the causing of the unlawful activity, no enforcement action should be instituted against the lender. The closer the lender is to the management decisions that caused the unlawful activity, the greater the chance of liability.

Where a company has gone into liquidation, the lender might have day-to-day management responsibility for the company. If the lender becomes aware that the company's current activities are unlawful, or were unlawful in the past, then the lender has an obligation to take steps to stop or mitigate the impacts of the activities on the environment. The most appropriate way of doing this, and also the most effective way of ensuring that DERM will not consider the lender to be liable for unlawful environmental or natural resource impacts, is to immediately notify DERM and take steps to prevent future unlawful activities. By mitigating the impacts of unlawful activity on the environment, lenders will not only fulfil their obligations under the law but also maintain the value of their assets.

Similarly, trustees and liquidators that take over the management responsibilities of a company must ensure the company's action comply with Queensland's natural resource and environmental legislation.

2.2.6 Liability of state and local governments

The legislation administered by DERM binds all people including state and local governments. The decision to commence enforcement action against state and local governments will depend on whether it is in the public interest. The laws in place are to be equally applied to both private and public sectors. The public has an interest in everyone abiding by these laws and public authorities have a greater responsibility to lead by example. One factor relevant to public interest is the potential cost of enforcement action to the taxpayer; this becomes a significant consideration as this involves a consideration of the costs of both parties.

3. Voluntary compliance

DERM recognises that one way to enhance environmental and natural resource protection is to protect companies that continuously improve their management practices and move beyond 'compliance'. To this end, DERM encourages companies to audit and monitor their operations. To maximise protection from higher level enforcement action, companies can follow these steps:

- implement (not just document) an appropriate risk management system that caters for routine and non-routine situations
- have contingency plans in place
- practise 'due diligence'
- comply with all statutory instruments
- have strategies in place to move towards industry best practice environmental management
- notify DERM immediately of any non-compliance
- give formal notice to DERM that the non-compliance will be appropriately dealt with and rectified.

3.1 Disclosure and co-operation

Encouraging voluntary disclosure and co-operation is in the public interest. DERM recognises that early notification of an incident and full co-operation with any investigation often mitigates the impact of the non-compliant activity. Accordingly, these factors will be taken into account when considering enforcement action.

3.2 Duty to notify and voluntary disclosure

The law creates a duty on all citizens to notify DERM, as soon as they become aware, of any actual or threatened environmental harm arising from an activity. Where this occurs, failure to notify DERM is an offence.

DERM wants to establish a culture of environmental and natural resource stewardship in the community where problems are reported before irreparable harm is caused. In determining whether to use information that a person has disclosed about themselves to initiate an enforcement response, DERM will consider whether the person or corporation made a voluntary, timely and complete disclosure of the incident giving rise to the offence. Specifically:

- whether the person promptly notified DERM
- whether the information assisted in the control or mitigation of any harm caused to the environment or natural resource
- whether the information substantially aided DERM's investigation of the incident
- whether the information was available from other sources
- whether the disclosure occurred prior to DERM or any other regulatory body obtaining knowledge of the non-compliance.

3.3 Without prejudice negotiations with alleged offenders

From time to time, it will be necessary for DERM to enter into 'without prejudice' discussions with alleged offenders about the type of enforcement tool to be employed in response to the unlawful conduct. The driving consideration in these discussions should be to achieve the best environmental or natural resource outcome. No agreement can be reached with an alleged offender who is not prepared to take responsibility for the impacts of the unlawful conduct. When taking part in these discussions, DERM may take into consideration the public interest considerations outlined above and in particular:

- the costs of the enforcement response relative to any outcome achieved
- whether a negotiated response sets an unsatisfactory precedent for DERM's response to the conduct
- whether a negotiated response provides an adequate deterrent for similar conduct.

General guideline on the enforcement tools

4. Administrative response (education and warnings and other statutory enforcement tools)

There are a number of non-statutory tools available to DERM to enhance regulatory compliance with Queensland's environmental and natural resource laws. As most of the community and industry are concerned with protection of the environment and natural resources, the majority of minor non-compliance can be dealt with by way of educating them regarding their obligations. Warning letters and notices are also an effective means to ensure that the recipient is made aware of their responsibilities in this respect.

There are a range of other statutory tools that provide an appropriate regulatory response to situations requiring a stronger response. Generally, the legislative provisions mandate certain criteria that have to be met prior to the use of these tools. Specific guidance on when these tools should be used is contained in separate guides prepared by DERM.

5. Infringement notices

5.1 Background

Infringement notices are a way of dealing with common breaches of the law where the impacts are not serious enough for court action. Some of these could be traversing a State forest without a permit, exceeding noise limits, working outside given hours, emitting black smoke from chimneys, or failing to carry out monitoring. The State Penalties Enforcement Regulation 2000 nominates the infringement notice offences and penalties under the law.

The infringement notice system modifies the traditional legal system. A notice is served because it appears an offence has been committed. However, payment of the penalty does not lead to the recording of a criminal conviction. Non-payment of the fine is not dealt with by a jail sentence but is recoverable as a civil debt. On the other hand, if a person elects to have the matter heard, proceedings are commenced in the criminal jurisdiction of the Magistrates Court.

Infringement notices can be issued by authorised officers. These can include officers from organisations, such as local governments and DERM. DERM has no direct control over how authorised officers from other organisations carry out their duties. However, for fairness and consistency, DERM's authorised officers will implement the infringement notice guidelines set out here.

5.2 Operation

Just as there is discretion to use any other enforcement tool, there is discretion whether to serve an infringement notice. Any discretion by individual officers must take into account the intention of the legislation to penalise those breaches that, in the past, might have gone unpunished, and to recognise those active in managing and minimising their environmental and natural resource use impacts.

Infringement notices are designed primarily to deal with one-off breaches that can be remedied easily. They are usually a first response when a preventable breach is discovered. Issuing successive infringement notices for multiple statutory breaches is generally inappropriate, unless the breaches are unrelated. In such circumstances, even though each breach might be comparatively minor, there is probably a major and continuing compliance problem. Such a problem needs to be dealt with through other enforcement measures if a past infringement notice has not motivated the recipient to successfully address the underlying issue.

The legislation does not set a time by which infringement notices have to be issued. Since serving a notice might be the first notification a person has of an alleged breach, it should be issued promptly out of fairness and courtesy.

The *State Penalties Enforcement Act 1999* gives DERM the discretion to withdraw an infringement notice after serving the notice. This allows for two possibilities:

- A more serious breach of the law might have taken place without the authority's knowledge when the notice was issued. The notice can be withdrawn to allow the more serious breach to be pursued.
- A mistake of fact was made and the notice should not have been issued. In such a case, the State Penalties Enforcement Regulation 2000 allows the authority to withdraw the notice, even if the penalty has been paid.

Withdrawal provisions should be seen as a safety net, not a mechanism to be applied regularly.

5.3 Summary

Infringement notices are generally appropriate when the following conditions are met:

- the breach is minor
- the facts are apparently indisputable
- the breach is a one-off situation easily remedied
- inspection discovers a breach that normal operating procedures should have prevented
- where the issuing of an infringement notice is likely to act as a deterrent.

Infringement notices should not be issued in the following circumstances:

- where large-scale habitat or environmental damage has occurred
- where the breach is continuing and not within the alleged offender's ability to remedy quickly
- where the penalty seems inadequate for the severity of the offence

- where the extent of the harm to the environment cannot be assessed immediately
- where the evidence is so controversial or insufficient that court action is unlikely to succeed
- where there has been substantial delay since the alleged breach
- where another authority has issued a notice for the same or similar offence in the same period
- where a notice, direction or order has been issued by DERM to do specified work within a time limit and the limit has not expired
- where multiple breaches have occurred, unless all are minor
- where the offence took place under a proposal approved by DERM.

6. Court orders

Many of the Acts administered by DERM provide a power to seek orders from a court to ensure compliance with legislative requirements. These orders may take a variety of forms, including declaratory orders, enforcement orders, restraint orders or orders resulting from a criminal prosecution. Court orders are amongst the strongest enforcement tools available to DERM and will only be sought where other alternatives have failed or where the conduct is of such a serious nature that DERM considers it necessary. The public interest considerations listed above (at section 2.1) should be considered by DERM when deciding whether court orders are appropriate.

6.1 Model litigant

As a Queensland Government department, DERM is bound to follow the model litigant principles, which can be found on the Department of Justice and Attorney General website. The principles ensure that when conducting litigation, DERM meets the community's and the courts' expectations that the State conducts itself in a manner which exemplifies the principles of justice, and that State power be used in the public interest.

6.2 Declarations

Where there is uncertainty regarding if an activity is unlawful in relation to the provisions of an Act administered by DERM, the Act may provide an avenue to seek a declaration from the court. A declaration is a formal statement of legal rights enabling or disallowing an activity. Seeking a court declaration enables an activity to proceed with a clear statement of the legal situation.

An example of where a court declaration may be sought is for consideration of whether a proposed commercial activity venture would be 'interfering' with the habitat of an endangered wildlife resource in a national park. Under similar provisions in the *Sustainable Planning Act 2009* people may seek a declaration about whether an activity is lawful under a planning scheme or is in breach of a condition of the development approval.

6.3 Enforcement and restraint orders

Where there is an existing ongoing or potential unlawful activity under legislation administered by DERM, the legislation may provide that a court may issue either a restraint order or an enforcement order. Enforcement orders are applied in the case of a development offence. Restraint orders may be issued for a threatened or anticipated offence against relevant legislative provisions.

Generally the legislation provides the court with very broad powers when issuing orders. For example, the court may, in some cases, direct the company or person to:

- a) stop an activity that either constitutes, or will constitute, the offence
- b) do anything to comply with the law
- c) cease activities that are in contravention of the law
- d) do anything required to stop committing an offence
- e) rehabilitate or restore an area.

When making a restraint or enforcement order, the court will specify the time required for compliance with the order. It is usually an offence for a person to contravene a court order. In order to stop frivolous or vexatious applications for restraint or enforcement orders, the court has the discretion to make an order in relation to costs.

7. Principle prosecution

7.1 Background

This guideline aims to identify the key steps in DERM's approach to initiating and progressing prosecutions by outlining:

- the basis on which DERM makes a decision to prosecute
- factors taken into account in deciding which charges to lay
- factors considered in determining the appropriate type of proceedings
- submissions on sentence.

7.2 The decision to prosecute

7.2.1 Evidence

The basic pre-requisite of any prosecution is that the available evidence, on first impression, appears to establish a *prima facie* case. At all times there is discretion not to prosecute, but the discretion to prosecute only arises once there is a *prima facie* case. This is a well established principle of law and has been enunciated in the Prosecutions Guidelines of the Queensland Office of the Director of Public Prosecutions.

The criteria that are to be applied in deciding whether to prosecute fall into two categories. First, is the evidence sufficient to justify proceedings? Second, does the public interest require a prosecution? The prosecutor must be satisfied as to the first question before moving on to the second.

Similarly, the Prosecution Policy and Guidelines of the Director of Public Prosecutions, New South Wales states:

A prima facie case is a necessary but not sufficient condition for launching a prosecution. Given the existence of a prima facie case it must be understood that a prosecution should not proceed if there is no reasonable prospect of a conviction being secured . . . This decision requires an evaluation of how strong the case is likely to be when presented in court. It must take into account such matters as the availability, competence and credibility of witnesses and their likely impression on the arbiter of fact, and the admissibility of any alleged confession or other evidence. The prosecutor should also have regard to any lines of defence which are plainly open to, or have been indicated by the alleged offender and any other factors which in the view of the prosecutor could affect the likelihood or otherwise of a conviction.

7.2.2 Discretion

Sufficient evidence is not the only criterion for prosecution since:

- not every breach of the criminal law is automatically prosecuted
- the laying of charges is discretionary
- the dominant factor in exercising that discretion is the public interest.

The Prosecution Policy of the Commonwealth Director of Public Prosecutions notes:

The decision whether or not to prosecute is the most important step in the prosecution process. In every case great care must be taken in the interests of the victim (in this case the environment), the suspected offender and the community at large to ensure that the right decision is made . . . The criteria for the exercise of this discretion cannot be reduced to something akin to a mathematical formula; indeed it would be undesirable to attempt to do so.

The breadth of the factors to be considered in exercising this discretion indicates a candid recognition of the need to tailor general principles to individual cases.

One of Parliament's main aims in making a breach of the law a criminal offence is to deter someone else from similar behaviour. By extending criminal liability to many people, for example, landowners and directors and managers of corporations, the law generates increased awareness and responsibility for environmental performance and natural resource management within corporate structures and throughout the community. Prosecution is part of DERM's strategy for achieving its objectives. If prosecution is unlikely to lead to deterrence, other measures may be considered.

Each case is to be assessed to determine whether prosecution is the appropriate strategic response. The factors to be considered when deciding to institute proceedings are listed above in 'public interest considerations' (at section 2.1).

Once a decision has been made to prosecute, DERM must present facts fairly and impartially to the court. DERM should have no interest in procuring a conviction, other than to ensure that the right person is convicted, that the truth is known and that justice is done (*R v Hay and Lindsay* (1968) QdR 459 at 476 and the Queensland Barristers' Rules).

7.3 Decisions relating to what charges to lay

7.3.1 General principle

The charges laid must reflect the nature and extent of the conduct disclosed by the evidence with the aim of providing a basis for the court to impose an appropriate penalty. In line with this general principle, the following policy is adopted:

The administering authority has a duty to refine its case to avoid laying either duplicate or multiple charges. There will be occasions where the same conduct is prohibited under separate statutes and involves an offence under each. Where another prosecuting authority is involved, DERM is to liaise with the other organisation to ensure the most appropriate charge(s) are laid. Conversely, other prosecuting bodies, which know of DERM's actual or potential involvement in a case, should initiate contact before proceedings begin.

7.4 Mode of trial – summary or indictable proceedings

Most offences under legislation administered by DERM are 'summary' offences that are heard by a Magistrate, who is the arbiter of fact and law. However, some offences are indictable, meaning that they may be heard in the District Court. Often the decision as to whether an indictable matter is to be heard summarily (before a Magistrate) is an election that can be made by the prosecution. In DERM's case, the decision as to whether or not to proceed on indictment ultimately rests with the Office of the Director of Public Prosecutions (ODPP). The ODPP have published guidelines on when it considers proceeding on indictment appropriate in the circumstances of environmental and natural resource offences. The Director of DPP guidelines can be found on its website at <www.justice.qld.gov.au>.

7.5 Sentencing considerations

The *Penalties and Sentences Act 1992* outlines the factors that can be considered by a court at sentence. When seeking a sentence for environmental and natural resource offences, the following is a non-exclusive list of factors which may be considered by DERM in preparing sentence submissions:

- the seriousness of the environmental impact or impact on natural resources (the 'victim' of the offence)
- the potential for the impact to be rectified or mitigated
- the steps taken by the defendant to rectify or mitigate the impact
- the level of cooperation by the defendant with DERM
- any prior convictions of the defendants relevant to environmental or natural resource management
- the level of penalty sufficient to deter others from similar conduct
- the prevalence of the offence
- the maximum penalty for the offence
- any relevant sentencing precedents.

8. Breaches of licence conditions

Breaches of licence, lease, permit, authority or the conditions of some other form of permission, can in some cases, lead to the following:

- the issuing of a warning notice or letter
- the issuing of an infringement notice
- prosecution of the offender
- the licence being cancelled.

Cancelling or suspending a licence is potentially the strongest penalty DERM can invoke as it may result in licensee's operations to close. In most cases, DERM will only take this step when:

- the breach of licence conditions has had serious consequences to human health, environment or natural resources
- continual minor breaches have occurred despite warnings being given by DERM
- provision is made for the automatic cancellation of the licence (e.g. accumulation of demerit points).

Specific legislative provisions provide the process DERM must follow before suspending or cancelling a licence. Once the process has been followed and a decision to suspend or cancel has been made, a licensee has the option to seek to have the decision reviewed by a court.

9. Conclusion

This guideline is not intended to have legal status. The matters outlined in this guideline are not legally binding on DERM and do not confine, restrain or limit the discretion of DERM to take any action. However, they provide general guidance on how enforcement decision-making is approached by DERM. More specific guidance can be obtained by reference to guidelines addressing specific pieces of legislation.

Should you wish to make comments or suggestions on this guideline, send them to:

Litigation Unit
Department of Environment and Resource Management
GPO Box 2454
Brisbane QLD 4001

If you want to provide information about an incident relating to Queensland environment or natural resource legislation, the DERM hotline is available 24 hours a day on 13 74 68 (13QGOV).

Assessment report

Environmental Protection Act 1994

Environmental protection order (EPO)

This document is intended for internal use to assist environmental service officers to document the information considered by the department when forming the decision whether to issue an environmental protection order (EPO).

Identifying details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If applicable
File number	File number
Applicant number	Number
Trading as	Trading as details
Registered business address	Address

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be endorsed by the investigating officer, supervisory review and the delegated decision maker.

1. Grounds for use of EPO

The legislation specifies that the EPO can only be used in certain circumstances (see s358). Please identify the relevant grounds upon which the decision whether to use an EPO is based:

- Where a person did not comply with a requirement to conduct/commission an environmental evaluation and submit it.
- Where a person did not comply with a requirement to prepare an environmental management program (EMP) and submit it.
- As a result of an environmental evaluation, the department is satisfied that an activity or event being carried out, or that is likely to be carried out, or is proposed to be carried out will cause or is likely to cause unlawful environmental harm.
- To secure compliance by the person with:

- general environmental duty
- an environmental protection policy (EPP)
- a condition of a development approval (DA) or environmental authority (EA)
- a standard environmental condition of a code of environmental compliance for a chapter 4 activity
- a condition of a site management plan
- an audit notice
- a surrender notice
- a rehabilitation direction
- a regulation.
- The person is, or has been, contravening any of the following provisions:
 - section 363E
 - section 440Q
 - section 440ZG
 - a provision of chapter 8, part 3D, 3E or 3F.

2. Expand Upon the Grounds

Please expand upon the grounds identified for issuing the EPO. This can include identifying an alleged offence or any statutory requirement which must be met prior to the department using an EPO, or a specific condition of a development approval (DA) or environmental authority (EA) to which the department seeks to secure compliance.

Each ground should be listed independently and be allocated a separate number.

Number	Specific ground
1	The department seeks to secure compliance with condition G-12 of developmental approval (DA) MIN12365478.
2	To secure compliance with the general environmental duty under s319 of the Act.
3	
4	

3. Brief history of the matter

Please briefly outline any historical information relevant to this decision.

Provide a succinct history of the matter in dot point form.

4. Detail the matters considered

The purpose of the table in the assessment report is to ensure that there is evidence to support the grounds for using the statutory tool. This is achieved by linking the elements of the breach to the evidence gathered and the conclusions formed. This section should also record how the department has met any statutory requirements associated with the use of the statutory tool.

When analysing evidence or developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of the information available, historical details, professional expertise and the weight attributed to any direct testimony provided.

Elements of the offence or legislative requirement	Evidence	Facts and circumstances
<i>List the elements of any alleged offence or (for grounds which are not offences) list the legislative requirement to be met by the department.</i>	<i>Identify the information considered which is relevant to the elements or requirement (i.e. statements, photographs, and recordings)</i>	<i>Detail the facts and circumstance that support the department's findings.</i>
Number 1 (Number taken from Section 2)		
Time	Unknown	Unknown
1 July 2010	Notes from phone calls received from residence in and around 123 Creek Road x10 in file no: 123	The department received a number of telephone calls regarding the level of dust/materials coming from the ABC Pty Ltd site on 123 Creek Road.
ABC Pty Ltd, proprietor Mr. Green	Company search of ABC Pty Ltd.	Company search shows that Mr Green is the sole director/secretary of the company
		Condition 47 of the DA number 123 held by the ABC Pty Ltd provides that they must have in place a dust suppression system which details how they will minimise the release windblown or site traffic generated dust/or particulate matter
Number 2		
The general environmental duty requires individuals to take reasonable steps to prevent or minimise environmental	Air samples taken	Sampling confirmed high levels of dust and particulate matter in the atmosphere at the area surrounding or near

harm		the site location
	Site inspection was carried out at 123 Creek Road on 4th July 2010	The site inspection revealed that Mr. Green had not put in place any mechanisms to minimise the release of dust and/or particulate to the atmosphere
Number 3		
Number 4		

Standard criteria checklist

Provide brief details of your consideration of each of the standard criteria in supporting and substantiating the relevant grounds purposed. If a criterion is not applicable, write "N/A".

Standard criteria	Detailed comments
Ecologically sustainable development	
Environmental protection polices (EPPs)	
Plans, standards or agreements	
Environmental impact study, assessment or report	
Receiving environment	
Best practice environmental management	
Financial implications	

Public interest	
Site management plan	
Any other matter prescribed under a regulation	
Any relevant integrated environmental management system or proposed integrated environmental management system (IMS)	

5. Natural justice

The investigating officer is required to notify the affected person that the department is considering issuing an EPO and that the individual is welcome to make representation to the department as to why this action should not be taken. Any information provided by the affected person is to be documented and considered.

- The person has been provided with the opportunity to put their side of the story forward.
Please describe how this was achieved.
- All information and/or defences provided were considered.
Please describe any information or defences provided.
- The department has considered the information or defences provided.
What consideration was given and what conclusions has the department formed?
- The decision maker and investigator are free from bias or the perception of bias.

6. Recommended conditions

If appropriate, please list any proposed conditions below. In order to ensure conditions are enforceable, they should be SMART; specific, measureable, achievable, relevant and time specific. Refer to the writing effective and enforceable conditions procedural guide for more information on writing conditions

<http://wwwhost.env.qld.gov.au/steps/reflaunch.cfm?nw=true&ref=2417>.

To ensure the conditions are reasonable officers are required to provide justification for the inclusion of the condition.

Proposed requirement	Justification
(1) As soon as practicable but not later than 5pm on 28 February 2011 you are required to cease any curshing or screening activity at the said premises until such time as a dust suppression system is installed and operational and has been approved by the department.	(1) To secure compliance with condition G-12 of EA XYZ98765432.
Proposed requirement	Justification

7. Recommendation

The investigating officer is required to make a recommendation in relation to the allegation.

Provide a recommendation

8. Endorsement

Investigating officer	Supervisory review
Print name:	Print name:
Date:	Date:
Delegate decision maker	Approve/reject recommendation (circle one)

Reasons for decision
For example: I endorse this recommendation based upon the information set out above.
For example: I endorse this decision for the reasons set out above and I note Mr Rodgers has previously received a warning letter in relation to this matter.
For example: I reject the above recommendation as I consider it more appropriate for the department to take an educational approach to this breach.
Print name:
Date:

Environmental protection order (EPO)

This document is intended for internal use to assist environmental service officers to undertake an environmental protection order.

What is an environmental protection order?

An environmental protection order (EPO) is an order that may be issued by the Department of Environment and Resource Management (the department) to impose a reasonable requirement upon a person to prevent or minimise environmental harm. This can include requiring the person to stop or not start a particular activity, to carry out a particular activity only during stated times on stated conditions or to take stated action by a certain date.

The issue of an environmental protection order is governed by Chapter 7, Part 5 of the *Environmental Protection Act 1994* (the Act).

Who can use an EPO?

A decision to issue an EPO must be made by a person with the delegated authority to do so. Decisions made by individuals who do not have the delegated authority to make the decision are generally found to be invalid.

As the individual (or position) that holds delegation changes regularly, officers must review the department's list of delegations at <http://insite2.dnr.qld.gov.au/derm/delegations/>.

When should I use an EPO (s358)?

The legislation specifies that an environmental protection order can be issued to a person in the following circumstances—

- if the person does not comply with a requirement to conduct or commission an environmental evaluation and submit it to the department
- if the person does not comply with a requirement to prepare an transitional environmental program (TEP) and submit it to the department
- if, as a result of an environmental evaluation, the department is satisfied that an activity or event being carried out, or that is likely to be carried out, or is proposed to be carried out by the person, is causing or is likely to cause unlawful environmental harm or
- to secure compliance by the person with:
 - the general environmental duty or
 - an environmental protection policy (EPP) or

- a condition of a development approval (DA) or environmental authority (EA) or
- a standard environmental condition of a code of environmental compliance for a chapter 4 activity or
- a condition of a site management plan or
- an audit notice or
- a surrender notice or
- a rehabilitation direction or
- a regulation or
- an accredited environmental risk management plan (ERMP) or
- if the person is, or has been, contravening any of the following provisions:
 - section 363E
 - section 440Q
 - section 440ZG
 - a provision of chapter 8, part 3D, 3E or 3F.

An EPO should be used where the outcome required is clear and can be actioned and achieved within a reasonable time frame. For further information about when to use an EPO, refer to the procedural guide: [Procedural guide - Choosing the appropriate statutory tool to respond to non-compliance](#)

Consider the standard criteria

Officers must consider the standard criteria set out in the Act when contemplating the issue of an EPO. Some guidance on the standard criteria is set out below—

- The principles of ecologically sustainable development (as set out in the *National strategy for ecologically sustainable development*).

Consider the following questions:

- Has the decision effectively integrated long and short term economic, environmental, social, and equity considerations?
- Has due regard been given to the precautionary principle? For example, where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- Does the decision have due regard to the global dimensions of environmental impacts and policies?
- Does the decision assist in the development of a strong, growing and diversified economy, which can enhance the capacity for environmental protection?
- Has the need to maintain and enhance international competitiveness in an environmentally sound manner been considered when making the decision?
- Have cost effectiveness and flexibility been considered?
- Does the decision and action allow for broad community involvement on issues that affect them?

- Any applicable EPPs.
 - Is the EPO consistent with the EPPs on water, air, noise and waste (where relevant)?
- Any applicable Commonwealth, State or local government plans, standards or agreements.
 - Consider documents such as State and regional coastal plan, National Health and Medical Research Council (NHMRC) and Australian and New Zealand Environment and Conservation Council (ANZECC).
- Any applicable environmental impact study, assessment or report.
 - Consider any findings or recommendations that are relevant to the EPO.
- The character, resilience and values of the receiving environment.
 - Does the EPO have regard to the environmental values of the receiving environment?
 - What is the impact on the values of the actions contained in the EPO?
- All submissions made by the applicant and submitters.
 - Consider any submissions made by the applicant and anyone who makes a properly made submission about the EPO.
- Best practice environmental management.
 - Consider how the EPO will ensure that best practice environmental management (BPEM) is incorporated on site. BPEM is defined in s21 of the Act and officers should refer to the Act for more detail on what BPEM is.
- The financial implications of the requirements.
 - Explore the financial implications for the client in complying with conditions of the EPO. Are they reasonable in the particular circumstances?
- The public interest.
 - Is it in the interests of the community that the EPO be approved?
- The site management plan.
 - If there is a site management plan for contaminated land (approved under chapter 7, part 8 of the Act), is the EPO consistent with the site management plan? If not, is the inconsistency necessary for addressing the matters in the EPO? How will any inconsistency be reconciled? Consult with the Contaminated Land Unit as early as possible when there are any contaminated land issues.
- Any relevant integrated environmental management systems (IEMS) or proposed IEMS.
 - Is the EPO consistent with the IEMS? If not, is the inconsistency necessary for addressing the matters in the EPO? How will any inconsistency be reconciled?

How do I successfully issue an EPO?

Officers must complete an assessment report to document the decision as well as completing the environmental protection order.

Step 1 - Complete the assessment report

Before completing the environmental protection order officers are required to complete an assessment report, which sets out the facts and circumstances relating to the matter and documents the decision making process used by the department in determining to issue an environmental protection order. The next part of this procedural guide is a guide to completing the assessment report. Note that the numbering and headings for each section in the procedural guide correspond to the numbering and headings in the assessment report.

The assessment report is not intended to replicate the departmental file. Rather it is designed to capture all critical aspects that have led to the department's decision. Accordingly, officers are encouraged to limit the information included to relevant points only. A template assessment report is attached [\[LINK\]](#)

1. Grounds for issuing an EPO

The legislation specifies that an environmental protection order can only be used in certain circumstances. Please identify the relevant situation or 'grounds' upon which the decision to use an environmental protection order is based.

2. Expand upon the grounds

The purpose of this section is to clearly identify what the department must 'prove' before deciding to use an EPO and should be used to expand upon the grounds which have previously been identified. This can include identifying a specific offence or breach under investigation. This could also include any statutory requirement listed in the legislation which must be met by the department prior to issuing an environmental protection order.

In instances where one action has resulted in multiple breaches each breach should be listed independently. For example, a site inspection could potentially detect a number of breached conditions associated with a single development approval. In this situation each breach would need to be proven on its own merits and should be listed separately.

Each ground (including breaches or requirements) should be allocated a separate number.

3. Brief history of the matter

Please briefly outline any historical information relevant to this decision. This information should be presented in succinct chronological dot points and should include how the department became aware of the alleged breach.

This can include (but is not limited to) the following details:

- any EAs, DAs, EPPs and/or TEPs that are in place
- any previous acts of non-compliances in respect to any of the above
- how the matter was brought to the attention of the department (eg: Complaint from member of the public, routine department inspection)
- any action carried out by the department to date.

4. Detail the matters considered

The purpose of the table in the assessment report is to link the elements of the breach to the evidence gathered and the conclusions formed. This is achieved by identifying: the ground or the elements of any specific breach

or allegation, the information or evidence which has been considered, and the conclusion that has been reached by the officer after considering the information sourced.

When documenting the evidence considered officers are encouraged to limit the information to relevant points only. This can include (but is not limited to):

- notes recorded in an officers official notebook
- samples collected for analysis and any subsequent lab reports
- photographs and copies of documents
- any observed actions and direct testimony received from individuals.

When developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of available evidence, historical details, professional expertise and the weight attributed to any direct testimony provided.

5. Provide for natural justice

Prior to the department making a decision which may adversely impact on an individual or group the department must:

- **Notify** - Notify the individual that the department is considering making adverse findings
- **Respond** - Provide the individual with an opportunity to respond to the allegation and
- **Consider** - Consider any representations made by the affected person before finalising the decision.

The seriousness of the matter will dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers are encouraged to use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. While in some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site inspection or a telephone interview and to take contemporaneous notes, in more serious circumstances a written notification which includes a specific closing date for submissions should be used.

Regardless of the manner in which natural justice is afforded, any information provided by the affected person is to be documented. The summary of information should include how natural justice was provided as well as any responses provided by the affected person.

6. Proposed requirements

In instances where it is recommended that requirements are imposed upon the affected person, the investigating officer is responsible for developing proposed requirements for consideration by the delegate. The legislation provides that the department may impose a reasonable requirement to prevent, or minimise harm. Without limiting the reasonable requirements that may be imposed by the department, s360(2) provides that the EPO may—

- require the recipient to cease or not start a particular activity indefinitely, for a stated period or until further notice from the department or
- require the recipient to conduct a stated activity only during stated times or subject to stated conditions or
- require the recipient to take stated action within a stated period.

When drafting the requirements, officers should consider whether the requirements are reasonable and how they will contribute to preventing or minimising environmental harm. As the recipient of the EPO is able to seek a review of the department's decision to impose one or more requirements, it is necessary for officers to provide justification for the inclusion of each requirement.

Requirements must be specific, measurable, achievable, time specific and relevant to the breach. For example:

You are required to do the following things—

- (1) *As soon as practicable but by no later than 5.00pm on 31 January 2011, you are required to transfer 20ml of contaminated water contained within the stormwater pond system into secure tanks currently located on the site so as to prevent the release of contaminated water in contravention of conditions D1-1 and D1-2 of environmental authority ABC87654321.*
- (2) *As soon as practicable but no later than 5.00pm on 7 February 2011, you are required to ensure that the water within the stormwater pond system meets either:*
 - (a) *the water quality limits set out in Schedule D – Table 5 (end of pipe contaminant release limits) of environmental authority ABC87654321 or*
 - (b) *the mandatory reporting level set out in the environmental authority ABC87654321.*
- (3) *From 5.00pm on 7 March 2011 you must prepare and implement an action plan to ensure that:*
 - (a) *at a minimum all storages on site meet the Design Storage allowance by 30 September 2011 pursuant to condition D1-4 of environmental Authority ABC87654321;*
 - (b) *adequate treatment and pumping options are available on the said premises prior to 1 December 2011 to prevent the release of contaminated during the wet season in breach of condition D1-1 and condition D2-2 of the Environmental Authority ABC8765432;*
 - (c) *monthly water reduction targets are set and provided to the department by 7 March 2011.*

7. Recommendation

The investigating officer is required to make a recommendation in relation to the alleged breach. For example:

It is the opinion of the department that ABC Pty Ltd failed to comply with its development conditions by allowing storm water to leave 24 Jones Road and enter Murphy Creek. It is recommended that an EPO be issued.

Administrative decisions are made based upon the balance of probabilities. This means that the decision maker must be able to determine whether, based upon the information available, it was more likely than not that the events relevant to the issue of the EPO occurred.

Officers are encouraged to consider alternative actions/tools, departmental enforcement guidelines, details of any consultations including site visit details and discussions with the ERA contact officer. The reasonableness of proposed timeframes for the completion of requirements should be taken into account (for example, if earthworks or sampling are involved the department should consider whether an impending wet season may result in delays, or if the location geographically isolated the department should consider allowing additional time to secure an appropriate contractors).

8. Approval

The assessment report is to be approved by an appropriately delegated officer. The department's list of delegations can be found at: <http://insite2.dnr.qld.gov.au/derm/delegations/>

Step 2 - Draft the EPO

The tool must meet a number of legislative requirements in order to be legally binding. Section 360 of the Act identifies that an environmental protection order—

- must be in the form of a written notice and
- must specify to whom the order is issued and
- may impose a reasonable requirement to prevent or minimise environmental harm and
- must state the review or appeal details and
- must be served on the recipient.

It is important to identify the appropriate person to whom the order should be issued (see Compliance - Procedural guide - Understanding Legal Entities for assistance). To help identify who runs a business, a business name a search can be used (see www.abr.gov.au).

Without limiting the reasonable requirements that may be imposed, and EPO may—

- require the recipient to stop or not start a particular activity for a stated period, until further notice from the department or indefinitely or
- require the recipient to undertake a stated activity only during stated times or subject to stated conditions or
- require the recipient to take certain action within a specified period.

With regard to issuing the environmental protection order the department is also required to notify individuals of the following in a timely manner:

- any decisions made against them
- the reasons for the decision (these are the facts and circumstances identified in section 4 of the assessment report)
- any available rights of internal and external review or appeal.

A template environmental protection order is attached [\[LINK\]](#). The environmental protection order should be signed by the decision maker in conjunction with the assessment report which records the formal decision.

Service of an EPO

Service means delivery to the party who will be affected by the notice. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the recipient in question. The following methods of service are acceptable:

- For a person:
 - by delivering it to the person personally or

- by leaving at, or by sending it by pre-paid registered post to, the place of residence or business of the person or
- For a body corporate - by leaving it at, or sending it by pre-paid registered post to, the head office, a registered office or a principal office of the body corporate.

If it is necessary for the EPO to be brought to the recipient's attention quickly, a copy of the EPO may be sent by facsimile or email and then be followed up by service by post.

The method of service should be documented by contemporaneous notes, a file note, or any receipts arising from the postage. In particular, officers should record the date, time and method of service. Sending the order by registered post with confirmation of delivery is good practice to ensure that the order has been delivered to the person.

What follow up is required?

It is important that the matter is appropriately followed up to make sure that the person to whom the environmental protection order is issued is complying with any requirements imposed. Follow up is to be scheduled by the relevant officer and confirmed with the business area manager. The business area manager is responsible for ensuring follow up action is undertaken within the agreed timeframe.

This is usually achieved by a follow up site inspection or telephone call to be conducted one week after the time period nominated in the notice has expired.

Officers are encouraged to utilise tools such as diary reminders to ensure the matter is followed up in a timely manner.

What are my record keeping responsibilities?

Officers are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measure screen (this includes a decision to take no further action). A hard copy of the signed assessment report and any accompanying documents should be placed on the paper file. The department is required to make, and record, an informed decision about all allegations of non-compliance.

Making changes to an issued EPO

If minor changes to the EPO or an extension of time are required, the person should be notified in writing.

If significant changes are required, officers should, in order to avoid confusion, repeal (revoke) the original environmental protection order, and issue a fresh one on the same grounds with the necessary changes. It is important to note that the recipient will have a fresh appeal rights and should be advised accordingly.

The repeal and issue of a fresh EPO should be carried out in the same way, and subject to the same conditions as the issuing of the original EPO. Accordingly, a new assessment report should be completed and endorsed by the appropriate delegate.

It is preferable if the decision is made by the original decision-maker. If this is not possible the decision should be made by a person with the appropriate delegation who holds a position equal or higher to that of the original decision-maker.

Officers should also update and record the changes or the decision to repeal and reissue the EPO in EcoTrack.

Review of decisions and appeals

The provisions regarding review of decisions and appeals may be found in Chapter 11, Part 3, ss519 to 539 of the Act.

The Act specifies that a person who is dissatisfied by a decision by the department to issue an environmental protection order may apply for a review of an original decision by submitting an application in the approved form to the department:

- within 10 business days after the day on which the person received notice of the original decision or the date when the department is taken to have made the decision (the “review date”) or
- if there are special circumstances, whatever longer period the department allows.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#)

If the person is dissatisfied with the review decision, the person may appeal to the Planning and Environment Court by filing written notice with the court within 22 business days after the person receives notice of the review decision, unless this time period is extended by the court.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

What penalties exist for non-compliance with an EPO?

The recipient of an EPO must not contravene an environmental protection order unless the recipient commences court proceedings or has a reasonable excuse.

If a recipient contravenes an EPO the department may issue a penalty infringement notice (PIN) for a maximum amount of:

- 5 penalty units or \$500.00 for an individual and
- 20 penalty units or \$2,000.00 for a corporation.

For further information about issuing PINs, consult the PIN Manual [[LINK](#)].

If a PIN would not be considered sufficient penalty for the contravention, the department may decide to commence legal proceedings against the recipient. The maximum penalty for an individual for contravening an EPO is 1665 penalty units (\$166,500.00).

The maximum penalty for a corporation for contravening an EPO is 8,325 penalty units (\$832,500.00).

The recipient must not **wilfully** contravene an EPO.

The maximum penalty for an individual for the wilful contravention of an EPO is 2,000 penalty units (\$200,000.00) or 2 years imprisonment.

The maximum penalty for a corporation for the wilful contravention of an EPO is 10,000 penalty units (\$1,000,000.00).

Environmental protection order (EPO)

This environmental protection order is issued by the administering authority pursuant to s358 of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Reference

Our reference: Reference

Dear Sir/Madam

TAKE NOTICE that under the provisions of the *Environmental Protection Act 1994* (the Act) an environmental protection order (EPO) is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the department).

The EPO is issued in respect to the activities of name at premises/place on land described as Lot lot number on RP/SP plan number situated address (the "said premises").

A. Grounds

The EPO is issued on the following grounds:

- Insert the applicable grounds under s358.

The facts and circumstances forming the basis for these grounds are:

- Only salient factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
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- Insert the facts and circumstances that form the factual basis for the grounds.

B. Requirements

In accordance with this EPO, you are required to do the following:

1. Insert the requirements that are necessary to prevent or minimise environmental harm.
2. Ensure the requirements are specific, measurable, attainable, relevant and time specific.
3. Insert the requirements that are necessary to prevent or minimise environmental harm.
4. Ensure the requirements are specific, measurable, attainable, relevant and time specific.
5. Insert the requirements that are necessary to prevent or minimise environmental harm.
6. Ensure the requirements are specific, measurable, attainable, relevant and time specific.
7. Insert the requirements that are necessary to prevent or minimise environmental harm.
8. Ensure the requirements are specific, measurable, attainable, relevant and time specific.

C. Penalty

The maximum penalty for failure to comply with an environmental protection order is \$200,000.00 or 2 years imprisonment for an individual or \$1,000,000.00 for a company.

AND TAKE NOTICE that:

- The requirements of this order take effect immediately upon service of the order.
- Failure to comply with this order is an offence under the Act.
- This order remains in force until further notice from the administering authority

D. Obligations

Should you propose to dispose of the place or business to which the EPO relates, you must advise the buyer of the existence of this EPO (s362 of the Act).

E. Review and appeal

If you are dissatisfied with the decision to issue this environmental protection order, you may apply to the department for a review of this decision within ten business days of the service of the order. You may also apply to the Court for a stay of the decision to issue the environmental protection order.

If you are dissatisfied with the review decision, you may appeal against this decision to the Planning and Environment Court. Further information about the review and appeal process is attached to this notice.

Should you have any queries in relation to the notice, please contact name of contact officer on telephone number phone number.

Signature:

Date: Date

Name of delegate

Position of delegate

Delegate of administering authority

Name of Act under which delegation provided

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Information Notice

Environmental Protection Act 1994
Environmental Evaluation

Extension of time for decision on submission of environmental report

This information notice is issued by the administering authority pursuant to section 328 of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our Reference: Our reference

Attention: [Name of principal contact]

A. Decision

This information notice is issued under the *Environmental Protection Act 1994* (the Act) to advise you that the administering authority has decided to extend the time it is required to decide whether or not to accept the environmental report submitted by you on [date] in response to a Notice to conduct or commission an environmental evaluation issued to you by the administering authority on [date]. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department).

The Notice to conduct or commission an environmental evaluation was issued in respect to the activities of [recipient's name] at [premises/place] on land described as [Lot number on RP/SP number] situated at [address of premises/place] (the site).

The Department has decided to extend the time it is required to decide whether or not to accept the environmental report until [date].

B. Reasons for decision

The Department has decided to extend the time it is required to decide whether or not to accept the environmental report for the following reason—

- the Department has required additional relevant information about the report
- the Department is satisfied there are special circumstances for extending the time.

(If applicable) the facts and circumstances forming the basis for this decision are:

- Insert the facts and circumstances that form the factual basis for the decision.
- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the decision.
- Only factors which directly relate to the decision are to be included.

C. Appeal rights

You may apply to the Department for a review of its decision to extend the time it is required to decide whether or not to accept the environmental report within ten business days of the service of this information notice, or such longer period the Department in special circumstances allows. You may also apply to the Court for a stay of the decision.

If you are dissatisfied with the review decision, you may appeal against this decision to the Planning and Environment Court. Specific information regarding the process for seeking a review or appeal is attached to this information notice. The information outlining the review and appeal process under the *Environmental Protection Act 1994* is intended as a guide only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

Should you have any queries in relation to this notice, please contact name of officer of the Department on telephone number telephone number.

Signature

Date

Name of delegate
Position of delegate
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
Local office details
Tel: Local number
Fax: Local number

FORMAL INVESTIGATION REQUEST

This document is submitted by business units following a decision that a matter warrants formal investigation.

Completed requests and supporting documentation are to be sent to Investigation.requests@derm.qld.gov.au

1. DETAILS OF OFFENCE/INCIDENT

Date	<INSERT date request is submitted>
Matter	<INSERT description of activity/incident/breach>
Alleged Offender	<INSERT details of alleged primary offender>
Multi-jurisdiction	<INSERT brief details of involvement of other business units> <input type="checkbox"/> Tick this box if this is a multi-jurisdictional issue
Issue	<INSERT brief details of the alleged offence/incident>
Primary Legislation	<INSERT legislation primarily applicable and refer to any specific provisions>
Other Legislation	<INSERT other legislation that may be relevant>
Timing	<INSERT details including date and reasons of relevant timeframes> <input type="checkbox"/> Tick this box if the matter urgent (i.e. requires action within 6 months)

2. CONTACT DETAILS

DERM officer	<INSERT name and position of officer completing this form>
Contact details of DERM officer	<INSERT phone number and e-mail address>
Other relevant DERM officers	<INSERT name, position and contact details of any other DERM officers who have had significant involvement with the matter and indicate their involvement with the matter>

3. RECORDS

CIRaM / Ecotrack Reference	<INSERT reference number>
Other relevant DERM system records	<INSERT system name and record reference (e.g. eLVAS, WMS)>

4. BACKGROUND

Date matter brought to DERM's attention	<INSERT date when DERM became aware of alleged offence/incident>
How matter came to DERM's knowledge?	<INSERT how DERM became aware of the offence/incident>
Parties involved	<INSERT all potential parties involved, including other potential offenders, property owners, contractors, companies, witnesses etc>
Property details	<INSERT street address and Lot/Plan of the affected property>
Use of Property	<INSERT use/activity/business related to property e.g. dwelling, vacant land, farm, resort etc>

5. PRIMARY CONSIDERATIONS

Details	Y/N	Comments (include facts/relevant information/circumstances of the conduct etc)
Did the conduct involve dishonesty?		
Has there been an attempt to deceive DERM?		

Has DERM been given false or misleading information by the alleged offender?		
Was the conduct wilful (i.e. was it intentional, reckless or negligent)?		
Was the conduct motivated wholly or partly by commercial considerations?		
Was there a failure to assess, manage or mitigate risk associated with the conduct or the activity?		
Did the conduct result in commercial gain?		
Did the conduct result in severe or irreversible harm to the environment, natural resources, human health or property?		
Did the conduct have the <i>potential</i> to result in severe or irreversible harm to the environment, natural resources, human health or property?		

6. OTHER CONSIDERATIONS (tick if applicable)

<input type="checkbox"/>	Serious offence	<input type="checkbox"/>	Field/site inspection conducted
<input type="checkbox"/>	Previous offences/history with DERM	<input type="checkbox"/>	Two or more years since the offence
<input type="checkbox"/>	Offence is continuing/ongoing	<input type="checkbox"/>	Other <provide details>
Comments: <INSERT details relevant to the above considerations>			

7. ADDITIONAL INFORMATION

Details	Y/N	Comments (include facts, relevant information and circumstances of the conduct etc)
Does the conduct relate to an approval/authority or code?		
Are there any characteristics about the alleged offender that may be relevant (e.g. age, physical/mental health)?		
Does the alleged offender carry a high degree of culpability?		
Has the alleged offender provided any excuse or justification for the alleged offence?		
Has DERM taken enforcement action against the alleged offender for the alleged offence (e.g. warning, EPO issued)?		
Are there any other jurisdictions involved or impacted (e.g. other Departments, Councils)?		
Has there been any media or community interest?		
Are there any views of traditional owners of the area?		

8. ENFORCEMENT ACTION

Actions Considered	Details (e.g. consideration of action and reasons why action may not be appropriate)
<input type="checkbox"/> Education Letter	

<input type="checkbox"/>	Warning Letter	
<input type="checkbox"/>	PIN	
<input type="checkbox"/>	Statutory Notice	
<input type="checkbox"/>	Other	

9. SUBMITTING OFFICER SIGN OFF

Name	Position	Contact	Signature	Date

10. ATTACHMENTS

Indicate attached documents			
<input type="checkbox"/>	Historical Title Search	<input type="checkbox"/>	Photos
<input type="checkbox"/>	Company Search	<input type="checkbox"/>	Correspondence – emails, faxes and letters
<input type="checkbox"/>	Business Name Search	<input type="checkbox"/>	Previous notices/history
<input type="checkbox"/>	Motor Vehicle Search	<input type="checkbox"/>	Other -
<input type="checkbox"/>	Relevant Approval/Authority/Code		
<input type="checkbox"/>	Maps		

11. APPROVAL

Formal Investigation Request Approval <i>Important – forms that are not signed by correct delegates will not be accepted</i>		
Manager <input type="checkbox"/> Supports Request Comments		
Name	Signature	Date

Regional Manager <input type="checkbox"/> Supports Request Comments		
Name	Signature	Date

Director <input type="checkbox"/> Supports Request Comments		
Name	Signature	Date

Administrative decision-making in response to non-compliance

The process for making an administrative decision

Appropriately made and well-documented administrative decisions should be able to withstand public scrutiny, internal review and, if required, judicial review¹. This guide is intended to act as a quick reference to support officers in using a statutory tool². However, each case should be determined on its own merits with the specific circumstances of each case dictating the extent of the record-keeping and notification undertaken.

The department has identified four critical stages in making a good administrative decision. These are:

1. preparation
2. making the decision
3. record-keeping
4. communicating the decision.

Stage 1: Preparation

Ensure legal authority

Prior to undertaking an investigative or decision-making process officers must:

1. ensure the matter is within the jurisdiction of the Department
2. ensure the officer has the authority to undertake an appropriate investigation of the matter
3. ensure the decision-maker has the authority to make a decision in relation to the matter.

1. Jurisdiction

The Department is generally only able to investigate a matter which falls under legislation that it administers. Should an allegation be raised which falls outside this jurisdiction, the matter should be referred to the appropriate local government, state government department or federal agency as quickly as possible.

In instances where jurisdiction is shared between the Department and a local government and the legislation does not clearly delineate responsibilities, the relevant business area is responsible for determining whether the Department will investigate the matter.

2. Authority to investigate

Before commencing an investigative process officers should give consideration to the type of investigation that is likely to be required, the type of powers necessary to support the investigation and the level of authority required by the investigating officer.

Officers are generally able to make inquiries on behalf of the Department and do not necessarily need to be authorised officers to conduct an administrative investigation. However, frequently legislation will specify that

¹ This information has been adapted from the Queensland Ombudsman's good decision-making guide. A copy of the guide is available from the Ombudsman's website <http://www.ombudsman.qld.gov.au>.

² A statutory tool is a legislative tool which can be used by the Department to ensure compliance with the legislation that it administers.

Administrative decision making in response to non-compliance

certain investigative functions (such as entering a premises or seizing evidence) can only be exercised by an authorised officer.³

3. Authority to decide a matter

Decisions made by individuals who do not have the delegated authority to make the decision are generally found to be invalid and are set aside. As the individual (or position) that holds delegation may change, officers are encouraged to review the Department's list of delegations at <http://insite2.dnr.qld.gov.au/derm/delegations/pdf/epa04.pdf>.

Ensure impartiality

Individuals undertaking an investigation or decision-making process must act impartially when considering the matter. This includes ensuring that the officer is free from bias, meaning that officers must not prematurely form an opinion or decision in relation to the guilt, innocence or actions of an individual.

In addition to actual bias, the perception of bias can invalidate a decision. The perception of bias occurs in instances where, although the officer is in fact not biased, other people may reasonably believe that bias exists.

One of the most frequent types of bias experienced is a conflict of interest. A conflict of interest occurs when a conflict exists between the personal interests of the officer and the interest of the Department in relation to the matter. This can include interests which relate to the officer's financial, family and personal relationships, or those of immediate family, close friends and organisations with which the officer may be affiliated.

Prior to considering making a decision, officers should determine whether bias or a perception of bias is likely to exist.

In instances where an officer becomes aware that they may lack impartiality, for whatever reason, the officer is required to immediately notify their line manager to discuss whether it is appropriate for another officer to take over the matter. When possible, the officer should take no further action in relation to the matter.

Start a document trail

Under the *Public Records Act 2002*, DERM is required to make and maintain full and accurate records. A document trail should be commenced at the start of any decision-making process and should record significant oral and written communications, as well as the events and actions (such as internal and external meetings) which relate to the matter under consideration.

Identify any specific conditions or requirements

Officers are encouraged to review the sections of legislation which are relevant to the administrative decision, the alleged breach or act of possible non-compliance, and any statutory tools which may be used. This includes:

- identifying any decision-making process established by the legislation
- identifying any (and all) criteria which are legislatively required to be considered
- identifying what actions constitute a breach or act of non-compliance
- reviewing the circumstances under which a particular statutory tool may be used
- identifying any specific requirements which must be considered as part of the decision-making process
- identifying any specific requirements which must be complied with in developing, issuing or reviewing the notice or order.

Officers are also encouraged to:

- review any Departmental policies or procedural guides available

³ [Procedural guide - Appointment of authorised persons](#)

Administrative decision making in response to non-compliance

- use any template memoranda, assessment reports, notices or orders which have been developed to assist officers in recording the decision.

While Departmental guides and procedures have been developed to complement the legislation and provide support to officers in the use of statutory tools, they may not be comprehensive. Accordingly, officers should refer to the specific legislation each time a statutory tool is used.

Record the relevant issues or factors

Before commencing a decision-making process, officers should clearly identify and record the relevant issues or factors associated with the process which should include:

- a brief history of the matter
- the specific situation, problem, act of possible non-compliance or alleged breach - the time, date or date range, the location, the person and the action which resulted in the alleged breach
- the information which the Department needs to source in order to make a decision and
- the options available to the Department to respond to the non-compliance.

Importantly, officers are required to make a record regarding all statutory criteria associated with a decision. This includes documenting factors or statutory criteria which were determined to be irrelevant or excluded from the decision-making process and detailing the reasons why this determination was made. Failure to fully document matters which were considered (even if they were subsequently dismissed) may render a decision open to challenge.

Gather and document information

Before determining whether to use a statutory tool, an officer should seek to identify the 'truths' or 'facts' associated with a matter.

This includes gathering and documenting the relevant issues or facts which need to be considered for the department to make a decision. This can include (but is not limited to) recording observations in an officer's official notebook, collecting samples for analysis, taking meeting notes, taking photographs and copies of documents, observing actions, and receiving information directly from individuals. All information collected should be labelled and recorded in an appropriate hard copy and/or electronic form.

Importantly, the strength of evidence necessary to establish a 'fact' or 'truth' may vary according to the seriousness of the issues involved. The more serious the issue, the stronger the evidence required.

Analyse the information gathered

In analysing the information they have gathered, officers should consider whether the information is:

1. **Relevant** - All relevant information (that both supports and disproves the alleged non-compliance) must be considered. This includes information which may provide a reasonable excuse (or defence).
2. **Reliable** - If contradictory information has been obtained the decision-maker will be required to determine which seems to be the most correct.

Stage 2: Making the decision

Observe natural justice

Natural justice (or procedural fairness) requires ensuring that a person who may be adversely affected by a decision is given a 'fair hearing' before a decision is made.

Prior to making a decision which may adversely impact on an individual or group the Department must:

Administrative decision making in response to non-compliance

- Notify the individual that the Department is beginning to form an opinion that may adversely affect them. This notification must identify the critical issues and contain sufficient information to allow the person to meaningfully participate in their own defence.
- Provide the individual with a fair hearing. This is achieved by providing a reasonable opportunity for the individual to respond to any possible negative findings and ensuring that any representations are genuinely considered by the Department.
- Ensuring that the decision-maker acts impartially in the consideration of the matter. This includes ensuring that the investigator and decision-maker are free from bias.

Exercising discretion

Decision-makers are required to exercise their discretion appropriately in relation to the decision-making process. Decisions are to be made after considering all relevant and reliable 'facts' or 'truths' in relation to the allegation as well as any representations made by the affected party.

Administrative decisions are made based upon the balance of probabilities. In other words, the decision-maker must be able to determine whether, based upon the information available, it is more likely than not that the event in question occurred.

Stage 3: Record-keeping

Good record-keeping is critical to good administrative decision making. Records should be clear, organised by date and document the decision-making process.

Record the decision

Officers are to complete a briefing note or assessment report to record the decision and reasons supporting it. The department's record should include:

- the history and any factors which have led to the Department's consideration of the matter
- all facts and circumstances considered in making the decision
- any information that was determined not to be relevant to the decision-making process
- justification as to why material was excluded from the decision-making process
- the reason a particular course of action has been selected
- the names of the investigating officer and decision-maker
- the date of the decision.

The Department uses both electronic and printed record-keeping systems. Officers are encouraged to contact their relevant business service areas to identify the appropriate record-keeping processes to be used.

Stage 4: Communicate the Decision

Notify the affected individual

The Department is responsible for maintaining an appropriate level of service provision which includes communicating clearly and effectively. Accordingly, when communicating with an affected person every effort should be taken to communicate in a manner, style and format which can be readily understood.

The Department is required to notify individuals of decisions made against them in a timely manner. In communicating with the affected person, officers are encouraged to provide information in the following way:

Administrative decision making in response to non-compliance

- communicate effectively – communicate in a manner, style and format which can be readily understood by the affected person
- set the scene – explain the legal basis for the decision and what factors need to be taken into account in making the decision
- refer to specific evidence – refer to specific pieces of evidence that support the conclusion reached
- discuss the weight of evidence – explain how conflicting evidence was treated and why more weight was given to some evidence than other evidence in reaching the conclusion
- presented in a logical order – that is, in a chronological order or some other appropriate order.

In addition to any specific legislative requirements which may need to be included, the notice or order must:

- include the facts identified as part of the investigation process
- include the reasons for the decision
- identify the legislation under which the decision has been made
- identify the authority of the decision-maker, including identifying if the individual is acting under a delegation
- include the date of the decision
- clearly outline any available rights of review or appeal and any associated timeframe
- identify any penalties for non-compliance with the notice or order.

Also, in instances where the affected person has made submissions to the Department under the natural justice provisions, the Department should expressly respond to their submissions.

Administrative decision making in response to non-compliance

Decision making checklist

- Does the Department have the jurisdiction to consider the matter?
- Does the decision-maker hold the necessary delegation?
- Does the officer have the necessary skills and qualifications to undertake the investigation?
- Are all officers involved in the investigation and determination of the matter free from bias?
- Has a document trail been established and followed?
- Have the issues and factors been identified and documented?
- Have the 'truths' and 'facts' been gathered where additional information was required to allow a decision to be made?
- Has the evidence been analysed to ensure it is reliable and relevant?
- Has natural justice been observed?
- Has the decision-maker considered the evidence and conclusions reached and made a decision?
- Has an appropriate record of the investigation/decision-making process been kept?
- Has the decision-maker made and recorded a decision?
- Have any submissions made by the affected person been responded to?
- Has the affected person been notified of their appeal rights?

Guideline

Reviewing a decision to respond to non-compliance

The review process

A number of pieces of legislation administered by the Department provide for an internal review process. This document is intended to act as a reference guide to support officers to review a decision made to use a statutory tool¹. However, this document is not intended to duplicate the process for making a good administrative decision and should be considered in conjunction with the Queensland Ombudsman's *Good Decision Making Guide*², applicable legislation, and any legislatively specific guidance material available.

Importantly, this document focuses primarily upon administrative review rather than addressing allegations of bias. Should an allegation of bias be received the reviewer is encouraged to contact the appropriate human resources contact for their business area in the first instance.

The Department has identified four critical stages in performing an administrative review. These are:

1. determine capacity
2. scope the review
3. undertake the review
4. communicate the decision.

Stage 1: Determine capacity

Ensure legal authority

When a request for the review of a decision is received the request should be forwarded to the business area that made the initial decision. The request is to be provided to the manager of the original decision-maker or, in the case of their prolonged absence, the manager's supervisor, who is responsible for identifying an appropriate reviewer. As soon as possible, but no later than two days from receipt of the request for review, the reviewer is to have been provided with the review request.

Prior to undertaking a review of a decision an officer must ensure they have the appropriate skills and qualifications to undertake the review. This includes ensuring that they:

- are not the original decision-maker
- hold a position equal or senior to that of the original decision-maker and
- have the authority to undertake the decision-making process.

¹ A statutory tool is a legislative tool which can be used by the Department to ensure compliance with the legislation that it administers.

² Note: A copy of the Ombudsman's Good Decision Making Guide is available from the Ombudsman's website <http://www.ombudsman.qld.gov.au>.

Reviewing a decision to respond to non-compliance

The internal reviewer should be someone who was not involved with the original decision-making process, yet has experience in making decisions of a similar nature. Frequently this means that the internal reviewer will be a line manager or an officer of an equivalent or higher level located in a different office.

Additionally, the internal reviewer must ensure that they have the authority to undertake the review. This includes insuring that the officer holds the appropriate delegation in relation to the matter. Importantly, a review can not be undertaken by an individual who does not have the authority to undertake the review, even if the individual is a more senior officer.

Ensure impartiality

Officers undertaking an internal review process must act impartially when considering the matter. This includes ensuring that the officer is free from real or perceived bias and does not prematurely form an opinion or decision in relation to the matter.

In instances where an officer becomes aware that they may lack impartiality, for whatever reason, the officer is required to immediately notify their supervisor to discuss whether it is appropriate for another officer to take over the handling of the matter. Whenever possible, the officer should take no further action in relation to the matter.

Ensure independence

Officers reviewing a decision must not allow themselves to be directed in their decision-making. While the reviewer may seek to consult with other staff to assist them to arrive at a decision, the analysis and decision made must ultimately be made independently.

Stage 2: Determine the scope of the review

Once it has been determined that it is appropriate for an officer to undertake a review process, the officer should perform a detailed scoping exercise to determine the purpose, depth, limitations and timeframes for the review. Reviewing officers are encouraged to consider and incorporate the following factors into their scoping exercise:

The application

Officers should carefully review the application for a review in order to determine the aspects of the decision which are being challenged. For example, officers should determine whether the application is challenging the decision due to:

- an allegation of bias
- an allegation regarding a flaw in the decision-making process or
- the merits of the decision.

Officers are also encouraged to consider whether the application has been properly made. This includes ensuring that the application:

- has been made within the required statutory timeframe as specified in the legislation and
- contains enough information to enable the reviewer to examine the application.

If the application does not contain sufficient information, it is considered best practice for the reviewer to contact the applicant by telephone, when possible, to enable the applicant to remedy the application. Any telephone conversation should be confirmed in writing immediately afterwards.

The legislation

Officers should review the legislation under which the application is made in order to:

Reviewing a decision to respond to non-compliance

- identify any statutory timeframes for making an initial decision, applying for a review, and/or completing a review
- ensure the matter raised by the complainant is reviewable under the legislation
- ensure the complainant has provided a properly made application and
- identify the extent of review which may be performed.

Importantly, legislative provisions regarding the extent of a review vary considerably. The legislation may:

- allow the complainant to make additional submissions
- allow officers to source new information
- limit the review to procedural matters only or
- limit the review to the information before the original decision-maker at the time of the decision.

The review category

Having examined the application for review against the relevant legislation, officers should be able to identify the scope of the review. Generally, the two types of review available are:

- 1) procedural reviews and
- 2) merit reviews.

It is important to note that the Department performs relatively few merit reviews and that the majority of reviews relate to the decision-making process or the conduct of the decision-maker.

1) Procedural reviews

A procedural review examines the decision-making process used. This type of review should consider whether:

- the decision was made without sufficient evidence
- relevant factors were not considered
- irrelevant factors were considered
- the required decision-making procedures were followed
- a breach of natural justice occurred
- the decision-maker had the authority to make the decision
- the decision was authorised under law
- the law it was purportedly made under did/did not apply
- an error of law occurred
- the decision was contrary to law
- fraud was involved
- a power under the law was exercised improperly.

In undertaking a procedural review, officers are encouraged to refer to Part 3 of the *Judicial Review Act 1991* for a comprehensive list of considerations. Additionally, as the provisions are extensive, officers are encouraged to refer to the legislation for further information on what constitutes improperly exercising a power under law.

2) Merit reviews

A merit review includes reviewing the original decision and making a fresh determination. The reviewer is to decide what the 'correct and preferable decision' is, having regard to the material before them.

Merit review is concerned with re-making the decision under review, rather than correcting errors which may have been made previously. In this context, the reviewer is to decide all questions of fact and discretion for themselves. This enables a reviewer to consider any evidence that will help them come to the correct decision, including evidence that the applicant failed to put before the original decision-maker. In light of that new evidence, the reviewer can substitute their own findings of fact, even if the original decision-maker's findings

Reviewing a decision to respond to non-compliance

were "correct" on the basis of the information available at the time. Additionally, even if the reviewer does not identify any errors of fact (or law) in the original decision, they may substitute their own judgment of how any discretion should be exercised in order to come to a decision.

Stage 3: Undertake the review

Approach to a review

In conducting an internal review, an impartial assessment of the matter is required. It is important for reviewers to be conscious that the earlier decision will be superseded by the new decision.

While the specific legislation will dictate the scope and extent of the review, generally the reviewer may consider some or all of the following:

- all of the information that the reviewer has been given pursuant to the internal review application
- any specific statutory requirements or criteria
- the information that was available to the original decision-maker at the time (whether or not they considered that material)
- any other relevant information (including any other information that was not available at the time of the original decision) and
- any submissions made by the person seeking the review.

Forming a decision

The decision must be made in accordance with the relevant sections of the applicable legislation and any relevant policy.

In forming a decision, reviewers should balance consideration of policy and the intent of the legislation. That is, whilst applicable Departmental policy affecting a decision should be considered by the reviewing officer, the weight should consider the particular circumstances of the application. Ultimately, decisions should be fair, reasonable and meet the aims of the legislation.

In making a decision the following options generally exist for reviewers:

- substitute the original decision with a new decision
- amend the decision, including the removal or addition of conditions
- confirm the original decision or
- revoke the original decision.

It should be noted that once a decision has been made in support of, or contrary to, a previous decision, it is the most recent decision which will be subject to any future reviews. This frequently means it is the reviewed decision that is subject to any judicial review process.

Stage 4: Communicate the decision

Record the decision

Under the *Public Records Act 2002*, agencies are required to make and maintain full and accurate records. Records should record all communications, as well as the events and actions which relate to the matter under consideration.

Officers are to complete a statement of reasons to record the decision. This document should be signed by the reviewing officer and must include:

Reviewing a decision to respond to non-compliance

- the decision
- the facts identified as part of the investigation process
- the evidence relied upon to establish the facts and
- the reasons for the decision.

Notify the affected individual

The Department is responsible for maintaining an appropriate level of service provision which includes communicating clearly and effectively. Accordingly, when communicating with an affected person every effort should be taken to communicate in a manner, style and format which can be readily understood.

The Department is also required to notify the person seeking the review of the decision in a timely manner. In addition to any specific legislative requirements which may need to be included in a notice, the notice should:

- include the requirements set out above
- identify the legislation under which the review was made
- identify the authority of the reviewer
- include the date of the review decision
- clearly outline any available rights of review or appeal and any associated timeframes.

Additionally, in instances where the affected person has provided a submission or information to the Department, the Department should expressly respond to their comments.

Notify the original decision-maker

The reviewer should notify the original decision-maker of the outcome of the review. In advising the original decision-maker, the reviewer should be sensitive to how the outcome of the review will be received, especially if the review revokes or substantially amends the original decision.

Guideline

Compliance and Investigations

Guidelines for level C compliance inspections

These guidelines have been developed to assist and guide officers when undertaking Level C compliance inspections for activities regulated by the Environmental Protection Act 1994. They may also provide general assistance for Level B inspections, and for inspections of other activities regulated by DERM.

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Purpose of these guidelines

These guidelines outline procedures and protocols on the auditing process that must be used when undertaking level C inspections of premises licensed under the *Environmental Protection Act 1994* (EP Act). They will help to ensure that all level C inspections are adequate, reliable and comparable. These guidelines (with any necessary changes) can also be used for level B inspections as appropriate, and for audits of activities regulated by other legislation administered by DERM. These guidelines have been adapted from the New South Wales Department of Environment and Climate Change (DECC) Compliance Audit Handbook.

Guidance on how to determine whether an inspection should be level A, level B or level C is contained at the back of the [compliance inspection report form](#) on Ecosteps.

Level C inspections are the most detailed level of compliance inspection that DERM undertakes. They may be undertaken for a site that has a risk rating of 4—High or 5—Very High as determined using the procedural guide [Risk assessment \(ERA and non-ERA\) industry/business activities](#) on Ecosteps. Level C inspections are pre-planned and scoped, will often involve a multi-disciplinary team for a specified period of time and will examine compliance with all aspects of issued statutory documents and the broader legislation. Level C inspections will usually include the taking of samples or performance of on-site monitoring to determine or validate the presence or absence of environmental impacts.

A note on terminology

Level C compliance inspections are also known as compliance audits. This is because they involve a detailed assessment of the performance of a site, compared against approval conditions and other requirements and obligations – in other words, an audit.

However, to avoid confusion with environmental audits that may be required under the *Environmental Protection Act 1994*, and to remain consistent with the level A, level B, level C classifications adopted by DERM, this guideline will refer to “level C inspections” rather than “audits”.

1 Introduction

1.1 What is a level C compliance inspection?

As noted above, a level C inspection is an “audit” of a site. The Australian standard AS/NZS ISO 19011:2003 defines a compliance audit as “*A systematic, independent and documented verification process of objectively obtaining and evaluating audit evidence to determine whether specified criteria are met*”. These guidelines are designed to ensure that level C compliance inspections are carried out in a way that is systematic, that the inspection process and findings are documented, and that evidence is gathered lawfully and appropriately.

It should go without saying that DERM officers should be independent and objective when conducting compliance inspections. They should be free from bias or from any reasonable apprehension of bias. For more information on bias and the requirement of DERM officers to be objective and impartial, refer to DERM’s [Code of Conduct](#).

The “specified criteria” referred to in the above definition include conditions of development approvals and environmental authorities, codes of environmental compliance and the requirements of the *Environmental Protection Act 1994* (EP Act).

1.2 Who does DERM inspect?

In the context of these guidelines, DERM inspects (or audits) organisations or individuals who are carrying out activities that are regulated by the EP Act. These will include people carrying out an environmentally relevant activity, or mining or petroleum and gas activities. People who are the subject of an audit are sometimes referred to as “auditees”.

More generally, anyone who carries out an activity that is regulated by DERM (such as clearing native vegetation or using water for irrigation) may also be audited by DERM officers.

1.3 Compliance inspections as a regulatory tool in DERM

There are four stages of regulation within DERM – setting standards; applying standards; monitoring performance and responding to performance. For the activities that DERM licences, *setting standards* is done through legislation (the EP Act and regulations) and policies about how that legislation is administered. *Applying those standards* is done by issuing licences that are consistent with the legislation and policies. Compliance inspections are one of the main ways that DERM *monitors performance*. The outcomes of compliance inspections will often dictate how DERM *responds to the performance* of its clients.

1.4 Annual compliance plans

DERM’s Compliance Strategy 2010-14 is the document that sets out DERM’s approach to ensuring that people comply with the laws that we administer. A part of that approach is to proactively monitor and manage risks to Queensland’s environment and natural resources. DERM undertakes an annual compliance planning process which identifies the main risks to the environment as well as the actions that DERM will undertake to address those risks. As part of DERM’s commitment to being transparent with the community, we publish annual compliance plans that set out what those actions are. The Compliance Strategy 2010-14 and the annual compliance plans are available on the DERM website <http://www.derm.qld.gov.au/>.

A key component of the annual compliance plans is the program of inspections of sites that are carrying out an environmentally relevant activity. Because the program focuses on inspecting high-risk sites, many of the inspections that are carried out are level C inspections – the most detailed compliance inspections that DERM undertakes, and so the inspections that are most appropriate for high-risk sites.

1.5 Purpose of compliance inspections

There are a number of reasons why DERM carries out compliance inspections of sites that it licences:

- They allow DERM to measure the performance of individual operators, and to find out whether they are complying with their approval conditions or other legal requirements.
- They can reveal strategic or systemic issues with a particular industry or client group, and can allow DERM to address those issues before they become larger problems.
- They increase DERM's profile in the community, and demonstrate that DERM is actively managing activities that pose a threat to environmental values. This increased profile can also deter people from breaching their obligations, by reminding them that they may be caught if they do the wrong thing.
- They can reveal whether people are carrying out activities without the necessary approvals from DERM.

It is important to remember that compliance inspections are fact finding exercises. The aim of inspections is to gather information that allows DERM to fulfil one of the objectives set out above. Inspections are not tools designed to punish bad behaviour.

1.6 Knowledge and skills of officers conducting compliance inspections

Officers who are involved in compliance inspections should have a level of skill and experience appropriate to their role. Officers who are leading a level C inspection should have been involved with previous level C inspections, and should be confident in their knowledge of and ability to use the powers of authorised persons under the EP Act. They should be familiar with the site to be inspected or the industry involved, or include in the inspection team someone with that knowledge.

Other officers involved in the inspection should have a sufficient knowledge and technical skills to be able to carry out their assigned role competently, safely and lawfully.

2.0 DERM Level C inspection Procedures

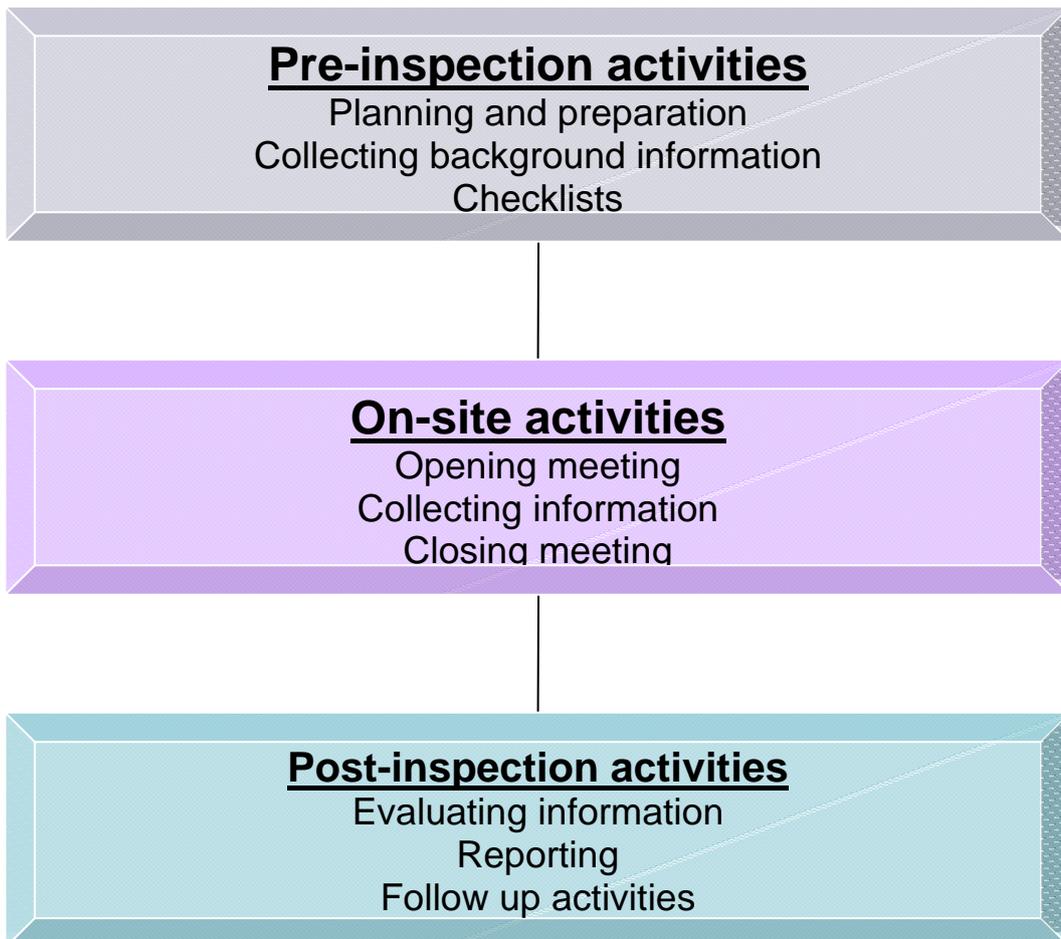
2.1 The inspection process

The inspection process involves different tasks which are sub-divided into the following phases of the inspection:

- Pre-inspection activities
- On-site activities
- Post-inspection activities

A successful inspection depends on more than just the inspection itself – it requires officers to carefully plan the inspection, and to conduct and prepare a thorough post-inspection evaluation and report

A level C inspection audit process involves:



2.2 Pre-inspection activities

To carry out a successful inspection, good planning and preparation is vital. Officers need to have a good knowledge of the relevant parts of the EP Act, as well as any other standards or conditions that are relevant to the client. Officers will also gather any other information that will be relevant to the inspection.

2.2.1 Inspection planning and preparation

Planning a level C inspection involves:

- Preparing an inspection plan
- Obtaining background information about the person to be audited
- A comprehensive consideration and assessment of workplace health and safety issues
- Ensuring that checklists are developed to cover all conditions of the relevant permit or statutory requirements
- Obtaining information on best practices being used in the industry being inspected

A Pre-inspection briefing note template is available on Ecosteps to assist officer in planning for an inspection.

Key elements of an inspection plan

The [compliance inspection plan](#) outlines the inspection's objectives, scope and timetable, and the products (such as reports) that the inspection will generate. The plan should be reviewed and approved by a manager before the inspection is conducted.

The key elements of an inspection plan:

- Inspection objectives
- Inspection criteria
- Inspection scope
- Inspection timetable
- Roles and responsibilities of officers
- Allocation of time and resources
- Workplace health and safety issues

Inspection objectives

The inspection objectives define what the inspection will achieve and can be based on considerations such as management priorities, or statutory and regulatory requirements. The inspection objectives must be established at the outset. The objectives of a level C compliance inspection can include:

- To check compliance with regulatory requirements
- To manage environmental impacts and reduce environmental risk associated with industry
- To provide guidance to industry on how they can improve their environmental performance
- To facilitate behavioural change
- To provide internal quality assurance to improve agency policies, processes and the quality of the instruments used
- To provide internal feedback to help protect the integrity of the regulatory system
- To assess overall policy performance
- To provide the community with confidence that robust compliance assurance systems are in place

Inspection criteria

The inspection criteria are the reference points used to determine whether the person being inspected is complying with their obligations. They can include:

- Development conditions of development approvals
- Requirements contained in the EP Act and regulations, codes of environmental compliance or other environmental standards
- Environmental management system requirements
- Industry codes of practice

Scope of the inspection

The scope of the inspection defines the extent and boundaries of the inspection, including:

- The physical location of the inspection (for example, a particular site or part of a site)
- Organisational units, activities or processes to be inspected
- Time period covered by the inspection

Inspection timetable

The inspection timetable should include:

- The date(s) and locations of on-site activities to be carried out during the inspection (such as meetings or taking samples)
- The expected time and duration of each activity.

Roles and responsibilities of officers

It is important that the roles and responsibilities of the officers who will be taking part in the inspection are clearly defined and are understood by everyone. Roles and responsibilities should be documented as part of the inspection plan, and discussed during the pre-inspection briefing. If necessary, a pre-inspection briefing should be held to make sure that everyone understands their role.

The inspection team will include a lead inspector, and other officers who will take part in the inspection. The team may also consist of technical specialists and/or officers from other agencies where necessary.

The lead inspector will choose the inspection team, and is responsible for leading the planning of the inspection, the gathering of pre-inspection information, coordination and management of on-site activities and the completion of all post-inspection activities. He or she will be the main point of contact between the client and DERM. The lead inspector must be an authorised person under the EP Act, and must be confident in his or her abilities to exercise the powers of an authorised person lawfully and ethically.

Other members of the inspection team may carry out a variety of roles, including providing pre-inspection information about the site, the client or the industry; reviewing documents or inspecting the site during the inspection; talking with members of the client's staff during the inspection; taking photographs or collecting samples; and preparing the post-inspection documents. Inspection team members are not required to be authorised persons.

Allocating appropriate resources

The lead inspector is responsible for ensuring that the personnel required for the inspection are available on the day, and that sufficient resources (including vehicles, sampling equipment and personal protective equipment)

are available. Resources should be addressed during the pre-inspection briefing to ensure that they are appropriate for the site and activities to be undertaken.

Workplace health and safety

The safety and security of all officers involved in the inspection is paramount. The lead inspector is required to make sure that workplace health and safety issues that may arise during the inspection are identified and addressed. This may include speaking with officers who are familiar with the site, and completing a [job safety analysis](#) (available on Robin). More information on managing health and safety risks is contained in the [Environmental Operations Safety Manual](#) (available on Robin). Workplace health and safety considerations must be addressed during the pre-inspection briefing.

2.2.2 Collecting background information

The purpose of collecting and reviewing background information is to make sure that the inspection team is as informed as possible about the nature of the operations being conducted at the site; the client's compliance and performance history; the legal requirements that the client is required to meet; and what constitutes an acceptable standard of environmental performance for the client's business.

When collecting background information, it is important to also consider whether the client may be conducting any activities at the site without the necessary approvals from DERM. Turn your mind to whether there are any activities that are commonly conducted in conjunction with any activities for which the client holds a licence, and consider what evidence of such activities you might be likely to find during the inspection.

The types of information that should be reviewed include:

- site details, such as maps, aerial photographs and process descriptions;
- the characteristics of the environment adjacent to the site;
- details of the company structure, directors and other executive officers;
- the main environmental issues that relate to the client's industry;
- technical information about the processes and operations carried on at the site;
- industry best practice and relevant standards;
- operating manuals, plans and procedures;
- company environmental policies and guidelines;
- any approval, authority or other permit issued by DERM to the client;
- statutory requirements (such as sections of the EP Act and regulations that may be relevant);
- previous audits and compliance history;
- evidence of past environmental performance, such as inspections and complaints;
- workplace health and safety issues related to the site and the industry;
- community concerns about the site, regional area or industry type; and
- and language, social or cultural characteristics of the client or their staff that may be relevant.

This information can be obtained from a number of sources including:

- Ecotrack;

- Ecomaps;
- client files;
- Google Earth and Google Maps;
- technical journals;
- Australian standards;
- Australian Securities and Investments Commission (ASIC) records (available from www.asic.gov.au or through Citec searches (available in some regional offices); and
- DERM officers.

2.2.3 Inspection checklists

The [compliance inspection checklist](#) breaks the conditions of any development approvals, authorities or other permits into their elements. This ensures that all aspects of each condition are appropriately addressed during the inspection. It is a tool that helps the inspection team to assess whether any of the conditions have been breached.

It is important to remember that checklists designed to help the inspection team to complete the inspection thoroughly. They should not be applied rigidly – do not ignore something that you find during an inspection just because it is not on a checklist.

A sample checklist, showing a condition broken down into its elements:

Permit / Approval No. JH4231	
Condition No.: 4C17	Compliant: yes <input type="checkbox"/> no <input type="checkbox"/>
Element / Question	
Dried sewage sludge – must be stockpiled in a bunded area – so as to prevent stormwater contamination being released off the site	
Observations	
Recommendation	

The condition has been broken up into its elements. If it would assist the person conducting the inspection, the elements could also be framed as questions – “Is there dried sewage sludge on the site?”; “Is it stockpiled in a bunded area?”; “Is it stockpiled in such a way as to prevent stormwater contamination being released off the site?”. During the compliance inspection, observations are made for each element and/or question and recorded in the row below, followed by any recommendations that are needed in order for the client to achieve compliance with the condition. Breaking down the condition in this way makes it easier to remember to turn your attention to all the elements of the condition, and to assess the client’s performance against the condition.

When developing a checklist, the lead inspector should consider the experience and knowledge of the auditor who will be using it, and also the environmental risks of the site to be inspected. This will enable the lead inspector to select the appropriate level of detail for the checklist. Experienced officers can use a checklist that

consists of a list of all the topics to be covered during the course of an audit and does not give details about how to undertake the auditing of each one. Less experienced officers should use a detailed checklist that lists everything they need to know and do. This allows them to undertake audits with less supervision from more experienced colleagues.

2.2.4 Providing prior notice of an audit

Because of the number of people involved in conducting a level C inspection, the length of time that the inspection will take and the need to look at all aspects of a site's environmental performance (and so the high level of cooperation that is often required from the client's staff), clients are generally advised of the planned date(s) of a level C compliance inspection before it takes place. Clients may be advised of the intended inspection verbally, but verbal advice should always be confirmed in writing. The amount of notice given will depend on the nature of the inspection. Not only is giving sufficient notice courteous, it can lead to a more effective inspection by allowing the client time to arrange for key staff to be present to answer questions and assist with the inspection. are undertaken in an announced manner.

If the lead inspector has reasonable grounds for believing that providing notice of the intended inspection will jeopardise the effectiveness of the inspection, he or she should discuss the matter with his or her manager and obtain their approval to conduct the inspection without notice. The difficulties caused by not providing notice should be weighed against the risks of providing notice to the client. In circumstances where an inspection without notice is required because of concerns about the client's performance, or in response to complaints from members of the public, it may be more appropriate to conduct the inspection as a level A or level B inspection, rather than a level C.

2.3 On-site activities

2.3.1 Opening meeting

The objectives of the opening meeting ([Compliance inspection opening meeting agenda/minutes template](#)) are to meet with the site manager or their representative and:

- explain and confirm the inspection plan, outlining the objectives, scope and inspection procedures;
- provide a short summary of how the inspection activities will be undertaken; and
- allow the site manager or their representative to ask questions.

The minutes of the opening meeting should be signed off by the site manager or their representative.

The opening meeting is an important part of the inspection process and can set the tone for how the inspection will proceed. It is important to be professional and polite throughout the meeting. At the opening meeting, the lead inspector should:

- introduce the inspection team and show identification;
- explain the purpose of the inspection;
- explain the inspection objectives, scope and criteria (this will help keep the audit on track);
- explain the methods and procedures used to conduct the inspection;

- explain the steps that will be taken when preparing the inspection report, (for example, explain that information collected during the inspection will be assessed, a report will be prepared and a letter summarising the findings of the inspection and any required follow up actions will be sent);
- explain the inspection timetable so that the site manager or their representative can arrange for appropriate personnel to be available during the inspection;
- ensure that the resources and facilities needed by the inspection team are available; and
- determine safety, emergency and security procedures.

2.3.2 Collecting information

After the opening meeting, the inspection team can start collecting and recording audit information. It is important that the lead inspector (and preferably the other members of the inspection team who are authorised persons) are familiar with the powers that they can exercise during the inspection (in particular s460 of the EP Act). This will ensure that any information gathered is done so lawfully. By being confident in the powers that they can exercise, officers are also more likely to be able to obtain all of the information that they need. Guidance on exercising powers is contained in the procedural guide [Powers of officers](#).

Some of the information that will be gathered will be in the form of documents, and may include monitoring results, complaints registers, incident report forms, maintenance records for plant and equipment, environmental management system manuals and documents required to be kept by the development approval. Authorised persons may make photocopies of documents in certain circumstances (refer to s460 of the EP Act). If it is not practical to copy or view all documents that might be relevant, officers may choose to copy or view a representative sample of documents.

Photographs can be an important record of the site inspection, and details of any photographs taken (including, the time and date the photograph was taken, who took it, and what the photograph shows) should be recorded in an official notebook. Other observations made, and significant conversations held, during the inspection should also be recorded in an official notebook (refer to the procedural guide [Use of official notebooks](#) for more information).

All samples taken during the inspection must be taken in accordance with any applicable standards (such as DERM's Water Quality Sampling Manual), both to ensure that sample results are accurate and reliable, and to ensure that the sample results can provide admissible evidence if legal proceedings result from the inspection.

Officers should consider whether they should conduct their own sampling (particularly water sampling) to verify sampling carried out by the client. Client sampling may not have been carried out in a way that produces reliable results, and may not be able to be relied on in legal proceedings. Accordingly it may be necessary for DERM officers to conduct their own sampling, even where the client has provided sampling results to DERM. Particular consideration should be given to conducting sampling where the contaminants have the potential to cause serious environmental harm, or where officers have reason to doubt the accuracy of the client's sampling results.

Another important point to note about sampling is that sampling (particularly water sampling) may be conducted to confirm sampling results provided by the client. The mere fact that a client has carried out sampling and provided the results to DERM does not mean that there is no need for DERM to conduct its own sampling. It is important that officers remember that any information collected during the inspection may at some time be used as evidence to support legal proceedings, so as much care as possible should be taken to ensure that the information will be admissible. This includes:

- making accurate notes of observations and conversations

- making notes during the inspection, or as soon as possible after returning to the office
- collecting samples in accordance with DERM procedures, and maintaining chain of custody records [chain of custody data sheet and sample submission form](#)
- recording all documents sighted, copied or borrowed and photographs taken in an inspection (a compliance inspection documents sighted form is available on Ecosteps)
- copying photographs onto a hard drive (if there is a likelihood that the photographs will be needed for court proceedings, they should be copied to a CD-ROM or DVD and stored securely).

At all times during site inspections, be mindful of your safety. If necessary, ensure that a representative of the client who understands the workplace health and safety issues for the site accompanies you during the inspection. A [compliance inspection hazard checklist](#) is available on Ecosteps to help officers conduct an initial hazard identification and perimeter inspection. If your safety is threatened in any way during the inspection, you should immediately take action to eliminate the risk to your safety, including terminating the inspection and leaving the site if necessary.

If, during the inspection, you become aware of a serious incident that is causing or is likely to cause serious or material environmental harm, you should inform your manager and the Manager Regional Investigations for your region immediately. If necessary, an emergency direction under s467 or 468 of the EP Act should be given to the client or their representatives in order to prevent or minimise, or remedy, the harm (refer to the procedural guide Emergency direction on Ecosteps).

2.3.3 Closing meeting

Once the inspection team has finished the site inspection a closing meeting (refer to the Inspection closing meeting agenda/minutes template available on Ecosteps) is held with the site representatives. Again, these minutes must be signed off by the site manager or their representative. At the closing meeting, the lead inspector should:

- present the preliminary findings
- discuss and agree to timeframes for reporting of findings
- discuss anything which may effect the reliability of inspection conclusions
- provide recommendations for improvements
- inform the site manager about any likely enforcement action (such as a penalty infringement notice or environmental protection order) that may result from the inspection.

2.4 Post-inspection activities

Once the site inspection is complete, the important activities of evaluating the information gathered during the inspection, recording the results of the inspection and conducting follow up activities will then begin.

2.4.1 Evaluation of information

The purpose of evaluating information collected during the inspection is to identify any significant observations that should be documented as findings of the inspection. While initial conclusions may be able to be drawn during the site inspection, a more detailed assessment of the information is usually possible once the inspection

team returns to the office. This assessment can be used to identify non-compliance, compliance, and best practice.

Evaluation of the information can include the following activities:

- Comparing monitoring data held by the client, or the results of samples obtained during the inspection with requirements of the development approval or other permit, or with best practice standards.
- Comparing observations and photographs with requirements contained in approvals or best practice standards.
- Comparing statements made by the client's representatives with observations, photographs and documents.
- Identifying any gaps in the information which may require follow up with the client.
- Assessing whether the information reveals breaches of approvals, permits or statutory requirements.
- Assessing whether enforcement action may be required (refer to DERM's Enforcement Guidelines available on the DERM website <http://www.derm.qld.gov.au/>).
- Identifying any shortcomings with approval conditions (for example, identifying that a condition is drafted in a way that makes it difficult to establish that it has been complied with).
- Comparing the information with information obtained from inspections of similar sites to identify any common or systemic problems.

2.4.2 Reporting

The inspection report is one of the most important parts of the inspection. It records the inspection team's findings on the performance of the client, the remedial actions that are required by the client, and any actions that DERM must take to respond to the client's performance. Preparing a written record means that important information is recorded for future reference, any actions taken by DERM can be justified if they are later challenged, and the results can be compared and analysed to see whether there is improvement over time or to identify trends.

The template [compliance inspection report form](#) is on Ecosteps.

2.4.3 Follow up actions

Once the information has been evaluated and the report prepared, there may be a number of other activities that need to take place.

Follow up letter

A follow up letter must be sent to the client once the inspection report has been completed. It should list any non-compliances identified, any follow up action required, and timeframes for completing those actions. The lead inspector should ensure that follow up actions have been completed within the stipulated timeframes. This may require follow up visits to the site. If actions have not been completed within the timeframes, the lead inspector must take some action to address this (which can range from negotiating a new timeframe with the client to taking enforcement action or recommending referral to the Investigations Team).

Responding to non-compliance

If the inspection reveals non-compliance with approval conditions or statutory requirements, it may be necessary to take some form of enforcement action. This can include issuing a warning notice or penalty infringement notice or issuing a statutory notice such as an environmental protection order or environmental evaluation. Although not strictly an enforcement action, in cases of serious non-compliance it may be appropriate to refer the matter to the Investigations Team for investigation with a view to determining whether a prosecution or other court action is warranted.

Guidance on choosing an appropriate response can be found in DERM's Enforcement Guidelines and the procedural guide [Choosing the appropriate statutory tool to respond to non-compliance](#).

Unlicensed ERAs

If the inspection revealed that the client is carrying out an environmentally relevant activity without the necessary approvals from DERM, refer to the procedural guide [Dealing with unlicensed ERAs](#) for information on what action is to be taken.

Inspection de-brief

No inspection runs perfectly, and there is always scope to improve the way an inspection is conducted. A valuable learning tool is to gather the inspection team soon after the conclusion of an inspection to discuss what worked well during the inspection, and areas for improvement. The de-brief should be conducted as an opportunity to improve the way DERM does its business, and not as a means of criticising officers. Any lessons learned for the de-brief should be recorded, and passed on to the relevant people for action.

Incident reports

If a workplace health and safety incident occurred during the inspection, an [incident report form](#) must be completed as soon as possible after returning to the officer. Your manager must also be notified.

2.4.5 Recording information

Keeping accurate records of compliance inspections is important for a number of reasons:

- it provides a record of client performance that may be important in the future
- it allows the department to defend any actions it takes as a result of the inspection, if those actions are challenged
- it preserves evidence that may be needed if legal proceedings result from the inspection
- it allows the department to identify trends and patterns that may suggest systemic problems that could pose a high risk to the environment
- good record keeping is an obligation of all public servants. Failure to keep good records may amount to a breach of the Code of Conduct.

Ecotrack is DERM's main source of compliance information. Data held in Ecotrack is used to assess individual client performance, to plan future compliance activities and to report to the Director-General and the Ministers on DERM's compliance program. It is important that details of compliance inspections are entered accurately and in a timely fashion. If not, significant decisions about future compliance activities may be made on the basis of bad information.

Inspections - tips and traps checklist

Compliance inspections (Level A, B and C)

This document is for internal use to assist Environmental Service officers to conduct safe, effective and efficient site inspections.

Effective and thorough preparation allows officers to effectively perform site inspections. Knowledge of the site prior to the inspection date enhances confidence and the likelihood that the objectives of the inspection will be met. It is important to know and understand inspection powers however polite appropriate questioning and proper preparation will limit the need to use them.

- Why are you going?
 - Reactive... responding to a complaint.
 - Proactive... auditing.
 - Establish clear objectives and set timeframes.
 - Facts to be determined.

- Where are you going and who are you meeting?
 - The property itself, and within the property - site plans/aerial photographs, access points, sampling points and any health and safety issues.
 - If applicable, telephone ahead of time to confirm/reconfirm inspection time, location and who you will be meeting with. Record in your notebook.

- What do you know?
 - 'Desktop' preparation – known facts regarding compliance history – previous conditions/ breaches/outstanding EPOs.
 - Take copies of any relevant documentation (e.g. conditions or TEPs) you may need to call upon. Do not assume that these will be available on site.
 - Check that you are authorised to carry out the inspection.
 - Know your powers and be confident and fluent in using them.
 - Compile and carry an emergency contact list of numbers in the event that you are presented with a serious situation and you need to act quickly.

- What are you looking for?
 - Facts to be determined - (consider any history of non-compliance and dangers).

- Identify the original operation conditions of the site. Check these against the relevant legislation to know what you are looking for.
- Know the offence provisions of the Act.
- If applicable, contact complainant to confirm details and location.

- What equipment might you need?
 - Take the time to put together a well-organised and easily accessible kit bag. This will assist you on site to carry and locate everything that you might need to conduct the inspection. Consider the following: voice recorder, camera, batteries, charger, GPS, notebooks and sampling equipment.
 - Do you require other technical experts to assist you?

- On-site
 - Introduce yourself and any other team members. Present your ID for inspection or wear it in an easily visible spot.
 - Politely but firmly explain the purpose of your visit, what you will be doing and any assistance that you may lawfully require (e.g. site safety inspection officer's input). Always maintain eye contact.
 - Have a clear idea of where you want to go on site. Do not let yourself be guided. Maintain control over your own movements on site.
 - Maintain control of the conversation. If you are refused access to a particular area or sight of covered materials ask why they do not want to show you. Do they have a reasonable excuse?
 - If for any reason the situation becomes out of control e.g. violent or threatening behaviour, trust your instincts, and walk safely away.
 - Never compromise you or your team member's safety under any circumstances. If necessary, leave the site and alert other authorities such as the police.

Investigation Costs Record

Record Costs and Expenses (including materials & external providers) and Officer Time

Record Costs and Expenses

Date	Details	Amount	Receipt Number

Officer Time

Date	Time Spent (to nearest ¼ hour)	Officer Name	Brief description of activity

Letter – Alleged source information request

Compliance and Support

Suggested Text – Alleged source information request

The purpose of this procedural guide is to provide officers with a suggest body of text with respect to an alleged source information request. Officers are required to copy and past the below text and insert the text into the current Departmental approved letter template. In addition officers are required to amend the font in blue to the extent that it relates to their current circumstances. If officers using this template require further assistance, please contact the Compliance and Investigations Branch.

The <INSERT Department or unit e.g. Community Response Unit (“CRU”)> recently received complaints from residents of <INSERT details> regarding <INSERT details – e.g. nuisance or noise> from <INSERT details> at <INSERT details>. The complainant alleges that:

<INSERT details>

The role of the <INSERT Department or unit e.g. Community Response Unit (“CRU”)> is to investigate this matter and ensure that where a genuine problem is found to exist, action is taken to fix the problem.

This matter will be investigated by the <INSERT Department or unit e.g. Community Response Unit (“CRU”)>, however at this stage the <INSERT Department or unit e.g. Community Response Unit (“CRU”)> invites you to respond to this allegation in writing on or before <INSERT date – usually 2 weeks from receipt of letter>.

The address to send your response to is:

<INSERT address>

Should you have any questions about this matter or require any further information, <INSERT contact name> of the <INSERT Agency or unit e.g. Community Response Unit (“CRU”)> on telephone <INSERT contact telephone number> will be happy to assist you.

Penalty Infringement Notice (PIN)

This procedural guide provides officers with information about issuing penalty infringement notices. It applies to: all legislation that comes within the regime of the State Penalties Enforcement Act 1999, that is the: Environmental Protection Act 1994 (EP Act), Vegetation Management Act 1995 (Veg Act), Nature Conservation Act 1992 (NC Act), Forestry Act 1959 (F Act), Recreational Areas Management Act (RAM Act) and the Marine Parks Act 2004 (MP Act).

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Penalty Infringement Notices (PINs)

This manual will provide officers who are authorised to issue Penalty Infringement Notices (PINs), information about how to issue the PIN and the location of other resources to assist them in issuing PINs.

The *State Penalties Enforcement Act 1999 (SPE Act)* and the *State Penalties Enforcement Regulation 2000 (SPE Reg)* enable authorised officers¹ to issue PINs for specific offences under various Acts. These Acts and offences are listed in [Schedule 2 of SPER](#). DERM in conjunction with the State Penalties Enforcement Registry (SPER) has developed a range of codes for these offences that must be used when issuing PINs.

Offence Codes

The Offence Codes can be currently accessed through Ecosteps.

- [Procedural Guides – Penalty Infringement Notices – Offence Codes – EP Act](#);
- [Procedural Guides – Penalty Infringement Notices – Offence Codes – Forestry](#);
- [Procedural Guides – Penalty Infringement Notices – Offence Codes – Marine Parks](#);
- [Procedural Guides – Penalty Infringement Notices – Offence Codes – Nature Conservation](#);
- [Procedural Guides – Penalty Infringement Notices - Offence Codes - RAM Act](#).
- [Procedural Guides – Penalty Infringement Notices - Offence codes – Vegetation \(*Sustainable Planning Act*\)](#)
- [Penalty Infringement Notices - Offence Codes – Land](#)
- [Penalty Infringement Notices - Offence Codes – Stock Routes](#)

These guides provide officers with the correct offence codes to use when issuing PINs. The shortened description of offences provided in the guides are **NOT** to be used as a substitute for consideration of the specific provisions of the legislation, and whether an offence has occurred. Further information on this will be provided below. To issue a PIN, officers **MUST** be satisfied that an offence has occurred under relevant legislation.

As a result of frequent legislative changes, the Offence Codes are updated regularly. Although the Compliance and Investigations Branch will endeavour to advise on changes, it is the responsibility of the issuing officer to ensure that you are issuing PINs with the correct offence codes. The relevant Offence Codes should be regularly checked on relevant databases to obtain the current offence code. It is important that officers ensure that they have given consideration to up to date versions of both the legislation and the relevant offence codes before issuing a PIN.

¹ “Authorised Officers” will be used to cover all persons who can be appointed under the relevant legislation to exercise powers in relation to compliance and enforcement. Commonly they can be called: authorised officers, inspectors, or conservation officers.

PINs that are incorrectly issued must be withdrawn (more information is provided on this below). Remember, the penalty applied is the penalty in force at the time/date of offence.

Who can issue a PIN?

PINs can be issued by officers authorised under the law. These can include officers from organisations such as local governments and DERM. This guide has been prepared for DERM authorised officers and is best practice. DERM requires all of its authorised officers to follow the PIN guidelines set out in this document.

A person *authorised* under relevant legislation (title dependant on the legislation) who reasonably believes a person has committed an offence specified as a PIN offence, may serve a PIN on the person for the offence (s13 (1) *SPE Act*).

The *SPE Regulation* provides that the following officers are authorised persons for the purposes of serving PIN:

- an **authorised person*** appointed under s 445 of the *Environmental Protection Act 1994*
- an **authorised person (litter)** appointed under s 445 of the *Environmental Protection Act 1994*
- a **forest officer** appointed under s 17 of the *Forestry Act 1959*
- a **conservation officer** appointed under s 127 of the *Nature Conservation Act 1992*
- an **inspector** appointed under s 52 of the *Marine Parks Act 2004*
- an **authorised officer** under s 143 of the *Recreational Areas Management Act 2006*.
- an **authorised officer** under s 24 of the *Vegetation Management Act 1999*
- an **authorised officer** under s 395 of the *Land Act 1994*

*Currently authorised persons under the *Environmental Protection Act* must first obtain the approval of their relevant Manager prior to the issuing of the PIN. For all other legislation, DERM staff should ensure that they have the appropriate delegation and are complying with relevant policy relating to the issue of the PIN applicable to their business unit.

When should a PIN be issued?

Authorised officers must reasonably believe an offence has occurred – see information under standard of proof. The DERM *Enforcement Guidelines* offer guidance for the use of regulatory tools and discretion. You may also find the Queensland Ombudsman [“Good Decision-Making Guide”](#) useful in determining or evaluating appropriateness and proportionality of the enforcement action.

The PIN process is available for matters that could be considered not of a serious enough nature to put immediately through court. A PIN is served based on the reasonable belief that an offence has been committed; however payment of the penalty does not lead to the recording of a criminal conviction. Non-payment of the fine is not dealt with by a jail sentence but is recoverable as a civil debt. On the other hand, if a

person elects to have the matter heard, proceedings are commenced in the criminal jurisdiction of the Magistrates Court.

Standard of Proof

As a basic proposition, an investigation should be undertaken and sufficient evidence must be obtained to establish beyond a reasonable doubt that an offence has occurred, before a PIN is issued. A PIN is in effect a *de facto* prosecution brief; the same evidence is led for either process. A PIN can be contested by the recipient and in this event it is likely that the authorised officer will have to give evidence as to the alleged offence. In essence a PIN should not be issued for any matter that the issuing officer (informant) would not be able to produce a brief of evidence for – the standard of proof remains the same.

There are a number of procedural documents that can help you in relation to establishing whether or not you have enough evidence to issue a PIN, for example:

- *Use of Official Notebooks* – provides you with information concerning what you should be recording when investigating offences and issuing PINs;
- *Briefs of Evidence* – provides you with the information that is required for a brief of evidence (relevant for when a PIN is contested)
- *Statement Guide* – provides you with information about taking statements from potential witnesses.

Discretion

Just as there is discretion to use any other enforcement tool, there is discretion whether to issue a PIN. Any discretion by individual officers must take into account the intention of the legislation in relation to managing and minimising environmental and natural resource use impacts, and any specific references to breaches of that legislation.

PINs are designed primarily to deal with one-off breaches that can be remedied easily and provide a mechanism to deal with breaches through a simplified administrative process. They are usually a first response when a preventable breach is discovered.

Issuing successive PINs for multiple and ongoing statutory breaches is generally inappropriate, unless the breaches are unrelated. In such circumstances, even though each breach might be comparatively minor, there is probably a major and continuing compliance problem. Such a problem needs to be dealt with through other enforcement measures if a past PIN has not motivated the recipient to successfully address the underlying issue.

An authorised officer may use their discretion about a matter. In determining whether to exercise the discretion to issue a PIN, regard should be had to the sufficiency of the evidence and public interest factors. The issue of a warning may also be appropriate for a minor breach of legislation.

Most matters do not have to be dealt with immediately and on-the-spot (exceptions to this generally related to service of the PIN to itinerant or international visitors). If in doubt, authorised persons should record all relevant details and seek advice from their manager. Inform the person that the matter has been recorded and that further action may result. **Do not** indicate that they are “likely to get” or “might receive” a warning or a fine – it leads to unfair expectations and can generate subsequent complaints from a person receiving a PIN.

Ensuring elements meet proof requirements

The same elements that must be proven when developing a brief of evidence for court are the same elements that need to be established when issuing a PIN.

There are some elements, which are common to every offence, such as time, date, place and a person. Apart from the common elements, each word or phrase of the offence must be examined to see if it involves a particular issue of law or fact. For example:

Offence: *A person must not camp in a protected area without a permit*

Elements:- <i>Time, date and place</i>
<i>A person (can be an individual or company)</i>
<i>Must not camp (if the term is not defined in the Act refer to the Macquarie Dictionary)</i>
<i>Protected Area (gazetted as a protected area)</i>
<i>Without Permit (record person’s reason for not having permit)</i>

It is good practice to secure evidence to support issue of a PIN at the time the offence is detected. Specifically contemporaneous notes and other aids such as photos, samples, and statements in the event that the recipient of the PIN later elects to have the matter heard in court. It may be too late to secure relevant evidence at a later time.

Juveniles

PINs are **NOT** to be issued to persons under the age of 17. PINs issued to minors will be withdrawn (even after payment).

How to issue a PIN?

Please refer to **Appendix 2**; PINs are produced on sensitised paper to facilitate duplication. A firmly pressed ball point pen is recommended when filling the document out. All the relevant fields must be completed. The PIN has an individual identifier and is an accountable document.

Alleged Offender

Try to confirm the identity of the alleged offender through some form of corroborative identification. If the person is reasonably suspected of committing an offence an authorised person may lawfully require the person to furnish identification.

Essential elements to include on PIN

It is essential that core elements of the PIN are correctly filled out with:

- Family/Company name and number (ACN);
- Given names;
- Residential/Company real address (not a post office box);
- Phone contact number;
- Date of birth; and
- Male/Female/Owner/Driver/Passenger/Other.

Note the origin of the source of identification used to confirm the identity of the alleged offender (for example: **Licence/permit type**: Driver's licence; **State**; **Number of licence/permit**; **Issued by**: eg DERM, Queensland Transport etc; and **Expiry date** of the licence/permit produced.)

Vehicle/Vessel/Aircraft related offences

Where a vehicle/vessel/aircraft are involved in the commission of the offence, the appropriate² vehicle details **must** be completed. For vehicle related litter offences, a [vehicle observation report](#) must be completed. Also see [Litter Procedural Guide](#) for further information.

In other circumstances where a vehicle/vessel is not involved in the actual commission of an offence, details of any vehicle present should be included on the rear of the original notice to assist in locating an alleged offender where the means of identification provided is subsequently proven to have been false.

Details to be included (some of which may appear on the back of the original PIN copy) are: Registration no; Registration label no; State; Type of vehicles/vessel/aircraft; Make/model; Colour/trim; and Expiry date of registration. Vehicle Identification Numbers (VIN and Hull Identification Numbers (HIN) should be recorded if possible.

A vehicle registration search should be undertaken to confirm that the registration details taken at the time of the offence match the description of the vehicle and to also confirm the name and address of the registered owner.

² The most appropriate vehicle will be the one directly involved with a vehicle offence. For example, a cigarette deposited by the driver of an articulated truck, the appropriate registration would be the prime mover. But if the litter fell from the trailer or dogs, then the appropriate registration to use would be the trailer.

Vegetation related offences

Where an officer issues a vegetation PIN, it is the regions responsibility to enter that PIN into the Compliance Information Register and Management system (CIRaM). Compliance and Investigations Support will update CIRaM to reflect any changes in the status of the PIN, for example receipt of payment or referral to SPER for further action. Monthly reports are generated from SPER to obtain a list of any infringement notices that have been paid or otherwise satisfied with SPER and CIRaM will be updated accordingly.

Alleged Offence

This section of the notice **must** contain the following details concerning the alleged offence:

- For those instances where a person is “found committing” an offence, tick the box marked ‘Committed’. For an offence where for example a person has permitted another person to commit an offence, tick the box marked ‘Permitted’ (this will often occur with vehicle or vessel related offences)
- Time of alleged offence, day of the week and date;
- ‘Between’ dates may be included where the offence took place over a period of time and did not involve a vehicle (refer s15(2)(d)(ii) *SPE Act*);
- Location of offence - this section should contain accurate details as to where the offence actually occurred. Details which cannot be included on the face of the notice due to insufficient space should be recorded in notes made on the rear of the original (prosecution) copy;
- Offence code and penalty – see list provided above; and
- Long title of relevant Act and description of alleged offence. **Do not** abbreviate legislation titles i.e. *EP Act*, *NC Act*. The legislation title must be written in full.

Particulars of animal (on second page)

Where the offence involves an animal, include details as to species, breed, colour, sex and identification tags, brands etc.

Issuing officer

This section of the notice includes the following details:

- Name of authorised person/officer;
- Office/agency to which they are attached;
- Name* and Signature; and
- Date of issue **must** be stated on the PIN (this date may differ from the actual date of the offence).

* There is a basic obligation the issuing authorised officers to identify themselves by name (please note *Employee Id number* is not suitable). DERM officers who are not prepared issue a PIN using their name may

request that their manager or an alternative authorised officer issue the PIN. Do not issue a PIN without an authorised officer named.

The original PIN and copies are dealt with as follows:

- White – Original
- Pink – Infringement Administration Officer's Copy
- Green – Audit Copy (remains in book, which remains in Region)
- Buff – Alleged Offender's Copy

When Should a PIN be Issued?

PINs are generally appropriate when the following conditions are met:

- where the breach is minor;
- where the facts are apparently indisputable;
- where the breach is a one-off situation easily remedied;
- when inspection discovers a breach that normal operating procedures should have prevented; and
- where the issue of an PIN is likely to be a deterrent.

When Should a PIN *not* be Issued?

PINs should not be issued in the following circumstances:

- where large-scale habitat or environmental damage has occurred;
- where the breach is continuing and not within the alleged offender's ability to remedy quickly;
- where the penalty seems inadequate for the severity of the offence;
- where the extent of the harm to the environment cannot be assessed immediately;
- where the evidence is so controversial or insufficient that court action is unlikely to succeed;
- where there has been substantial delay since the alleged breach;
- where another authority has issued a notice for the same or similar offence in the same period;
- where a notice, direction or order has been issued by DERM to do specified work within a time limit and the limit has not expired;
- where multiple breaches have occurred, unless all are minor; or where the offence took place under a proposal approved by DERM.

How do you serve a PIN?

The legal term for giving someone a ticket is *service*. There are statutory rules that must be applied to ensure the PIN is *served* legally (and thus enforceable by a Court or SPER). Therefore it is imperative that appropriate service is chosen and affected correctly.

After completion, the issuing officer should **carefully** scrutinise the notice for possible mistakes ensuring all relevant sections have been completed. The alleged offender's copy can then be served.

A PIN may be served "on-the-spot" **in person** (preferred), **by post** (preferably *registered post* for record-keeping and proof) to an address supplied by the alleged offender (or otherwise known by the authorised officer), or in the case of an unattended vehicle, served on "The Owner" and placed conspicuously on the vehicle.

If the offender is likely to receive a PIN in the circumstances, but it is not proposed to serve the PIN on-the-spot then it is appropriate to inform the person of this. It is unfair to suggest to an alleged offender that they may receive a warning as a result of reporting the matter to a Manager. It gives a person an expectation that the matter *will* result in a warning and the receipt of a PIN in the mail is often cause for a formal complaint to be made. If an authorised officer is genuinely unsure of what an outcome will be at the conclusion of enquiries, the alleged offender should be told that the matter will be investigated, or enquiries will be made, and that they will be notified of the result in the mail. Do not get drawn into committing to a final outcome by an alleged offender.

PINs issued on-the-spot

"On-the-Spot" service of a PIN refers to circumstances where the PIN is served directly to the alleged offender found committing an offence immediately or soon after discovery. This is the most effective, fair and immediate method of serving a PIN, and is the preferred method for QPWS officers conducting regulatory duties. It ensures the matter is dealt with promptly and that the offender has definitely received their copy of the PIN. The only time a QPWS officer should defer to an alternative method of service is if they genuinely consider they may be at physical risk or it is likely to escalate a confrontation. An alternative method of service should not be used just to avoid having direct and difficult conversations with clients.

Officers issuing PINs under legislation other than primarily QPWS administered legislation may be subject to policy requirements to ensure management approval of PIN service. Please ensure you have complied with your relevant business unit obligations.

When serving the PIN personally at the time of offence (for forestry, nature conservation and marine parks offences), a verbal explanation should include advice on the following:

- Why the person is being issued the PIN
- The amount of the penalty
- How the payment of the penalty can be made;
- How to contest the matter through an option to elect for a court hearing.

Responses and reasons offered by the recipient should be noted on the rear of the original (white) copy of the notice.

PINs not issued on-the-spot

While a PIN can be served at any time (within the limitation of time specified in relevant legislation for proceedings for an offence), in fairness to an offender it is highly desirable that the notice is served within **14 days** after detection of the offence. The pink copy must be forwarded to the Infringement Administration Officer **within 2 days of service**.

Where to send the PIN

Where service of a PIN cannot be effected personally, officers may do so by post. The PIN can be mailed to a PO Box; however, the address appearing on the PIN must be the full address of where the person actually lives or works. In all instances where there is a need to effect service of a PIN notice by post, the method of posting recommended is by registered post and return of service card.

What to send with the PIN

There are suggested PIN cover letters available from Compliance and Investigation Support for use by staff. Help can be sought using the following email: infringement.notices@derm.qld.gov.au.

When issuing a *littering PIN*, officers must ensure they include a frequently asked questions (FAQ) information sheet with the PIN. This FAQ is designed to answer the general queries people will have when receiving a PIN. The FAQ is also available from Compliance and Investigation Support.

How do I make notes for evidence?

The authorised person should record details of any conversation with the alleged offender on the rear of the prosecution copy of the PIN (white). Observations by the authorised person concerning the offence alleged should also be recorded. Where there is insufficient space for recording such information on the rear of the prosecution copy of the PIN, officers are to utilise their official notebooks (see procedural guide on [Use of official notebooks](#) for further information). Reference to relevant notebook page numbers used is also to be included on the rear of the prosecution copy of the PIN.

Notes of any conversation and/or observations made can be referred to by a witness during a court hearing only if they were made during or as soon as practicable after the conversation and/or observations (*contemporaneously*). Great care must be taken when making these notes, as they might be required later as evidence to support the prosecution case. The time and place the notes were made should also be recorded and adoption of the notes by a corroborator is recommended.

Relevant PIN Copies

The distribution of the prosecution and central office copies of a PIN should be attended to promptly following service of the notice.

The prosecution (white) copy, is the original notice, and forms the basis of any future prosecution action. It is to be removed from the book and placed in a separate file at the issuing office and a photocopy is to be placed on a relevant file (if any) relating to the alleged offender. There should be a regional file for storing all original PINs. These are to be filed in numerical order. This procedure ensures that other previously issued original PINs that might be required in any future court proceedings will not be lost if a book of PINs is lost.

What to return to Investigations Support

The Infringement Administration Officer's (pink) copy of the notice is to be forwarded to the Infringement Administration Officer **within 2 days** of the issue of the PIN. It is important to get the pink copy returned as it is the only record the administering officer has to manage payment from offenders. The copy may be sent by mail (GPO Box 2454, Brisbane 4001), or scanned and emailed to infringement.notices@derm.qld.gov.au

The Audit (green) copy remains in the book for the purpose of record keeping and government audit requirements. The PIN book also remains with the Region that it was issued to. Completed books are **not** to be returned to the Infringement Administration Officer.

The Alleged Offender's (Buff/Beige) copy is served on the named person or company.

Service Letter PINs

Where an officer has received a PIN back as 'return to sender' or 'not known at this address', it is essential the officer informs the Investigations Support Unit this has occurred as soon as possible. Where possible the Infringement Administration Officer will conduct a secondary drivers licence or vehicle registration check to confirm the mailing address is correct.

How is a PIN cancelled?

An officer may *cancel* a PIN written in error **prior to service** on the alleged offender. If an officer detects an error before serving a PIN, under no circumstances should particulars be crossed, removed or deleted.

Two parallel lines are to be drawn across the face of the original (white) page of the PIN and the word '*cancelled*' written between the lines. The entry is to be initialled and dated. Another PIN can then be issued.

The original of the cancelled PIN is to be filed with other previously issued original PINs. The duplicate and triplicate copies and a [Cancellation of Infringement Notice](#) form are to be forwarded to Infringement Administration Officer for recording.

How is a PIN withdrawn?

The *State Penalties Enforcement Act 1999* gives DERM the discretion to *withdraw* a PIN notice **after serving** the notice. This allows for two possibilities:

- where a more serious breach of the law might have taken place without the authority's knowledge when the PIN was issued. The notice can be withdrawn to allow the more serious breach to be pursued; or
- where a second possibility is that a mistake of fact was made and the PIN should not have been issued. In such a case, the *State Penalties Enforcement Regulation 2000* allows the authority to withdraw the PIN, even if the penalty has been paid.

Unfortunately errors in PINs are often detected after it has been served..

A PIN must be withdrawn and a new PIN served for the offence when it contains one or more of the following types of errors:

- no time / incorrect time of alleged offence;
- no date / incorrect date of alleged offence [in the 'Alleged offence details' section only];
- no date or an incorrect date of issue (separate to date of offence);
- no location / incorrect location of alleged offence [differs greatly from actual location];
- no penalty / incorrect penalty;
- no offence / incorrect offence;
- incorrect registration no. of vehicle / vessel / aircraft where involved in the commission of the offence.
- Act or Regulation the PIN is issued under is incorrect
- missing issuing officer's signature or identifier

A PIN can be withdrawn for reasons other than for an error or omission. If for example after having issued a PIN, the alleged offender is found to be a persistent offender and has previously committed similar offences, the PIN may be withdrawn. This then allows the matter to proceed to prosecution by way of complaint and summons. Evidence gathered for the issue of the PIN can be used for any subsequent prosecution.

A PIN may also be withdrawn based on evidentiary, procedural, or policy matters. A PIN will be withdrawn if the recipient is found to be less than 17 years of age.

Withdrawal of PINs may occur until the issue of a warrant by the State Penalties Enforcement Registry.

Withdrawal provisions should be seen as a safety net, not a mechanism to be applied regularly.

Section 160 of the SPE Act provides for the delegation of powers by the Chief Executive of an administering authority. Accordingly, the Chief Executive has delegated certain powers (including the power to withdraw a

PIN) under the SPE Act to various officers within the department (delegate). Please be aware that it is not lawful to “withdraw” a PIN after it has been served unless you are a delegated officer (Current delegation sits with Director, C&I and Director, Litigation, and Manager, Investigation Support).

Where a PIN has been issued and it is determined that there are reasons for withdrawing the PIN, the issuing officer is to complete a [Withdrawal of Infringement Notice](#) form and forward it to the relevant manager outlining the circumstances and the reasons for the requested withdrawal. The form is then to be forwarded through the relevant Manager to the Infringement Administration Officer, with a recommendation as to withdrawal of the notice. In locations where mail is slow or difficult, please email them to infringement.notices@derm.qld.gov.au

A delegate within the Investigation Support Team will then withdraw the PIN and forward appropriate advice to the alleged offender. Following withdrawal of a PIN, advice in writing is to be forwarded by the Infringement Administration Officer to the issuing officer so that other copies of the PIN can be similarly noted. Copies of the withdrawn PIN, the ‘Withdrawal of the Infringement Notice’ form and any legal advice from the Litigation Team are to be placed on the common file for all PINs, and on a relevant file (if any) relating to the alleged offender.

Where a PIN has been paid and a decision is subsequently made to withdraw it and proceed by summons, a full refund is to be made to the alleged offender by the Infringement Administration Officer. The refund should be accompanied by an explanation as to the reasons for the refund and the intended course of action.

Requests for Review and Complaints concerning the issue of PINs

In addition to advising the person concerned that they can elect to have the matter heard in court, PIN recipients can also be informed that they may seek a formal review relating to the issue of a PIN within the 28 day statutory period. Persons wishing to make a complaint concerning the issue of a PIN are to be informed that any complaint they wish to make must be in writing and forwarded to the Infringement Administration Officer at the address appearing on their copy (rear) of the notice, or email infringement.notices@derm.qld.gov.au

On occasions, a person issued with a PIN may consider that the issue of such notice was unwarranted and seek advice from the issuing officer as to what action they can take. A verbal discussion about the circumstances surrounding the issue should be avoided and the person should be directed to submit a written complaint to the Infringement Administration Officer outlining their version of events and concerns. The Infringement Administration Officer will record the correspondence and ensure an appropriate review of the circumstance surrounding the issue of the PIN is conducted by the relevant Regional Manager or delegate.

When the Infringement Administration Officer receives a written complaint or request for review, an acknowledgment letter will be sent as an initial reply.

At the same time, a memorandum and copy of the letter of complaint is sent to the relevant Regional Manager requesting that a report be generated by the issuing officer setting out the full circumstances surrounding the issue of the relevant PIN. This is to aid Compliance and Investigation staff in communicating with the client.

The completed report is to be returned to the Infringement Administration Officer via the Regional Manager with a recommendation as to whether or not the notice should be waived. In the case that the recommendation is to withdraw the PIN, it will be referred to an appropriate delegate and actioned in accordance with the Regional Manager's recommendation. Where the decision is to uphold the decision to issue a PIN, appropriate advice will then be sent to the person concerned.

Where a letter of complaint concerning the issue of a PIN is received at a regional office, the letter is to be forwarded immediately to the Infringement Administration Officer who will action the matter in the previously outlined process. Written advice should not be forwarded from the office receiving the letter of complaint or review until it has first been received by Infringement Administration Officer as it may inhibit the capture and recording of all relevant correspondence.

All reviews of PINs must be coordinated through the Infringement Administration Officer to ensure statutory compliance and consistency.

Infringement Administration Officer

The Infringement Administration Officer (IAO) is responsible for the management of all PINs issued by DERM officers. The generic email to use is infringement.notices@derm.qld.gov.au

The Infringement Administration Officer will enter PIN details for SPER on CIRaM, and is responsible for those PINs recorded as being overdue for payment, that is, those PINs that have not been paid within the initial 28 days. If no action is taken by the alleged offender to meet the requirements of the PIN within the 28 payment day period, the Infringement Administration Officer may forward information contained on the original PIN to the SPER to enforce.

The Infringement Administration Officer is able to extend the 28 day period at the reasonable request of the alleged offender.

State Penalties Enforcement Registry

The referral of a matter to the State Penalties Enforcement Registry (SPER) Registrar by the Infringement Administration Officer effectively ends DERM's involvement in the enforcement process unless the alleged offender subsequently chooses to have the matter heard in the Magistrates Court.

The possible outcomes of the SPER system are as follows:-

- Alleged offender pays in full. SPER remits money
- Alleged offender applies for extension of further 28 days to pay
- Alleged offender applies to pay fine by instalments
- Alleged offender applies for fine option order
- Alleged offender elects not to pay - SPER may issue enforcement warrant, fine collection notice or arrest and imprisonment warrant
- Alleged offender elects hearing in Magistrates Court. SPER will refer the matter back to the Infringement Administration Officer for commencement of summons proceedings

Election for Court hearing

A recipient of a PIN may elect for the matter to be heard by the Magistrates Court. When an alleged offender elects to have their matter heard by a court, the Election for Court Hearing Notification section on the rear of the offender's copy of the PIN is completed by the recipient and forwarded to the Infringement Administration Officer. Alternatively advice may be received from the State Penalties Enforcement Registry Registrar of a defended matter.

Upon receipt of an election to have a PIN dealt with in Magistrates Court, the Infringement Administration Officer will acknowledge receipt, and notify the issuing officer (Informant) and the Manager responsible for the location and business in which the alleged offence occurred. The matter will also be entered on CIRaM for tracking and notification to Manager, Regional Investigations.

It is the issuing officer's obligation as the informant in the first instance to ensure that all evidence to be alleged is available. The issuing officer and their Manager should review the circumstances in which the PIN was issued and ensure the progression of the matter to court is desirable and appropriate in the circumstances. It is also appropriate and encouraged that the relevant Manager, Regional Investigations (MRI) is involved in such discussions. The Manager of the issuing business unit should then confirm the decision to proceed via memo or email to the MRI with a copy to the Infringement Administration Officer.

At this time the matter is no longer managed as a PIN (through SPER) process and becomes a DERM investigation. The PIN process is concluded by the Infringement Administration Officer.

Upon confirmation that the PIN must be escalated to a brief of evidence by the issuing officer's manager (memo or email) the following steps should be taken :

- Manager, Regional Investigations will delegate the task to an investigator
- Issuing officer and investigator will liaise and review circumstances and available evidence. Carriage of the matter remains always with issuing officer, who now becomes *informant* in the matter, but will be

assisted/lead by the investigator until the matter is complete (this is to ensure consistency and best practice)

- Investigator will review available evidence and where necessary gather further evidence in support of the brief of evidence. The PIN has effectively become an investigation and will be managed in accordance with brief of evidence protocols and time frames
- Investigator is responsible for production of the *Brief of Evidence* document with recommendations to the MRI and the brief checker and then onto the Litigation Unit
- The decision to seek approval from the Assistant DG (ENRR) as delegate to charge and proceed to court is made by Director, Compliance and Investigation in consultation with Regional Managers
- As informant, the issuing officer carries the responsibility of lead witness. The concluding obligation of the issuing officer will be the presentation of their evidence before a court

If at any point in this process a decision is made to withdraw the PIN, the Infringement Administration Officer must be notified and a [Withdrawal of Infringement Notice](#) forwarded to infringement.notices@derm.qld.gov.au through the Infringement Administration Officer to Manager, Investigation Support to ensure statutory compliance.

As capacity is built within various branches of business the necessity to heavily involve investigators in PIN matters should reduce.

How is a PIN paid?

Officers are not to accept payments for PINs in the field. The only acceptable methods of payments are:

- Attendance at DERM office (equipped to take payments)
- by mail to GPO Box 2454, Brisbane QLD 4001.
- Credit Card payment over the phone

All monies received from the Customer Service Unit and Infringement Administration Officer as payment for PINs are to be sent to the DERM Financial Services Unit. Internal procedures within the Customer Service Unit are to be referred to when transferring money to the DERM Financial Services Unit.

After receipting of PIN monies, the Financial Services Unit will forward details of monies receipted and the relevant PIN to the Infringement Administration Officer. The Infringement Administration Officer will then enter details on ECOTRACK against the PIN paid in *Environmental Protection Act* only matters, and the PIN database.

How do I get more PIN books? (Accountable forms)

Each Region has a nominated regional/environmental support officer for accountable forms. To request a supply of accountable forms³, a requesting officer is required to obtain manager approval before filling out a [Supply of Accountable Forms](#) form (this form is between the requesting manager and regional/environmental support officer) and sending the form through to the relevant regional/environmental support officer for his/her region.

Upon receiving an order for accountable forms, the regional/environmental support officer is then required to prepare and submit a [Supply of Accountable Forms](#) form to the Administration Officer, Litigation Team. The Administration Officer will then arrange for the order to be filled using the relevant region's costing code. The Administration Officer will then complete the 'supply' section of the Supply of Accountable Forms form and return the form to the regional/environmental support officer with the required accountable forms. The Administration Officer is required to keep an accountable forms record (type of forms, sequence numbers, date application received, date forms issued) of all forms distributed to regional/environmental support officer.

On receiving the requested supply, the regional/environmental support officer is to immediately check that the forms received are the same as those detailed in the request and supply section of the Supply of Accountable Forms form. The regional/environmental support officer is then to complete the acknowledgement section of the Supply of Accountable forms form and return it to the Administration Officer. The regional/environmental support officer is required to keep an accountable forms record (type of forms, sequence numbers, date of application, date forms received) of all accountable forms received from the Administration Officer.

Once this is completed the regional/environmental support officer is to distribute the forms to the requesting manager along with the completed "supply" section of the Supply of Accountable Forms form and maintain a record in an Accountable Forms Register (type of forms, sequence numbers, date application received, date forms issued) of all forms issued to offices within the Region.

On receiving the requested supply, the requesting manager is to immediately check that the notices received are the same as those detailed in the request and supply section of the Supply of Accountable Forms form forwarded by the regional/environmental support officer, enter the details (type, sequence numbers, date application issued, date forms received) in the office's Accountable Forms Register and place the forms in secure storage. The requesting manager must then complete the acknowledgment section of the Supply of Accountable Forms form and return the form to the regional/environmental support officer.

An entry in the Accountable Forms Register is to be completed on all occasions when stocks of accountable forms have been issued for use.

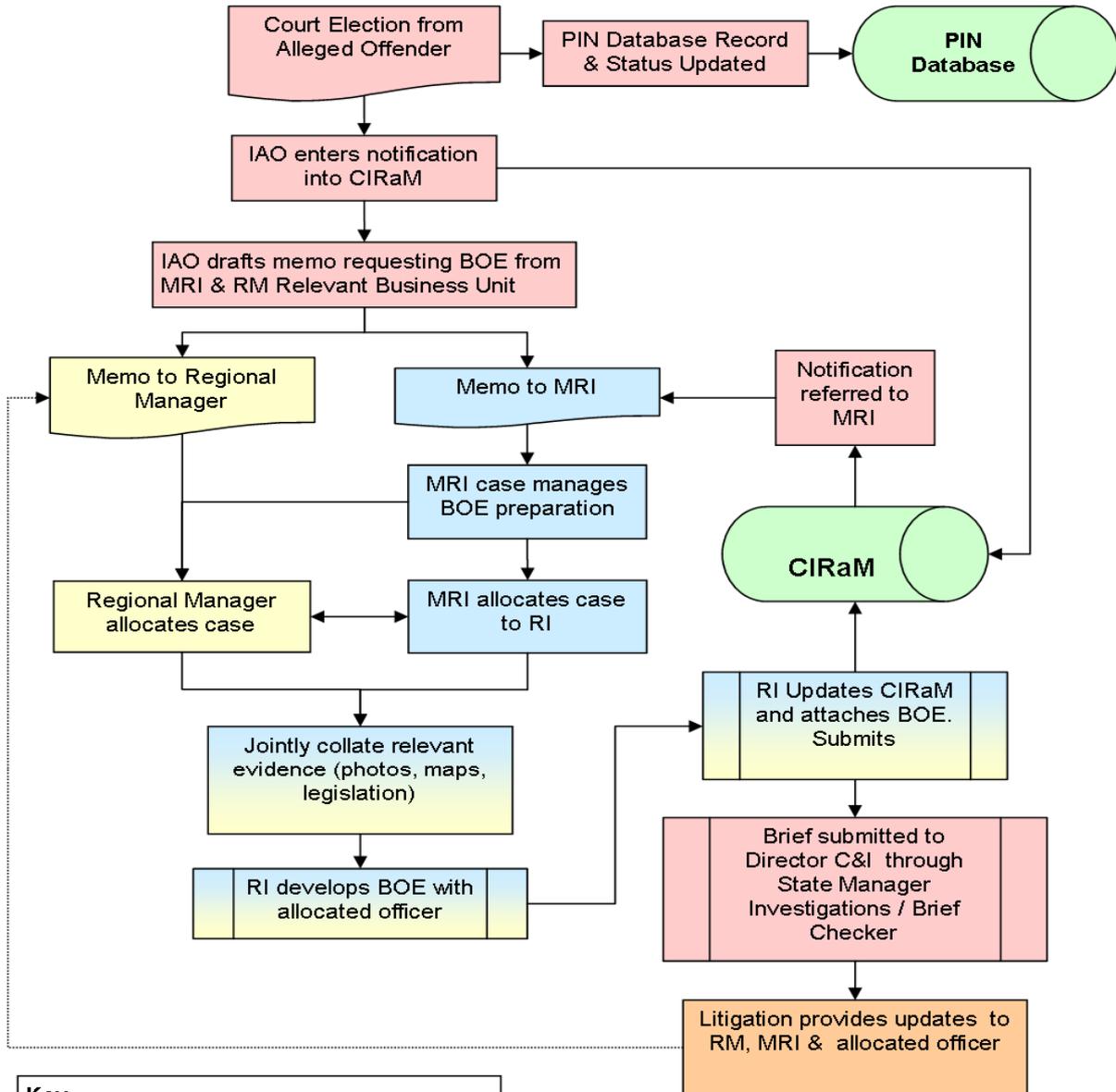
³ Accountable forms includes Penalty Infringement Notice books,

Accountable forms must be held in secure storage at all times. Accountable forms must never be left unattended at any time when not in secure storage.

Disclaimer

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the former Environmental Protection Agency should satisfy themselves independently and by consulting their professional advisors before embarking on any proposed course of action.

Appendix 1 PIN Flow Chart



Key

- Regional Staff
- C&I Branch
- Regional Investigations Unit
- Litigation Unit

Acronyms

- IAO**—Infringement Administration Officer
- RM**—Regional Manager
- MRI**—Manager Regional Investigations
- RI**— Regional Investigator
- BOE**—Brief of Evidence
- C&I**—Compliance & Investigations
- CIRaM**—Compliance Information Register and Management System

Assessment report

Environmental Protection Act 1994 Transitional Environmental Program (TEP)

Part 1 – Notice requiring a draft TEP

This document is intended for internal use to assist Environmental Services officers to record the information considered by the Department when deciding to issue a notice requiring a draft TEP.

Identifying Details	
Compliance activity number	Number
EcoTrack number	Number
Permit number:	Permit number (if applicable)
File number:	File Number
Applicant number:	Number
Trading as:	Trading as details (if applicable)
Registered business address:	Registered business address

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be endorsed by the responsible officer, supervisor and the delegated decision-maker.

1. Brief history of the matter

Briefly outline any historical information relevant to this decision in chronological order.

Briefly outline the historical information in chronological order.

2. Grounds for issuing a notice requiring a draft TEP

Section 332 of the *Environmental Protection Act 1994* provides that the Department may require the submission of a draft Transitional Environmental Program (TEP) in certain circumstances. Identify on which of the following grounds the decision to issue a notice requiring a draft TEP is based.

The Department may require a person or public authority to prepare and submit to it for approval a draft TEP:

As a condition of an environmental authority (EA).

OR

- As a development condition of a development approval (DA).

The Department may also require a person or public authority to prepare and submit to it for approval a draft Transitional Environmental Program if it is satisfied:

- An activity carried out, or proposed to be carried out, by the person or authority is causing, or may cause, unlawful environmental harm.

OR

- It is not practicable for the person or public authority to comply with an environmental protection policy or regulation on its commencement.

OR

- That a condition of an environmental authority held by the person or public authority is, or has been, contravened.

OR

- That a standard environmental condition of a code of environmental compliance for a Chapter 4 activity is, or has been, contravened by the person or public authority.

OR

- A development condition of a development approval is, or has been, contravened and the person or public authority is:
- an owner of the land for which the approval is granted or
 - another person in whom the benefit of the approval vests.

3. Expand Upon the Grounds

Expand upon the grounds identified for issuing the notice requiring a draft TEP. This can include identifying an alleged offence or any statutory requirement which must be met prior to the Department issuing the notice.

Each ground should be listed independently and allocated a separate number.

Number	Specific Ground
1	Example: ABC Pty Ltd is a timber preservation/treatment operator. While conducting timber preservation/treatment activities, ABC Pty Ltd has released stormwater from its operating site that does not comply with release limits, thereby causing unlawful environmental harm. If ABC Pty Ltd does not upgrade its site and improve its stormwater management system, it is likely that non-compliant releases of stormwater from the site will continue, thereby causing further environmental harm.
2	
3	
4	

4. Detail the Matters Considered

The purpose of the following table is to ensure that there is evidence to support the use of the statutory tool. This is achieved by linking the elements of the breach to the evidence gathered and the conclusions formed (i.e. the facts and circumstances).

When analysing evidence or developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of the information available, historical details, professional expertise and the weight attributed to any direct testimony provided.

<p>Elements of the offence or legislative requirement</p> <p><i>List the elements of any grounds for issuing the notice requiring a TEP</i></p>	<p>Evidence</p> <p><i>Identify the evidence considered which is relevant to the elements or requirement (i.e. statements, photographs, and recordings)</i></p>	<p>Facts and Circumstances</p> <p><i>Detail the facts and circumstance that support the Department's findings.</i></p>
<p>Number 1 (Number taken from Section 2)</p>		
<p>An activity carried out, or proposed to be carried out by the person.....</p>	<p>Compliance Inspection CA123: Notes from officer's official notebook taken during site inspection on 20 May 2008.</p>	<p>ABC Pty Ltd carries out timber preservation and treatment activities at its site at 123 Creek Road, Murphyville.</p> <p>The inspection has shown that whilst the operators have some stormwater controls in place, it is apparent that the current system would not be able to effectively manage an increase in production and/or increased rain levels.</p>
	<p>Photographs (x20) of the ABC Pty Ltd site taken during the site inspection on 20 May 2008.</p>	<p>Photographs taken of the existing stormwater management infrastructure, including the stormwater catchments show that the catchments are 80% full. An increase in production or heavy rain is likely to fill the catchments to overflowing.</p>
<p>Is causing, or may cause, unlawful environmental harm.....</p>	<p>Compliance inspection CA456: Notes from officer's official notebook taken during compliance inspection on 3 May 2009.</p>	<p>A visual inspection of the stormwater catchments show that they are 90% full.</p>
	<p>Copy of letter to ABC Pty Ltd from the Department dated 12 May 2010.</p>	<p>Letter to ABC Pty Ltd outlining the Department's concerns in relation to stormwater controls and management on the site and reminding the site operator of its responsibilities.</p>

	Copy of the company's stormwater quality monitoring results for the past 12 months.	The stormwater quality monitoring results indicate that ABC Pty Ltd has exceeded its release limits on 2 occasions in the past 12 months.
	Compliance inspection CA780: Copy of the site operator's stormwater quality monitoring results for the previous 12 months collected from the operator during compliance inspection on 15 May 2010.	The stormwater quality monitoring results indicate that the operator has exceeded stormwater release limits on 6 occasions in the past 12 months.
	Compliance inspection CA780: Notes from officer's official notebook taken during compliance inspection on 15 May 2010.	<p>During the site inspection, Departmental officer Mary Green had further discussions with the site operator regarding the implications of the repeated exceedances of the stormwater release limits.</p> <p>The site operator says that ABC Pty Ltd has made significant investment in stormwater management infrastructure in 2005. However, the business has grown substantially since this time.</p> <p>During the discussions the site operator indicated an acceptance of the need to investigate and pursue further stormwater management improvements and included a commitment to consider drafting a voluntary TEP.</p>
	File note written by environmental officer Mary Green on 23 June 2010.	<p>ABC Pty Ltd is carrying out timber preservation/treatment activities at a site at 123 Creek Road, Murphyville.</p> <p>Visual inspections of the site in 2008, 2009 and 2010 have indicated that the business has grown substantially and the stormwater management system and infrastructure are no longer coping and require improvements.</p> <p>Annual stormwater release quality monitoring records for 2009 and 2010 indicate that ABC Pty Ltd has exceeded its stormwater release limits on a number</p>

		<p>of occasions.</p> <p>The repeated exceedences of the stormwater release limits by ABC Pty Ltd are causing unlawful environmental harm and may cause further unlawful environmental harm. The operator indicated that it would voluntarily submit a draft TEP. However, a voluntary draft TEP has not been submitted.</p> <p>In the circumstances, the Department considers that a notice requiring a draft TEP should be issued to ABC Pty Ltd.</p>
Number 2		
Number 3		

5. Natural Justice

The investigating officer is required to notify the affected person that the Department is considering issuing a notice requiring a TEP and that the individual may make representations to the Department as to why this action should not be taken. Any information provided by the affected person is to be documented and considered.

- The person has been provided with the opportunity to put their side of the story forward.
Describe how this was achieved.
- All information and/or defences provided were considered.
Describe any information or defences provided.
- The Department has considered the information or defences provided.
Describe the consideration given and the conclusions formed by the Department based on the information provided.
- The decision-maker and the environmental officer are free from bias or the perception of bias.

6. Recommended Conditions (if appropriate)

If appropriate, please list any proposed conditions below. In order to ensure conditions are enforceable, they should be SMART - Specific, Measureable, Achievable, Relevant and Time-specific. Refer to the [Procedural Guide - Writing effective and enforceable conditions](#)

To ensure the conditions are reasonable, officers are required to provide justification for the inclusion of the condition.

Proposed Requirement	Justification
Proposed requirement	Justification

7. Recommendation

The responsible officer is required to make a recommendation in relation to the allegation.

Recommendation:

8. Approval

Environmental Officer	Supervisor
Print Name:	Print Name:
Position:	Position:
Date:	Date:

Delegate Decision-Maker	Approve / Reject Recommendation (Circle One)
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Reasons for Decision <i>For example:</i> <i>I approve this recommendation based upon the information set out above.</i> <i>Or, I approve this decision for the reasons set out above and I note Mr Rodgers has previously received a warning letter in relation to this matter.</i> <i>Or, I reject the above recommendation as I consider it more appropriate for the Department to take an educational approach to this breach.</i>
Print Name:
Position:
Date:

Procedural guide

Environmental Protection Act 1994 Transitional environmental program (TEP)

Part 1 – Notice requiring a draft TEP

This document is designed to assist Environmental Services officers to issue a notice requiring a draft TEP under the provisions of Chapter 7, Part 3 of the Environmental Protection Act 1994.

What is a TEP?

Section 330 of the *Environmental Protection Act 1994* (the Act) provides that a transitional environmental program (TEP) is a specific program which, when complied with, facilitates compliance with the Act for the activity to which the TEP relates by doing one or more of the following—

- reducing environmental harm caused by the activity
- detailing the transition of the activity to an environmental standard
- detailing the transition of the activity to comply with:
 - a condition (including a standard environmental condition) of an environmental authority or code of environmental compliance or
 - a development condition.

The legislative provisions in respect to TEPs can be found in Chapter 7, Parts 3 and 4 (ss330-357) of the Act.

Who can enter into a TEP?

A person or public authority may enter into a TEP voluntarily or may be required to submit a draft TEP by the Department.

When can a TEP be used?

TEPs are intended to be used where a significant change or changes are needed to be made by a person to achieve compliance. One of the reasons for this is that a person has some protection from prosecution for actions conducted under the TEP for the duration of the TEP.

(a) Requirement to submit a draft TEP

There are certain circumstances when the Department may require a person or public authority to prepare and submit for approval a draft TEP. These circumstances are set out in Section 332 of the Act.

(b) Voluntary TEP

Section 333 of the Act provides that a person or public authority may also, at any time, submit a draft TEP to the Department for an activity the person or public authority is carrying out or proposes to carry out.

(c) Program notices

A person intending to prepare and submit a voluntary TEP may give the Department a program notice under s350 of the Act. For further information in regard to program notices, see: [Procedural Guide - Program notices TEP](#)

(d) Fee for consideration of draft TEP

A person or public authority that submits a draft TEP to the Department for consideration and approval must pay the Department the fee prescribed by regulation. See: [Operational policy - Transitional Environmental Program \(TEP\) fees](#)

An invoice for the fees incurred should be issued to the person or public authority that has submitted the draft TEP for approval at the time when the notice stating the Department's decision is issued.

How do I successfully issue a notice requiring a draft TEP?

Officers must complete an assessment report to document the decision to issue a notice requiring a draft TEP, as well as completing the notice.

Step 1 - Complete the Assessment Report

Before completing the notice requiring a draft TEP, officers must complete an assessment report. The assessment report sets out the facts and circumstances relating to the matter and documents the decision-making process of the Department in determining whether or not to issue the notice.

The following sections of the procedural guide are a guide to completing the assessment report. The numbering and headings of the sections in the procedural guide correlate with those in the assessment report for ease of reference.

The assessment report is not intended to replicate the Departmental file. Rather it should capture all critical aspects considered by the Department in making a decision. Accordingly, officers should include relevant points only. A template assessment report may be found on the Compliance Support Materials page on the Departmental intranet.

1. Brief history of the matter

Briefly outline any historical information relevant to the decision. This information should be presented in succinct chronological dot points and include how the Department became aware of the issues that led the Department to consider issuing a notice requiring a draft TEP.

For example:

- *Previous compliance inspections have identified risks with stormwater controls and management on the site (CA123 – Ecotrack – May 2008) (CA456 – Ecotrack – May 2009).*
- *The operator made significant investments in stormwater management infrastructure in 2002, however the business has grown substantially since this period with no changes to stormwater management.*
- *Discussions with the operator during a compliance inspection on 10 May 2010 indicated an acceptance of the need to investigate and pursue further stormwater management improvements and included a discussion of the potential submission of a draft TEP.*

- *The Department wrote to the operator on 1 June 2010 to advise of the outcomes of the May compliance inspection.*
- *The Department received an Annual Return Form from the operator attaching stormwater release monitoring results demonstrating non-compliance with development approval conditions C11 and C12.*
- *The Department issued a notice requiring a draft TEP to another timber preservation/treatment operator in the region for non-compliance with development approval conditions associated with stormwater management issues.*

2. Grounds for issuing a notice requiring a draft TEP

The legislation provides in Section 332 that the Department may require the submission of a draft TEP—

- as a condition of an environmental authority or
- as a development condition of a development approval.

The Department may also require the preparation and submission of a draft TEP if satisfied that—

- an activity carried out, or proposed to be carried out by the person or authority is causing, or may cause unlawful environmental harm or
- it is not practicable for the person or public authority to comply with an environmental protection policy or regulation on its commencement or
- a condition of an environmental authority held by the person or public authority is, or has been, contravened or
- a standard environmental condition of a code of environmental compliance for a chapter 4 activity is, or has been, contravened by the person or public authority or
- a development condition of a development approval is, or has been, contravened and the person or public authority is:
 - an owner of the land for which the approval is granted or
 - another person in whom the benefit of the approval vests.

In this section, an officer must identify the relevant grounds upon which the decision to issue the notice requiring a draft TEP is based. For example:

A timber preservation/treatment operator is required under development approval conditions to ensure that stormwater released from the site meets specific limits. A compliance inspection was undertaken on the site that identified some issues with stormwater controls and management. Following the inspection, a letter was sent by the Department to the operator advising of the outcomes of the inspection and reminding the operator of its responsibilities. The operator submitted monitoring results indicating that on occasion, stormwater was released from the site in breach of the release limits.

A notice requiring a draft TEP was issued to the operator based on the following grounds:

1. *that an activity carried out, or proposed to be carried out, by the person is causing, or may cause, environmental harm and/or*
2. *that a development condition of a development approval is, or has been, contravened and the person is an owner of the land for which the approval is granted.*

3. Expand upon the grounds

The purpose of this section is to clearly identify the elements, or what the Department must 'prove' before deciding to use a notice requiring a draft TEP, and should be used to expand upon the grounds which have previously been identified. This can include identifying the specific offence or breach under investigation or any statutory requirements listed in the legislation which must be met by the Department prior to issuing the notice.

In instances where one action has resulted in multiple breaches, each breach should be listed independently. For example, a site inspection could potentially detect a number of breached conditions associated with a single development approval. In this situation each breach would need to be proven on its own merits and should be listed separately.

Each ground (including breaches or requirements) should be allocated a separate number.

4. Detail the matters considered

The purpose of the table in the assessment report is to link the elements of the breach to the evidence gathered and the conclusions formed. This is achieved by identifying:

- the elements of any specific breach or allegation
- the evidence which has been considered for each element and
- the conclusion that has been reached by the officer after considering the information sourced.

When documenting the evidence, officers should limit the information to relevant points only. This can include (but is not limited to):

- notes recorded in an officer's official notebook
- samples collected for analysis and any subsequent lab reports
- photographs and copies of documents and
- any observed actions and direct testimony received from individuals.

The last column in the table requires officers to detail the relevant facts and circumstances. Officers are encouraged to consider the accuracy and relevance of available evidence, historical details, professional expertise and the weight attributed to any direct testimony provided.

After considering the details, evidence, facts and circumstances, officers are required to set out how the TEP would deal with the issues.

5. Provide for Natural Justice

Prior to the Department making a decision which may adversely impact on an individual or group it must:

- **Notify** - Notify the individual that the Department is considering issuing a notice requiring a draft TEP
- **Respond** - Provide the individual with an opportunity to respond to the allegation and
- **Consider** - Consider any representations made by the affected person before finalising the decision.

The seriousness of the matter will dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers should use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. In some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site

inspection or a telephone interview and to take contemporaneous notes. In more serious circumstances a written notification which includes a specific closing date for submissions should be used.

Regardless of the manner in which natural justice is afforded, any information provided by the affected person is to be documented. The summary of information should include how natural justice was provided as well as any responses given by the affected person. For example:

Following each of the compliance inspections, the Department wrote to the site operator advising of the outcomes of the inspections and the risks identified with stormwater management on the site:

- CA123 – May 2008
- CA456 – May 2009
- CA780 – May 2010

On-site discussions with the operator during the May 2010 compliance inspection indicated an acceptance of the need to investigate and pursue further stormwater management improvements and included commitments to consider drafting a voluntary TEP.

Since the May 2010 compliance inspection the Department has had further discussions with the operator, raising the implications of the exceedances of the release limits observed in the stormwater quality monitoring results for the last 12 months. The operator was also informed that the Department's intention was to issue a notice requiring a draft TEP and given a period of five business days to submit any further information for consideration by the Department. The operator did not submit any formal submissions to the Department but has advised by telephone of an intention to engage a suitably qualified consultant to assist with drafting a plan of action for site upgrades.

6. Proposed requirements of the TEP

Officers are required to include the following things (amongst other things as set out in s332(4)) in the notice requiring a draft TEP—

- the matters to be addressed by the program and
- the period over which the program is to be carried out and
- the day (at least a reasonable period after the notice is given) by which the program must be prepared and submitted to the Department.

In instances where it is recommended that requirements are imposed upon the affected person, officers are required to develop proposed requirements for consideration by the delegate. As affected persons are able to seek a review of the Department's decision to impose one or more conditions/requirements, it is necessary for officers to provide justification for their inclusion.

Requirements must be specific, measureable, achievable, relevant to the activity and time-specific. For further information, refer to the [Procedural Guide - Writing effective and enforceable conditions](#). For example:

Proposed requirement	Justification
<i>The draft TEP must include a stormwater management plan in order to cease all unlawful releases of stormwater from the site on or before 30 November 2011 and be submitted to DERM by 1 July 2011.</i>	<i>The development of a stormwater management plan is considered to be best practice and is a requirement which is currently being met at other ABC Pty Ltd development sites in Queensland. Compliance inspections conducted in May 2008, 2009</i>

The stormwater management plan must include the following—

1. *An assessment of the existing site infrastructure, including but not limited to:

 - (a) *a determination of the effectiveness of existing stormwater infrastructure in controlling stormwater runoff and capturing contaminants to prevent or minimise the release of contaminants to waters and*
 - (b) *a determination of the effectiveness of existing containment facilities associated with the storage, transport and production of materials in minimising the release of contaminants to the stormwater system and*
 - (c) *a determination of the effectiveness of current management practices and procedures regarding the minimisation of stormwater contamination.**
2. *An identification of measures to improve stormwater management on site, which must:

 - (a) *assess the adequacy of existing pollution control measures and*
 - (b) *identify opportunities to reduce areas of surface contamination and minimise contact of stormwater with contaminants and*
 - (c) *identify opportunities to separate the clean and contaminated stormwater catchments and*
 - (d) *identify opportunities for harvesting clean stormwater for beneficial reuse and*
 - (e) *identify the infrastructure (including its appropriate structural design) required to effectively manage stormwater in each of the stormwater catchments.**
3. *A program of activities to construct measures to improve stormwater management on the site, including but not limited to:

 - (a) *a program of activities informed by 1 and 2 above and*
 - (b) *stormwater quality monitoring to inform the effectiveness of (a) above.**
4. *The operator is required to propose a reasonable timetable for consideration of approval by the*

and 2010 have identified a number of exceedances of release limits of stormwater, with an increase in the last 12 months.

The Department has consulted with the operator on a number of occasions and discussed the implications of the exceedances. However, such consultation has not resulted in any action by the operator in relation to reducing unlawful stormwater releases.

The Department estimates that it will take at least 12 months for the operator to upgrade the site to a standard that results in compliance with stormwater release limits.

After considering all of the issues and the estimated time-frame for the operator to achieve compliance, the Department considers that requiring the operator to provide a draft TEP is the most appropriate and effective course of action.

As ABC Pty Ltd is currently operating in a regional area, the Department has allowed ABC Pty Ltd 9 weeks (5 weeks more than for an urban area) to develop the plan.

<i>administering authority for the above actions to be completed.</i>	
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7. Recommendation

The responsible officer is required to make a recommendation in relation to the alleged breach. For example:

<i>It is the opinion of the Department that ABC Pty Ltd failed to comply with development conditions D11 and D12 of development approval IPDE123456 by allowing stormwater to leave 24 Jones Road and enter Murphy Creek. After considering all factors the Department has determined that requiring a draft TEP would be the most effective way of achieving the operator's compliance with the development conditions. It is recommended that a notice requiring a draft TEP be issued.</i>

Administrative decisions are made based upon the balance of probabilities. This means that the decision-maker must be able to determine whether, based upon the information available, it was more likely than not that the event occurred.

Officers are encouraged to consider alternative actions/tools, the Department's enforcement guidelines, details of any consultations including site visit details and discussions with the ERA contact officer (if applicable) prior to making a recommendation. The reasonableness of proposed timeframes for the completion and submission of the draft TEP for consideration and approval, and the period over which the TEP is to be carried out, should be taken into account. For example, if the location is geographically isolated, or there is an impending wet season, the Department may consider allowing additional time for the recipient of the notice to prepare the draft TEP.

6. Approval

The assessment report is to be approved by an appropriately delegated officer. The Department's list of delegations can be found at: <http://insite2.dnr.qld.gov.au/derm/delegations/>

Step 2 - Complete the notice requiring a TEP

The notice requiring a draft TEP must meet a number of legislative requirements in order to be legally binding. A requirement to prepare and submit a draft TEP must be made by written notice which must state—

- the grounds on which the requirement is made and
- the matters to be addressed by the TEP and
- the period over which the TEP is to be carried out and
- the day (at least a reasonable period after the notice is given) by which the TEP must be prepared and submitted to the Department and
- the review or appeal details.

A template notice requiring a draft TEP is included in the TEP material.

The notice and the assessment report must be signed by the decision-maker.

Service of a notice requiring a draft TEP

Service means delivery to the party who will be responsible for actioning the notice. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the recipient in question.

Methods of service are provided for in ss39 and 39A of the *Acts Interpretation Act 1954* (AI Act).

A notice requiring a draft TEP may be served:

- on a person:
 - by delivering it to the person personally or
 - by leaving it at, or by sending it by post, facsimile or similar facility (e.g. email) to the person's last known place of residence or business or
- on a body corporate - by leaving it at, or sending it by post, facsimile or similar facility (e.g. email) to the head office, a registered office or a principal office of the body corporate.

The date, time and method of service should be documented by contemporaneous notes, a file note, any receipts arising from the postage or any facsimile confirmations and email 'read' receipts.

What follow-up is required?

It is important that the matter is appropriately followed up to make sure that the person to whom the notice requiring a draft TEP is issued complies within the required time-frame. Follow-up is to be scheduled by the relevant officer and confirmed with the business area manager. The business area manager is responsible for ensuring follow-up is undertaken within the agreed time frame.

Once a notice has been issued, dates for the submission of the draft TEP and the review and appeal periods should be diarised and monitored. If the draft TEP is not submitted by the due date, follow-up should be carried out by way of a site visit or telephone call. The recipient should be reminded that the time-frame has expired and that non-compliance with the notice could lead to prosecution.

The recipient of the notice requiring a draft TEP may contact the Department during the period of the notice and establish legitimate reasons for non-compliance with the relevant time frame. In this instance the Department may consider granting an extension of time. However, it must be remembered that the affected person should communicate any issues with time-frames prior to their expiration. For further information regarding amendments to an issued notice requiring a draft TEP, please see the paragraph below headed 'Amendments to an issued notice requiring a draft TEP'.

What are my record-keeping responsibilities?

Officers are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measures screen (this includes a decision to take no further action). Hard copies of any relevant documents should be placed on the paper file. The Department is required to make and record an informed decision about all allegations of non-compliance.

Amendments to an issued notice requiring a draft TEP

If minor changes to the notice requiring a draft TEP or an extension of time to respond are required, the recipient of the notice should be notified in writing.

If significant changes are required, officers should, in order to avoid confusion, repeal (revoke) the original notice, and issue a fresh one on the same grounds with the necessary changes.

The repeal and issue of a fresh notice requiring a draft TEP should be carried out in the same way, and subject to the same conditions as the issuing of the original notice. Accordingly, a new assessment report should be completed and endorsed by the appropriate delegate.

It is preferable if the decision to issue a fresh notice is made by the original decision-maker. If this is not possible the decision should be made by a person with the appropriate delegation who holds a position equal to or higher than that of the original decision-maker.

Officers should also update and record the changes or the decision to repeal and re-issue the notice in EcoTrack or CIRaM and place hard copies of any documents on the paper file.

Review of decisions and appeals

The provisions regarding review of decisions and appeals may be found in Chapter 11, Part 3 of the Act.

The Act specifies that a person who is dissatisfied by a decision made by the Department in respect to a notice requiring a draft TEP may apply for a review of an original decision by submitting an application on the approved form to the Department—

- within 10 business days after the day on which the person received notice of the original decision or the Department is taken to have made the decision, or
- if there are special circumstances, whatever longer period the Department allows.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#)

A person who has made an application for review of an original decision may immediately apply to the Planning and Environment Court for a stay of the decision.

If the person is dissatisfied with the review decision, the person may appeal against that decision to the Planning and Environment Court by filing written notice of appeal with the registrar of the Court within 22 business days after the day the person receives notice of the decision or the decision is taken to have been made, unless the Court extends the period for filing the notice of appeal.

The court may grant a stay of a decision appealed against until such time the appeal is decided. An appeal against a decision does not affect the operation or the carrying out of a decision unless the decision is stayed.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

Non-Compliance with a notice requiring a draft TEP

Officers must respond and may take further action in relation to non-compliance with a notice requiring a draft TEP. The following issues should be considered—

- **Providing extra time** – If extra time to comply has been granted, officers should document the details of the extra time allowed and the reasons for giving the extension of time. Confirmation of these details should be provided in writing to the recipient of the notice.
- **Other tools** – It may be that using another compliance tool would be more likely to achieve compliance. For example, issuing an Environmental Protection Order (EPO) in relation to the non-compliance may be a more appropriate way to achieve compliance due to the far higher penalty for breaching the EPO.
- **Prosecution** – If no other action is likely to be effective, officers should consider prosecuting a non-compliant recipient of a notice requiring a TEP for both failure to comply with the notice as well as for the environmental harm being caused.

What penalties exist for non-compliance with a notice requiring a draft TEP?

A person must comply with a notice requiring a draft TEP, unless the person has a reasonable excuse (s332(5)).

Maximum penalty for non-compliance with a notice requiring a TEP—

For an individual – 100 penalty units or \$10,000.00.

For a corporation – 500 penalty units or \$50,000.00.

Notice

Environmental Protection Act 1994 Transitional Environmental Program (TEP)

Notice requiring a draft TEP

This notice requiring a draft Transitional Environmental Program is issued by the administering authority pursuant to s332 of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our reference: Our reference

TAKE NOTICE that under the *Environmental Protection Act 1994* (the Act), a notice requiring a draft Transitional Environmental Program (TEP) is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department).

The notice requiring a draft TEP is issued in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of premises/place (the premises).

A. Grounds

The notice requiring a draft TEP is issued on the following grounds:

- Insert the applicable grounds under s332 of the Act.
- Insert the applicable grounds under s332 of the Act.
- Insert the applicable grounds under s332 of the Act.
- Insert the applicable grounds under s332 of the Act.

The facts and circumstances forming the basis for these grounds are:

- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.

- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.

B. Matters to be addressed by the TEP

You are required to address the following matters in the draft TEP:

1. Insert the matters to be addressed by the program.
2. Ensure the requirements are specific, measurable, attainable, relevant and time-specific.
3. Insert the matters to be addressed by the program.
4. Ensure the requirements are specific, measurable, attainable, relevant and time-specific.
5. Insert the matters to be addressed by the program.
6. Ensure the requirements are specific, measurable, attainable, relevant and time-specific.
7. Insert the matters to be addressed by the program.
8. Ensure the requirements are specific, measurable, attainable, relevant and time-specific.

The TEP is to be carried out [insert time period over which the TEP is to be carried out].

TAKE NOTICE that:

- The requirements of the notice requiring a draft TEP take effect immediately upon service of the notice
- This notice remains in force until further notice from the administering authority.
- The draft TEP must be prepared and submitted to the Department by date (must be at least a reasonable period after the notice is given).

C. Appeal rights

You may apply for a review of the decision to issue the notice requiring a draft TEP within ten business days of the service of the notice. You may also apply to the court for a stay of the decision to issue the notice.

If you are dissatisfied with the review decision, you may appeal against this decision to the Planning and Environment Court. Specific information regarding the process for seeking a review or appeal is attached to this notice.

However, the information outlining the review and appeal process under the *Environmental Protection Act 1994* is intended as a guide only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

D. Penalties

You must comply with this notice unless you have a reasonable excuse. The maximum penalties for non-compliance are:

- For an individual - \$10,000.00.

- For a corporation - \$50,000.00.

Should you have any queries in relation to this notice, please contact name of officer of the Department on telephone number telephone number.

Signature:

Date:

Name of delegate

Position of delegate

Delegate of the administering authority

Environmental Protection Act 1994

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Notice

Environmental Protection Act 1994 Environmental evaluation

Notice requiring additional relevant information

This notice requiring additional relevant information is issued by the administering authority pursuant to s326(4) of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our Reference: Our reference

TAKE NOTICE that under the *Environmental Protection Act 1994* a notice requiring additional further information on an environmental report is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department).

This notice requiring additional relevant information is issued in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of premises/place (the "said premises"). The additional relevant information is required in regard to a report on an environmental <PICK FROM LIST> submitted by you to the Department on date.

A. Grounds

The notice requiring additional relevant information is issued on the following grounds:

- Insert the applicable grounds under the relevant legislation.
- For example: A notice to conduct or commission an environmental [audit] OR [investigation] was given to you by the Department on [date].
- For example: An environmental report was submitted to the Department by you on [date].by you on [date].
- For example: The Department is satisfied that additional relevant information is required regarding the environmental evaluation and/or the report.
- For example: The Department requires you to give it the information.

The facts and circumstances forming the basis for these grounds are:

- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.

B. Requirements

The additional relevant information you are required to provide is as follows:

- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.

The additional relevant information must be submitted to the Department on or before:

- date

TAKE NOTE that:

- The requirements of the notice to provide additional relevant information take effect immediately upon service of the notice.
- This notice remains in force until further notice from the Department.
- You are responsible for meeting the costs of providing the additional relevant information to the Department.

C. Appeal rights

There is no specific provision in the Act for review or appeal regarding a notice to provide additional relevant information. A person aggrieved by the decision to issue this notice may be able to make an application under the *Judicial Review Act 1991* for a statutory order of review pursuant to s20 or 21 of that Act or a request for a statement of reasons for the decision pursuant to s32 of that Act.

However, the information outlining the review and appeal process under the *Judicial Review Act 1991* should be considered as general advice only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

Environmental Protection Act 1994
Notice requiring additional relevant information

Should you have any queries in relation to this notice, please contact name of officer of the Department on telephone number telephone number.

Signature

Date

Name of delegate

Position of delegate

Delegate of Administering Authority

Name of Act under which delegation provided

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Notice

Environmental Protection Act 1994 Environmental evaluation

Notice requiring additional relevant information

This notice requiring additional relevant information is issued by the administering authority pursuant to s326(4) of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our Reference: Our reference

TAKE NOTICE that under the *Environmental Protection Act 1994* a notice requiring additional further information on an environmental report is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department).

This notice requiring additional relevant information is issued in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of premises/place (the "said premises"). The additional relevant information is required in regard to a report on an environmental <PICK FROM LIST> submitted by you to the Department on date.

A. Grounds

The notice requiring additional relevant information is issued on the following grounds:

- Insert the applicable grounds under the relevant legislation.
- For example: A notice to conduct or commission an environmental [audit] OR [investigation] was given to you by the Department on [date].
- For example: An environmental report was submitted to the Department by you on [date].by you on [date].
- For example: The Department is satisfied that additional relevant information is required regarding the environemntal evaluation and/or the report.
- For example: The Department requires you to give it the information.

The facts and circumstances forming the basis for these grounds are:

- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.

B. Requirements

The additional relevant information you are required to provide is as follows:

- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.
- List the additional relevant information required by the Department.

The additional relevant information must be submitted to the Department on or before:

- date

TAKE NOTE that:

- The requirements of the notice to provide additional relevant information take effect immediately upon service of the notice.
- This notice remains in force until further notice from the Department.
- You are responsible for meeting the costs of providing the additional relevant information to the Department.

C. Appeal rights

There is no specific provision in the Act for review or appeal regarding a notice to provide additional relevant information. A person aggrieved by the decision to issue this notice may be able to make an application under the *Judicial Review Act 1991* for a statutory order of review pursuant to s20 or 21 of that Act or a request for a statement of reasons for the decision pursuant to s32 of that Act.

However, the information outlining the review and appeal process under the *Judicial Review Act 1991* should be considered as general advice only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

Environmental Protection Act 1994
Notice requiring additional relevant information

Should you have any queries in relation to this notice, please contact name of officer of the Department on telephone number telephone number.

Signature

Date

Name of delegate

Position of delegate

Delegate of Administering Authority

Name of Act under which delegation provided

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Assessment report

Environmental Protection Act 1994
Environmental evaluation

Part 1 – Notice to conduct or commission an environmental evaluation

This document is intended for internal use to assist environmental services officers to record the information considered by the Department when forming the decision to issue a notice to conduct or commission an environmental evaluation.

Identifying details	
Compliance activity number	Number
EcoTrack number	Number
Permit number	If applicable
File number	File number
Applicant number	Number
Trading as	Trading as details
Registered business address	Address
Date decision made	Date Note: Within eight business days after deciding to require an environmental audit or an environmental investigation, the Department must give the intended recipient of the notice an information notice about the decision. This requirement may be met by issuing the notice within the eight business day period.

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be approved by the environmental officer, supervisor (where possible) and the delegated decision-maker.

1. Grounds to issue a notice to conduct or commission an environmental evaluation

Please identify the relevant grounds upon which the decision to issue a notice to conduct or commission an environmental evaluation is based. Officers are required to establish whether the environmental evaluation required should be an environmental audit (s322) or an environmental investigation (s323).

- Environmental audit**
- A person who holds or is acting under an environmental authority (EA) is breaching, or has breached, a condition of the authority.

OR

- A person is contravening, or has contravened, a development condition of a development approval (DA).

OR

- A person is, or has been, contravening a regulation, an environmental protection policy or a transitional environmental program (TEP).

- Environmental investigation**

- An event has happened causing environmental harm while an activity was being carried out.

OR

- An activity has caused, or a proposed activity is likely to cause, environmental harm.

2. Expand upon the grounds

Please expand upon the grounds identified for issuing the notice to conduct or commission an environmental evaluation. This can include identifying a specific alleged offence or any statutory requirement which must be met prior to the Department using the notice.

Each ground should be listed independently and be allocated a separate number.

Number	Specific ground
1	Example: ABC Pty Ltd , a company carrying out effluent irrigation activities, has caused environmental harm by releasing contaminants onto a neighbouring property.
2	Example: ABC Pty Ltd has breached its TEP by releasing contaminants onto land from premises situated at 123 Creek Road, Murphyville that are owned by ABC Pty Ltd.
3	Example: ABC Pty Ltd is contravening a DA condition by causing salt scald on a neighbouring property due to the carrying out effluent irrigation activities on premises situated at 123 Creek Road, Murphyville.
4	

3. Brief history of the matter

Briefly outline any historical information relevant to this decision in chronological order.

Briefly outline the historical information in chronological order.

4. Detail the matters considered

The purpose of the following table is to ensure that there is evidence to support the grounds for using the statutory tool. This is achieved by linking the elements of the breach to the evidence gathered and the conclusions formed. This section should also record how the Department has met any statutory requirements associated with the use of the statutory tool.

When analysing evidence or developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of the information available, historical details, professional expertise and the weight attributed to any direct testimony provided.

<p>Elements of the offence or legislative requirement</p> <p><i>List the elements of any allegation or the grounds which must be met for issuing the notice to conduct or commission an environmental evaluation</i></p>	<p>Evidence</p> <p><i>Identify the information considered which is relevant to the elements or proving the grounds (i.e. statements, photographs, and recordings)</i></p>	<p>Facts and circumstances</p> <p><i>Detail the facts and circumstances that support the Department's findings.</i></p>
Number 1		
<p>1 July 2010 at 9.30am</p>	<p>File note of telephone call on 1 July 2010 at 9.30am from Mr Flower, owner of the property adjacent to the northern boundary of 123 Creek Road, Murphyville.</p>	<p>Mr Flower has alleged that effluent irrigation activities carried out by a neighbour, ABC Pty Ltd at 123 Creek Road, Murphyville, are causing salt scald to his property.</p>
<p>123 Creek Road, Murphyville (more particularly known as Lot 555 on RP 78987)</p>	<p>SLAM Data identifying property boundary</p>	<p>Shows the northern boundary of 123 Creek Road, Murphyville where it borders onto Lots 1 and 2 on RP 45678 which are owned by Mr Flower.</p>
<p>JP Citizen</p>	<p>Title Search identifying Mr Citizen as owner of 123 Creek Road, Murphyville.</p>	<p>Mr John Paul Citizen is the registered owner of 123 Creek Road, Murphyville, more particularly known as Lot 555 on RP 78987.</p>
<p>ABC Pty Ltd</p>	<p>ASIC company extract for ABC Pty Ltd.</p>	<p>ASIC company extract shows Mr JP Citizen to be the sole director and secretary of ABC Pty Ltd.</p>
<p>An activity is being carried out.....</p>	<p>Photographs (x 15) taken during site visit by Ms Green of DERM on 1 July 2010 showing a designated effluent irrigation area along the northern boundary of 123 Creek Road, Murphyville.</p>	<p>ABC Pty Ltd is carrying out effluent irrigation activities at 123 Creek Road, Murphyville which is inconsistent with its DA conditions.</p>
<p>An activity or proposed activity is causing, or is likely to cause environmental harm.....</p>	<p>File note of conversation with complainant Mr Flower during site visit on 1 July 2010 at 2.00pm to 4.00pm.</p>	<p>Mr Flower states that an area of his property adjacent to the northern boundary of 123 Murphy Road, Murphyville appears to have been affected by salt scald caused by</p>

		<p>effluent irrigation activities from mid 2009 and the following months.</p> <p>Mr Flower reported that the affected area had increased in size over a period of five to six months but had approximately doubled in size over the past three months.</p>
<p>It is alleged that contaminants have been released to land beyond the boundaries of 123 Creek Road, Murphyville.....</p>	<p>Photographs (x 16) taken of Lots 1 and 2 on RP 456 near northern boundary of 123 Creek Road, Murphyville by DERM officer Ms Green during site visit on 1 July 2010 during which Ms Green inspected the alleged salt affected area.</p>	<p>Ms Green noted what appeared to be a salt-affected area approximately 48 metres from north to south and approximately 37 metres from east to west on Lots 1 and 2 on RP 456. The area was approximately 10 metres down the slope from the northern boundary fence of 123 Creek Road, Murphyville.</p> <p>Photographs show the alleged salt-affected area has almost no living vegetation on it. Two trees upslope but adjacent to the affected area have recently died.</p>
	<p>Surface soil samples (0 to 10cm) were taken from two locations in the affected area and two other samples were taken nearby from which appears to be an unaffected area.</p>	<p>Results of the analysis carried out on the soil samples indicates salt scald of the alleged affected area on Lots 1 and 2 on RP 456.</p>
		<p>It is the conclusion of Ms Green, a senior environmental officer of DERM, that the salt scald on Mr Flower's property has been caused by the release of contaminants to land as a result of effluent irrigation activities carried out by ABC Pty Ltd at 123 Creek Road, Murphyville.</p> <p>Based on a site inspection, analysis of soil samples and discussions with the complainant, Mr Green is of the opinion that effluent irrigation activities being carried out by ABC</p>

		<p>Pty Ltd are causing environmental harm, namely salt scald, on an adjacent property.</p> <p>In the circumstances it is appropriate to issue a notice to conduct or commission an environmental evaluation (environmental investigation) to Mr John Paul Citizen as director of ABC Pty Ltd.</p>
Number 2		

5. Provide for natural justice

Officers are required to notify the affected person that the Department is considering issuing a notice to conduct or commission an environmental evaluation and that the individual is welcome to make representation to the Department as to why this action should not be taken. Any information provided by the affected person is to be documented and considered.

Sections 322(2) and 323(2) of the Act state that within eight business days after making a decision to require a person to conduct or commission an environmental audit or environmental investigation, the Department must give the person an information notice about the decision. The legislative requirements in regard to the information notice will be met by serving the notice to conduct or commission an environmental evaluation upon the individual concerned within 8 business days.

- The person has been provided with the opportunity to put their side of the story forward.
Describe how this was achieved.
- All information and/or defences provided have been considered.
Please describe any information or defences provided.
- The Department has considered the information or defences provided.
What consideration was given and what conclusions has the Department formed?
- The decision-maker and the environmental officer are free from bias or the perception of bias.

6. Relevant matters for the environmental evaluation

List any relevant matters for the environmental evaluation below – that is, the matters that the recipient of the notice will be required to investigate or audit.

The relevant matters must be SMART: specific, measurable, achievable, relevant and time specific. Refer to the [Writing effective and enforceable conditions procedural guide](#) for more information on writing conditions and/or requirements.

As the recipient can seek a review of the decision to require an environmental evaluation, officers are required to provide justification for the inclusion of the relevant matters.

Proposed relevant matter	Justification
Proposed relevant matter	Justification

7. Recommendation

The environmental officer is required to make a recommendation in relation to issuing the notice to conduct or commission an environmental investigation.

Recommendation:

Example: It is the opinion of the Department that ABC Pty Ltd failed to comply with its development conditions by allowing storm water to leave 24 Jones Road and enter Murphy Creek. It is recommended that a notice to conduct or commission an environmental evaluation be issued.

8. Approval

Environmental officer	Supervisor (if applicable)
Print name:	Print name:
Date:	Date:

Delegated decision-maker	Approve / reject recommendation (circle one)
--------------------------	--

Reasons for decision <i>For example:</i> <i>I endorse this recommendation based upon the information set out above.</i> <i>Or, I endorse this decision for the reasons set out above and I note Mr Rodgers has previously received a warning letter in relation to this matter.</i> <i>Or, I reject the above recommendation as I consider it more appropriate for the Department to take an educational approach to this breach.</i>
Print name:
Date:

Procedural guide

Environmental Protection Act 1994 Environmental evaluation

Part 1 – Notice to conduct or commission an environmental evaluation

This document is intended for internal use to assist Environmental Services officers to issue a notice to conduct or commission an environmental evaluation.

What is an environmental evaluation (s321)?

An environmental evaluation is an administrative tool designed to assess the nature, extent and cause of environmental harm being caused for the purpose of facilitating a solution to the problem.

The legislative provisions relating to environmental evaluations can be found in ss321 to 329 of the *Environmental Protection Act 1994* (the Act). The Act provides that an environmental evaluation is an evaluation of an activity or event to decide—

- the source, cause or extent of environmental harm being caused, or likely to be caused, by the activity or event and
- the need for a transitional environmental program for the activity or event.

There are two types of an environmental evaluation:

- (1) environmental audit (s322 of the Act)
- (2) environmental investigation (s323 of the Act)

A person given a notice to conduct or commission an environmental evaluation must carry out an audit or investigation into the matters stated in the notice and submit a report on that evaluation to the Department.

Who can issue a notice to conduct or commission an environmental evaluation?

A notice to conduct or commission an environmental evaluation can be issued by the administering authority or delegates of the administering authority.

Decisions made by individuals who do not have the delegated authority to make the decision will be found to be invalid.

As the individual (or position) that holds delegation changes regularly, officers must review the Department's list of delegations at <http://insite2.dnr.qld.gov.au/derm/delegations/>

When should I require an environmental evaluation?

(1) Environmental audit (s322)

The Department may require a person to conduct or commission an environmental audit and submit a report on the audit, if it is satisfied on reasonable grounds that a person is breaching a condition of an environmental

authority (EA) or contravening a regulation, environmental protection policy or a transitional environmental program (TEP) under the Act or contravening a development condition of a development approval (DA) given pursuant to the provisions of the *Sustainable Planning Act 2009*.

Example:

The Department has received a telephone call from a member of the public complaining of a foul smelling liquid emanating into Murphy Creek from the site of ABC Pty Ltd, operators of a sewage treatment plant. A limited site inspection carried out by a senior officer in the vicinity of Murphy Creek has confirmed the presence of a foul liquid being discharged from the site.

ABC Pty Ltd, the holder of Development Approval (DA) number 68754, must comply with a condition of the DA, which requires effluent to be appropriately treated and meet development approval water quality levels prior to being released. The Department is satisfied on reasonable grounds that treated effluent that is contaminated above development approval water quality release limits has been released into Murphy Creek.

In this instance, the Department does not know the exact cause of the treatment failure (e.g. could be volume of effluent to be treated, failure of biological treatment process, or possibly the quality of the influent) to be able to direct steps to be taken to rectify. An environmental audit would be the appropriate type of environmental evaluation to be used in the circumstances as the Department is satisfied on reasonable grounds that ABC Pty Ltd has contravened a development condition of DA number 68754 and requires further information in regard to the contravention so as to identify the cause of the problem and position the Department and holder of the DA as to what steps should then be taken to rectify the problem.

(2) Environmental investigation (s323)

The Department may require a person to conduct or commission an environmental investigation, and submit a report on the investigation, if it is satisfied on reasonable grounds that an event causing environmental harm has occurred while an activity was being carried out, or an activity or proposed activity is causing, or is likely to cause, environmental harm.

Example:

It has been alleged in a telephone call from a member of the public that ABC Pty Ltd, in the course of its business activities, has released a large amount of contaminated waste into Murphy Creek, thereby causing environmental harm. A senior officer of the Department has attended the site at Murphy Creek where it is alleged the contaminated waste was released and noted brown sludge oozing from the western boundary of the ABC Pty Ltd site into Murphy Creek. Water samples were taken from Murphy Creek and samples of the sludge were also taken from the area near the creek and from the western boundary of the ABC Pty Ltd site. Testing of the samples indicates that both the water and area surrounding Murphy Creek are contaminated with toxic chemicals. The same chemicals have been found in the sludge sample taken from near the ABC Pty Ltd site.

In the circumstances, the Department is satisfied on reasonable grounds that an event has happened causing environmental harm while ABC Pty Ltd was carrying out an activity. Accordingly it would be appropriate to require ABC Pty Ltd to carry out an environmental investigation.

A number of factors might need to be investigated in this instance, including obtaining information on how the release of toxic waste came about, what could have been done to prevent it, what could be done to prevent it happening again and the extent of the harm caused to the environment by the event.

Consider alternative tools

Before issuing a notice to conduct or commission an environmental evaluation, officers should consider if any other tool may be more suitable to use. For instance, it may be possible that the required information can be obtained by using a notice to provide relevant information under s451 of the Act. Or it may be more appropriate for preliminary investigation and testing to be done pursuant to the provisions of s453, or an initial inspection to be carried out under s454 of the Act.

What can the Department require someone to do in an environmental evaluation?

The notice to conduct or commission an environmental evaluation must set out the matters that the recipient is required to address in the evaluation. The matters must be aimed at determining the source, cause or extent of environmental harm being caused by the activity or event that the notice relates to. The recipient cannot be required to conduct an evaluation into matters that are not related to finding out about environmental harm.

The notice must not require the recipient to do things that are not in the nature of an evaluation. For example, the notice may require the recipient to conduct monitoring or sampling but may not require the recipient to implement a plan or carry out works. If officers require the recipient to take actions in addition to carrying out an environmental evaluation, an environmental protection order should be issued as well as the notice.

The notice may not require the recipient to submit interim reports.

How do I successfully issue a notice to conduct or commission an environmental evaluation?

Officers must complete an assessment report to document the decision as well as completing the notice to conduct or commission an environmental evaluation.

Step 1 - Complete the assessment report

Before completing the notice to conduct or commission an environmental evaluation, officers are required to complete an assessment report which sets out the facts and circumstances relating to the matter and documents the decision making process used by the Department in determining to issue the notice.

The following sections of the procedural guide are a guide to completing the assessment report. The numbering and headings of the sections in the procedural guide correlate with those in the assessment report for ease of reference.

The assessment report is not intended to replicate the departmental file. Rather it is designed to capture all critical aspects that have led to the Department's decision. Accordingly, officers are encouraged to limit the information included to relevant points only. A template assessment report is attached [\[LINK\]](#)

What follows is what is needed to assess:

1. Grounds for issuing a notice to conduct or commission an environmental evaluation

The legislation specifies that an environmental evaluation can only be required in certain circumstances. Please identify the relevant situation or 'grounds' upon which the decision to issue a notice to conduct or commission an environmental evaluation is based.

The Department may require a person to conduct or commission an environmental audit (s322 of the Act) if it is satisfied on reasonable grounds that—

- a person who holds or is acting under and environmental authority (EA) is, or has been, breaching a condition of the authority or
- a person is, or has been, contravening a development condition of a development approval (DA) or
- a person is or has been contravening a regulation, an environmental protection policy or a transitional environmental program (TEP).

OR

The Department may require a person to conduct or commission an environmental investigation (s323 of the Act) if it is satisfied on reasonable grounds that—

- an event has happened causing environmental harm while an activity was being carried out or
- an activity or proposed activity is causing, or is likely to cause environmental harm.

Officers will need to establish whether the environmental evaluation required should be an environmental audit (s322) or an environmental investigation (s323).

A definition of environmental harm may be found in s14 of the Act.

2. Expand upon the grounds

The purpose of this section is to clearly identify what the Department must ‘prove’ before deciding to issue a notice to conduct or commission an environmental evaluation and should be used to expand upon the grounds which have previously been identified. This should also include any statutory requirement listed in the legislation which must be met by the Department prior to issuing a notice to conduct or commission an environmental evaluation and can include identifying any specific offences or breaches under investigation.

In instances where one action has resulted in multiple breaches each breach should be listed independently. For example, a site inspection could potentially detect a number of breached conditions associated with a single development approval. In this situation each breach would need to be proven on its own merits and should be listed separately.

Each ground (including breaches or requirements) should be allocated a separate number.

3. Brief history of the matter

Please briefly outline any historical information relevant to this decision. This information should be presented in succinct chronological dot points and should include how the Department became aware of the alleged breach.

4. Detail the matters considered

The purpose of the table in the assessment report is to link the elements of the breach to the evidence gathered and the conclusions formed. This is achieved by identifying: the elements of any specific breach or allegation, the evidence which has been considered for each element, and the conclusion that has been reached by the officer after considering the information sourced.

When documenting the evidence considered officers are encouraged to limit the information to relevant points only. This can include (but is not limited to):

- notes recorded in an officer’s official notebook

- samples collected for analysis and any subsequent lab reports
- photographs and copies of documents and
- any observed actions and direct testimony received from individuals.

When developing the facts and circumstances, officers are encouraged to consider the accuracy and relevance of available evidence, historical details, professional expertise and the weight attributed to any direct testimony provided.

5. Provide for natural justice

Prior to the Department making a decision which may adversely impact on an individual or group the Department must:

- **Notify** - Notify the individual that the Department is considering making adverse findings
- **Respond** - Provide the individual with an opportunity to respond and
- **Consider** - Consider any representations made by the affected person before finalising the decision.

The seriousness of the matter will dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers are encouraged to use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. While in some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site inspection or a telephone interview and to take contemporaneous notes, in more serious circumstances a written notification which includes a specific closing date for submissions should be used.

6. Relevant matters for the environmental evaluation

Section 327 of the Act provides that the recipient of a notice to conduct or commission an environmental evaluation must meet the costs of carrying out the requirements of the notice and of providing any additional relevant information about the report required by the Department. Carrying out the environmental evaluation and preparing the required report may also cause down-time and potential loss of profits for the recipient of the notice. Officers should consider whether the expense and inconvenience to the recipient is justified in the circumstances.

The notice must set out the relevant matters for the environmental evaluation – that is, the issues that the recipient of the notice is required to investigate or audit. As the recipient can seek a review of the notice, it is necessary for officers to provide justification for the inclusion of each of the relevant matters.

The relevant matters must be specific, measureable, achievable, time-specific and relevant to the breach or reason why the notice to conduct or commission an environmental evaluation is being issued. For example:

On or before 5.00pm on 24 July 2010, ABC Pty Ltd will have carried out an assessment of affected soils and comparison with unaffected soils that addresses at least the following matters:

- (i) an analysis of affected soils, and comparable unaffected soils, for a range of analytes sufficient to identify any impacts that may have resulted from the irrigation of effluent on ABC Pty Ltd and*
- (ii) a description of the contaminants contained in the effluent irrigated and sludges applied on the ABC Pty Ltd site, including the results of a recent analysis of effluent and sludge for analytes found at elevated levels in soils from the affected area and*

(iii) the date, quality and quantity of effluent and sludge applied for each irrigation run in the area known as Lot 123 on RP 45678 from 1 June 2008 to 1 June 2010 and an analysis of rainfall records and soil moisture records at the times of irrigation for the same period and

(iv) an assessment of the quantity of contaminants applied per hectare in the area known as Lot 123 on RP 45678 from 1 June 2008 to 1 June 2010.

A copy of the assessment must be provided to the Department on or before 5.00pm on 24 July 2010.

7. Recommendation

The investigating officer is required to make a recommendation in relation to the alleged breach. For example:

It is the opinion of the Department that ABC Pty Ltd failed to comply with its development conditions by allowing storm water to leave 24 Jones Road and enter Murphy Creek. It is recommended that a notice to conduct or commission an environmental evaluation be issued.

Administrative decisions are made based upon the balance of probabilities. This means that the decision maker must be able to determine whether, based upon the information available, it was more likely than not that the event occurred.

Officers are encouraged to consider alternative actions/tools, departmental enforcement guidelines, details of any consultation undertaken including site visit details and discussions with the ERA contact officer. The reasonableness of proposed timeframes for the completion of requirements (for example, if earthworks are involved the Department should consider whether an impending wet season may result in delays, or if the location is geographically isolated the Department should consider allowing additional time to secure an appropriate contractors).

8. Approval

The assessment report is to be approved by an appropriately delegated officer. The Department's list of delegations can be found at: <http://insite2.dnr.qld.gov.au/derm/delegations/>.

Step 2 - Complete the notice to conduct or commission an environmental evaluation (s324)

Sections 322(2) and 323(2) of the Act provide that a requirement to conduct or commission an environmental evaluation must be made by written notice and must—

- state the grounds on which the requirement is made and
- outline the facts and circumstances forming the basis for the grounds and
- state the relevant matters for the evaluation and
- state the day (at least a reasonable period after the notice is given) by which an environmental report must be submitted to the Department.

Information notice

Sections 322(2) and 323(2) of the Act also state that within eight business days after making a decision to require a person to conduct or commission an environmental audit or environmental investigation, the

Department must give the person an information notice about the decision. The information notice must be in writing and must state the following—

- the decision and
- the reasons for the decision and
- the review or appeal details.

In order to meet these legislative requirements and to ensure the notice is readily understood by the recipient, the information required to be provided in the information notice must be included in the notice to conduct or commission an environmental evaluation. Officers should ensure that this notice is served upon the recipient within eight business days. If this is not possible, an information notice must be sent to the recipient within the eight business day period. The template notice to conduct or commission an environmental evaluation includes the information that must be included in the information notice.

A template notice to conduct or commission an environmental evaluation is attached [\[LINK\]](#)

A copy of the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#) should be attached to the notice.

The notice to conduct or commission an environmental evaluation should be signed by the decision maker in conjunction with the assessment report which records the formal decision.

Complete the statutory declarations

When an environmental report is submitted to the Department, it must be accompanied by statutory declarations signed by the recipient of the notice and the person who carried out the environmental evaluation (s325 of the Act). Copies of the template statutory declarations should be provided to the recipient of a notice to conduct or commission an environmental evaluation along with the notice itself. Template statutory declarations are attached: [\[LINK\]](#)

Service of a notice to conduct or commission an environmental evaluation

Service means delivery to the party who will be responsible for actioning the notice. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the recipient in question. Methods of service are provided for in ss39 and 39A of the *Acts Interpretation Act 1954* (AI Act).

For the purposes of any Act that requires a document to be served on (which includes 'given' or 'sent to') a person, the document may be served:

- on a person:
 - by delivering it to the person personally or
 - by leaving it at, or by sending it by post, facsimile or similar facility (e.g. email) to the person's last known place of residence or business or
- on a body corporate - by leaving it at, or sending it by post, facsimile or similar facility (e.g. email) to the head office, a registered office or a principal office of the body corporate.

The date time and method of service should be documented by contemporaneous notes, a file note, any receipts arising from the postage or any facsimile or email confirmations.

What follow-up is required?

It is important that the matter is appropriately followed up to make sure that the person to whom the notice to conduct or commission an environmental evaluation is issued is complying with any requirements imposed. Follow-up is to be scheduled by the relevant officer and confirmed with the business area manager. The relevant manager is responsible for ensuring follow up is undertaken within the agreed time frame.

This is usually achieved by checking that the environmental report has been received by the department by the due date, followed by a site inspection to be conducted one week after the time period nominated in the notice has expired. Officers are encouraged to use tools such as diary reminders to ensure the matter is followed up in a timely manner.

If the recipient of the notice fails to provide the environmental report by the due date, or the follow-up site visit uncovers further problems, officers must consider what further action should be taken. This may include enforcement action or the use of an alternative compliance tool, such as an environmental protection order (EPO) for example.

What are my record keeping responsibilities?

Officers are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measures screen (this includes a decision to take no further action). A hard copy of the notice to conduct or commission an environmental evaluation, the signed assessment report and any accompanying documents must be placed on the paper file. The Department is required to make, and record, an informed decision about all allegations of non-compliance.

It is important that officers adequately respond to and report on all inquiries in order to assist in building a comprehensive compliance history.

Amendments to an issued notice to conduct or commission an environmental evaluation

If minor changes to the notice to conduct or commission an environmental evaluation or an extension of time are required, the recipient of the notice should be notified in writing.

If significant changes are required, officers should, in order to avoid confusion, repeal (revoke) the original notice, and issue a fresh one on the same grounds with the necessary changes. It is important to note that the recipient will have a fresh appeal rights and should be advised accordingly.

The repeal and issue of a fresh notice to conduct or commission an environmental evaluation should be carried out in the same way, and subject to the same conditions as the issuing of the original notice. Accordingly, a new assessment report should be completed and endorsed by the appropriate delegate.

It is preferable if the decision is made by the original decision-maker. If this is not possible the decision should be made by a person with the appropriate delegation who holds a position equal or higher to that of the original decision-maker.

Officers should also update and record the changes or the decision to repeal and reissue the notice in EcoTrack and place hard copies of any documentation on the paper file.

Review of decisions and appeals (ss519 to 539 of the Act)

The provisions regarding review of decisions and appeals may be found in ss519 to 539 of the Act.

The Act specifies that a person who is dissatisfied by a decision by the Department in respect to an environmental evaluation may apply for a review of an original decision by submitting an application on the approved form to the Department within:

- within 10 business days after the day on which the person received notice of the original decision or the date when the Department is taken to have made the decision (the “review date”) or
- such longer period as allowed by the department if there are special circumstances.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#).

If the person is dissatisfied with the review decision, the person may appeal to the Planning and Environment Court by filing written notice with the court within 22 business days after the person receives notice of the review decision, unless this time period is extended by the court.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#).

What penalties exist for non-compliance with a notice to conduct or commission an environmental evaluation?

A person must comply with a notice to conduct or commission an environmental evaluation unless the person commences court proceedings or has a reasonable excuse.

Should a person fail to comply with a notice to conduct or commission an environmental evaluation, the Department may determine to commence legal proceedings.

The maximum penalty for an individual is 100 penalty units or \$10,000.00.

The maximum penalty for a corporation is 500 penalty units or \$50,000.00.

Notice

Environmental Protection Act 1994 Environmental Evaluation

Notice to conduct or commission an environmental evaluation¹

This notice to conduct or commission an environmental evaluation is issued by the administering authority pursuant to <PICK FROM LIST> of the Environmental Protection Act 1994.

Date

Recipient's name

Business name (if applicable)

Street address

Suburb, State and Postcode

Your reference: Your reference

Our Reference: Our reference

TAKE NOTICE that under the *Environmental Protection Act 1994* a notice to conduct or commission an environmental <PICK FROM LIST> is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department).

The notice to conduct or commission an environmental <PICK FROM LIST> is issued in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of premises/place (the "said premises").

A. Grounds

The notice to conduct or commission an environmental <PICK FROM LIST> is issued on the following grounds:

- Insert the applicable grounds under s322 or s 323.
- Insert the applicable grounds under s322 or s 323.
- Insert the applicable grounds under s322 or s 323.
- Insert the applicable grounds under s322 or s 323.

¹ An environmental evaluation may be either an environmental audit under section 322 or an environmental investigation under section 323.

Notice to conduct or commission an environmental evaluation

The facts and circumstances forming the basis for these grounds are:

- Only factors which directly relate to the decision are to be included.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.
- Insert the facts and circumstances that form the factual basis for the grounds.

B. Requirements

The report on the environmental <PICK FROM LIST> must address the following matters:

- List the matters that the person must address in the report on the environmental audit/investigation.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- List the matters that the person must address in the report on the environmental audit/investigation.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- List the matters that the person must address in the report on the environmental audit/investigation.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- List the matters that the person must address in the report on the environmental audit/investigation.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.

Section 325 of the Act specifies that a statutory declaration by both the recipient of this notice and the person who carries out the environmental <PICK FROM LIST> must accompany the environmental report. Statutory declaration forms are attached. The report on the environmental <PICK FROM LIST> must be submitted to the Department on or before:

- date

TAKE NOTICE that:

- The requirements of the notice to conduct or commission an environmental <PICK FROM LIST> take effect immediately upon service of the notice.
- This notice remains in force until further notice from the administering authority.
- You are responsible for meeting the costs of conducting or commissioning the environmental evaluation and preparing the environmental report.

Notice to conduct or commission an environmental evaluation

C. Appeal Rights

If you are dissatisfied with the decision to issue the notice to conduct or commission an environmental <PICK FROM LIST>, you may apply to the Department for a review of this decision within ten business days of the service of the notice. You may also apply to the Court for a stay of the decision to issue this notice.

If you are dissatisfied with the review decision, you may appeal against this decision to the Planning and Environment Court. Further information about the review and appeal process is attached to this notice. However, the information outlining the review and appeal process under the *Environmental Protection Act 1994* should be considered as general advice only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

D. Penalty

A person must comply with a requirement to conduct or commission an environmental <PICK FROM LIST>.

The maximum penalty for an individual is \$10,000.00.

The maximum penalty for a corporation is \$50,000.00.

Should you have any queries in relation to this notice, please contact name of officer of the Department on telephone number telephone number.

Signature

Date

Name of delegate

Position of delegate

Delegate of Administering Authority

Environmental Protection Act 1994

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Notice

Environmental Protection Act 1994 Environmental evaluation

Notice to conduct or commission another environmental evaluation¹

This notice to conduct or commission another environmental evaluation is issued by the administering authority pursuant to s326(3) of the Environmental Protection Act 1994.

Date

Recipient's name

Street address

Suburb, State and Postcode

Your reference: Your reference

Our Reference: Our reference

TAKE NOTICE that under the *Environmental Protection Act 1994* a notice to conduct or commission another environmental <PICK FROM LIST> is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department).

The notice to conduct or commission another environmental <PICK FROM LIST> is issued in respect to the activities of recipient's name at premises/place on land described as Lot lot number on RP/SP plan number situated at address of premises/place (the premises).

A. Grounds

The notice to conduct or commission another environmental <PICK ONE> is issued on the following grounds:

- For example: A notice to conduct or commission an environmental [audit] OR [investigation] was given to you by the Department on [date].
- For example: An environmental report was submitted to the Department by you on [date].by you on [date].
- For example: The Department is satisfied the report does not adequately address the relevant matters for the environmental evaluation to which the report relates.

¹ An environmental evaluation may be either an environmental audit under section 322 or an environmental investigation under section 323.

Notice to conduct or commission another environmental evaluation

- For example: The Department requires the recipient to conduct or commission another environmental [audit] or [investigation].
- You are required to conduct or commission another environmental [audit] OR [investigation] and submit a report on the [audit] OR [investigation] to the Department.

The Department is satisfied the report provided by you on date does not adequately address the following relevant matters:

- State which matters in the original notice were not adequately addressed in the report and provide reasons why this is the case.
- State which matters in the original notice were not adequately addressed in the report and provide reasons why this is the case.
- State which matters in the original notice were not adequately addressed in the report and provide reasons why this is the case.
- State which matters in the original notice were not adequately addressed in the report and provide reasons why this is the case.
- State which matters in the original notice were not adequately addressed in the report and provide reasons why this is the case.
- State which matters in the original notice were not adequately addressed in the report and provide reasons why this is the case.

B. Requirements

The report on the environmental <PICK FROM LIST> must address the following matters:

- List the matters that the person must address in the report on the environmental audit/investigation.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- List the matters that the person must address in the report on the environmental audit/investigation.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
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- Ensure the requirements are specific, measurable, attainable, relevant and time specific.
- List the matters that the person must address in the report on the environmental audit/investigation.
- Ensure the requirements are specific, measurable, attainable, relevant and time specific.

Section 325 of the Act specifies that a statutory declaration by both the recipient of this notice and the person who carries out the environmental <PICK FROM LIST> must accompany the environmental report. Statutory declaration forms are attached. The report on the environmental <PICK FROM LIST> must be submitted to the Department on or before:

Notice to conduct or commission another environmental evaluation

- date

TAKE NOTE that:

- The requirements of the notice to conduct or commission an environmental <PICK FROM LIST> take effect immediately upon service of the notice.
- This notice remains in force until further notice from the Department.
- You are responsible for meeting the costs of conducting or commissioning the environmental evaluation and preparing the environmental report.

C. Appeal rights

There is no specific provision in the Act for review or appeal regarding a notice to conduct or commission another environmental evaluation. A person aggrieved by the decision to issue this notice may be able to make an application under the *Judicial Review Act 1991* for a statutory order of review pursuant to s20 or 21 of that Act or a request for a statement of reasons for the decision pursuant to s32 of that Act.

However, the information outlining the review and appeal process under the *Judicial Review Act 1991* should be considered as general advice only. You may have other legal rights and obligations and should seek and be guided by your own legal advice.

Should you have any queries in relation to this notice, please contact name of officer of the Department on telephone number telephone number.

Signature

Date

Name of delegate

Position of delegate

Delegate of the Administering Authority

Name of Act under which delegation provided

Enquiries:

Local office details

Tel: 1300 130 372 or local no

Fax: 07 3896 3342 or local no

Administrative Policy Outlining Exercise of Delegated Powers

The object of this policy is to ensure that the appropriate people are exercising powers in relation to their appointment as Project Directors and Project Managers for specific projects. This should lead to the better achievement of the objects of the relevant legislation. This policy is not to be construed as a fetter on the way in which processes are to be exercised by Project Directors and Project Managers.

General provisions

- The delegate is defined by position rather than by name. Under section 27A of the Acts Interpretation Act 1954, it is possible to delegate to a named office (as opposed to the person holding the office at the time). This approach has been adopted with these delegations. Therefore a person temporarily acting in a named office which holds a delegation is entitled to exercise those delegations associated with the position. However, delegates should note that they cannot delegate their powers to another person in a named office.
- When exercising a delegation you must ensure that due process is followed in accordance with the relevant legislation, policies and procedures and that advice is sought when necessary from Agency officers with appropriate expertise.
- Where a delegate is required to give reasons for their decision, section 27B (Content of statement of reasons for decision) of the Acts Interpretation Act 1954 applies. 'Ecotrack' provides for the recording of reasons for every decision.
- All work associated with a delegation must be carried out in a timely manner having regard to the circumstance of the case.
- In all cases where a person is required to perform an act or do any thing, a reasonable time for the performance of the act or thing must be allowed.
- Delegates need to be aware that all documentation (including information stored in 'ecotrack') can be subject to the Freedom of Information Act 1992.
- Delegates need to be aware that their decisions are open to judicial appeal under the Judicial Review Act 1991 as well as any other appeal or review procedures contained in the legislation under which they are making their decisions.

Specific provisions

These provisions relate to the exercise of delegations under 'ecoaccess', i.e. they relate only to licensing and permitting.

- These delegations provide officers with very broad powers under a number of pieces of legislation rather than just under one piece of legislation. This administrative policy limits the situations in which

Administrative Policy Outlining Exercise of Delegated Powers

officers may exercise their delegated powers. Officers must consider this policy when exercising their delegated powers under 'ecoaccess'.

- Project Directors who have been properly appointed for level 2-4 projects, may exercise all their delegations where necessary in relation to the projects to which they have been appointed. The delegated powers include the ability to make decisions whether to grant or refuse applications as well as any other powers which are necessary to assist the Project Manager with the smooth running of the project.
- If an officer has not been appointed as a Project Director or a Project Manager they may not exercise the powers which they have been delegated.
- Properly appointed Project Managers for level 2-4 projects, may exercise all their delegated powers which are necessary to carry out their role in managing the project. This does not include the powers necessary to make a decision whether to grant or refuse an application but does include powers such as issuing a request for further information.
- For level 1 projects, the Project Managers are LPCU officers. LPCU officers may exercise all their delegated powers which are necessary to manage projects which the Manager LPCU has allocated to them.
- For level 1 projects lodged with the LPCU, the Project Director is the Manager LPCU or Team Supervisor LPCU. These positions may exercise all their delegations in relation to the projects for which they are appointed as Project Director. Their delegated powers include the ability to make decisions whether to grant or refuse an application as well as any other powers which are necessary to assist the Project Manager with the smooth running of the project.
- For urgent applications for level 1 projects, which are walked into a regional office, District Managers, Senior Rangers and above, will exercise all the powers necessary to act as the Project Director.
- Where a project team member and the Project Manager is one and the same officer for the one project, the officer may exercise all the delegations necessary to carry out the role as a Project Manager and make a recommendation to the decision maker (the Project Director).
- There should be no situation where the Project Director and the Project Manager are the same for one project. A person cannot exercise the powers of an assessing officer (Project Manager) and a decision maker (Project Director) for the same project.
- It would be prudent for Project Managers to obtain all relevant information, including knowledge which may be possessed in the Agency. Nevertheless, a delegate, in making a decision, must comply with the instrument of delegation and therefore a knowledge of the relevant legislation and section 27A of the Acts Interpretation Act 1954 will be required.

Pre-inspection communication

Letter advising of compliance inspection

Date

Recipient's name

Street address

Suburb, State and postal code

Your reference: Your reference

Our reference: Our reference

Dear Sir/Madam

Compliance inspection: Name of recipient's business

We write to inform you that the Department of Environment and Resource Management (the Department) will be carrying out a compliance inspection at the premises of name of recipient's business, situated at address of site where inspection to be carried out on date of inspection at time of inspection.

Objectives and scope of the inspection

The objectives and scope of the inspection include:

- For example: The objectives include assessing your compliance with development approval number 12345.
- For example: The inspection will focus predominantly on water management.
- List the objectives and scope of the inspection.
- List the objectives and scope of the inspection.
- List the objectives and scope of the inspection.

It is anticipated that, subject to site conditions and excluding any site induction, Departmental officers will be present on-site for approximately insert anticipated time on-site.

Requirements

Your assistance prior to, and during the inspection process will be greatly appreciated and will help facilitate an efficient site inspection. Please provide the Department with the following information by close of business on date:

1. Any health and safety requirements, including site induction requirements and personal protection equipment (PPE) required for this visit.
2. The name and contact details of the site representative who will accompany Departmental officers during the compliance inspection.
3. Insert required information (e.g. groundwater monitoring data, etc).
4. Insert required information (e.g. site based management plan, etc).
5. Insert required information (e.g. rehabilitation plan, etc).

On the day of the inspection please ensure that:

- key site personnel responsible for [focus of inspection e.g. water management] are available for discussion during the inspection
- all relevant records and documents are available for viewing.

What will happen during the inspection?

During the inspection, Departmental officers may use photographic equipment to record details of the inspection and may take effluent, soil, surface water and/or groundwater samples . We may also need to speak with your staff about list relevant matters .

Further information

If you require any further information please contact name of officer on insert phone number, email address.

Signature:

Date:

Enquiries:

Name of officer

Position

Tel: Local number

Fax: Local number

Pre-inspection communication

Letter advising of compliance inspection

Date

Recipient's name

Street address

Suburb, State and postal code

Your reference: Your reference

Our reference: Our reference

Dear Sir/Madam

Compliance inspection: Name of recipient's business

We write to inform you that the Department of Environment and Resource Management (the Department) will be carrying out a compliance inspection at the premises of name of recipient's business, situated at address of site where inspection to be carried out on date of inspection at time of inspection.

Objectives and scope of the inspection

The objectives and scope of the inspection include:

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Requirements

Your assistance prior to, and during the inspection process will be greatly appreciated and will help facilitate an efficient site inspection. Please provide the Department with the following information by close of business on date:

1. Any health and safety requirements, including site induction requirements and personal protection equipment (PPE) required for this visit.
2. The name and contact details of the site representative who will accompany Departmental officers during the compliance inspection.
3. Insert required information (e.g. groundwater monitoring data, etc).
4. Insert required information (e.g. site based management plan, etc).
5. Insert required information (e.g. rehabilitation plan, etc).

On the day of the inspection please ensure that:

- key site personnel responsible for [focus of inspection e.g. water management] are available for discussion during the inspection
- all relevant records and documents are available for viewing.

What will happen during the inspection?

During the inspection, Departmental officers may use photographic equipment to record details of the inspection and may take effluent, soil, surface water and/or groundwater samples . We may also need to speak with your staff about list relevant matters .

Further information

If you require any further information please contact name of officer on insert phone number, email address.

Signature:

Date:

Enquiries:

Name of officer

Position

Tel: Local number

Fax: Local number

Letter advising the inspection report not finalised

Date

Recipient's name

Street address

Suburb, State and postal code

Your reference: Your reference

Our reference: Your reference

Dear Sir/Madam

Environmental compliance inspection

I refer to the site inspection of recipient's name conducted at recipient's address, by environmental officer name of the Department of Environment and Resource Management (the Department). Thank you for the time and assistance provided by you and your staff during the inspection.

The Department has not yet finalised its inspection report. It is anticipated that this report will be completed by date. Following finalisation of the report the Department will write to you and outline any requirements for action.

Further information

Should you require any further information, wish to provide any information or if you foresee any difficulties, please contact name of officer on insert phone number, email address.

Signature:

Date:

Enquiries:

Name of officer

Position

Ph 1300 130 372 or local no

Fax (07)3896 3342 or local no

Post compliance inspection communication

Post-inspection letter

Enquiries Name of officer
Telephone Telephone number
Our Ref: Our ref
Your Ref Your ref

Date

Recipient's name
Street address
Suburb, State and Postcode

Dear Recipient's name

Proactive Environmental Compliance Inspection - Date of inspection

I refer to the site inspection of client name at address where compliance inspection carried out conducted by environmental [officer] OR [officers] name(s) of DERM officer(s) of the Department of Environment and Resource Management (the Department).

The site inspection was conducted in the presence of [client name] [and] OR [or] employee, [employee name]. The purpose of the inspection was to evaluate compliance with the development approval DA number of Code of Compliance issued by the Department in date of issue of [DA] OR [Code of Compliance]. Thank you to you and your staff for providing your time and assistance during the site inspection.

The Department has finalised the inspection and identified a range of non-compliance matters outlined in Table 1. Under section 435 of the *Environmental Protection Act 1994*, it is an offence to contravene a development condition of a development approval. This is regarded as a serious offence, the maximum penalty for an individual being \$200,000.00 or two year's imprisonment. The maximum penalty for a corporation is \$1,000,000.00.

In response to the identified non-compliance matters and alleged offences, please provide a written report to the Department by the date by which report required outlining how these matters will be addressed and what measures will be implemented to bring them into compliance with the relevant legislation.

Additionally, please find attached at Table 2 with further observations of concern for your consideration.

Should you wish to discuss any of the matters raised in this letter, please liaise with Environmental officer's name and title who can be contacted by telephone on Officer's telephone number.

Yours sincerely

Manager's name
Manager
Environmental Services, Manager location

Table 1:

Insert Part 1 of Part G (Inspection results summary) of the Inspection Toolkit.

Table 2:

Insert Part 2 of Part G (Inspection results summary) of the Inspection Toolkit.

Post compliance inspection communication

Post-inspection letter

Enquiries Name of officer
Telephone Telephone number
Our Ref: Our ref
Your Ref Your ref

Date

Recipient's name
Street address
Suburb, State and Postcode

Dear Recipient's name

Proactive Environmental Compliance Inspection - Date of inspection

I refer to the site inspection of client name at address where compliance inspection carried out conducted by environmental [officer] OR [officers] name(s) of DERM officer(s) of the Department of Environment and Resource Management (the Department).

The site inspection was conducted in the presence of [client name] [and] OR [or] employee, [employee name]. The purpose of the inspection was to evaluate compliance with the development approval DA number of Code of Compliance issued by the Department in date of issue of [DA] OR [Code of Compliance]. Thank you to you and your staff for providing your time and assistance during the site inspection.

The Department has finalised the inspection and identified a range of non-compliance matters outlined in Table 1. Under section 435 of the *Environmental Protection Act 1994*, it is an offence to contravene a development condition of a development approval. This is regarded as a serious offence, the maximum penalty for an individual being \$200,000.00 or two year's imprisonment. The maximum penalty for a corporation is \$1,000,000.00.

In response to the identified non-compliance matters and alleged offences, please provide a written report to the Department by the date by which report required outlining how these matters will be addressed and what measures will be implemented to bring them into compliance with the relevant legislation.

Additionally, please find attached at Table 2 with further observations of concern for your consideration.

Should you wish to discuss any of the matters raised in this letter, please liaise with Environmental officer's name and title who can be contacted by telephone on Officer's telephone number.

Yours sincerely

Manager's name
Manager
Environmental Services, Manager location

Table 1:

Insert Part 1 of Part G (Inspection results summary) of the Inspection Toolkit.

Table 2:

Insert Part 2 of Part G (Inspection results summary) of the Inspection Toolkit.

Notice

Environmental Protection Act

Prepare a draft transitional environmental program

This statutory notice is issued by the administering authority pursuant to section 332 of the Environmental Protection Act 1994, to advise you of a decision or action.

Your reference : <INSERT reference>

Our reference : <INSERT reference>

<INSERT recipient's name>

<INSERT street address>

<INSERT suburb, state and postal code>

Attention: < INSERT principal contact>,

Re: Draft transitional environmental program for <INSERT reason for TEP> at <INSERT location for activity with TEP>.

The Department of Environment and Resource Management has decided to require you to prepare, or commission the preparation of, a draft transitional environmental program. This requirement is because of a condition of your environmental authority number <INSERT EA no.>.

of a development condition of your development approval.

the person carrying out <INSERT activity> at premises/place on land described as <INSERT lot> on Plan <INSERT plan>, located at <INSERT street address>, is causing, or may cause, unlawful environmental harm.

you are unable to comply with an environmental protection policy, on its commencement.

you are unable to comply with an environmental protection regulation, on its commencement.

a condition of your environmental authority number <INSERT EA no.> is, or has been, contravened.

a development condition of your development approval, is, or has been, contravened.

a standard environmental condition of a code of environmental compliance is, or has been, contravened.

The draft transitional environmental program must be submitted to the Department of Environment and Resource Management at the address at the end of this notice by <INSERT date>.

The program is required based on the following grounds:

<INSERT grounds>

The program must address the following matters:

<INSERT specific issues to be addressed>

Prepare a draft transitional management program

The transitional environmental program is to be carried out over the period <INSERT period>.

Fees apply for the assessment of a draft transitional environmental program and any subsequent annual returns. The fees are outlined in the attached operational policy *Transitional environmental program (EMP) fees*.

You may apply to the Department of Environment and Resource Management for a review of this decision within 10 business days of receiving this Notice. You may also appeal against this decision to the Planning and Environment Court.

Information outlining the review and appeal processes under the *Environmental Protection Act 1994* is included with this notice. This information is intended as a guide only. You may have other legal rights and obligations

Should you have any queries in relation to this notice, <INSERT contact officer's name> of the Department of Environment and Resource Management on telephone <INSERT phone number> would be happy to assist you.

SIGNATURE

<INSERT delegate's name>
<INSERT delegate's position>
<INSERT delegate>
<INSERT Act or Agency>

DATE

Enquiries:

<INSERT Permit and Licence Management or local office details>

Ph. <INSERT 1300 130 372 or local no.>

Fax. <INSERT (07) 3896 3342 or local no.>

Choosing the appropriate statutory tool to respond to non-compliance

This procedural guide provides assistance to officers in choosing the most appropriate statutory tools available for responding to alleged non-compliance under the Environmental Protection Act 1994 and the Sustainable Planning Act 2009. It should be read in conjunction with the procedural guides for each tool, which cover the tools in more detail.

Introduction

This procedural guide outlines the statutory tools that are available to the Department under the *Environmental Protection Act 1994* (EP Act) and *Sustainable Planning Act 2009* (SP Act). It provides guidance on which tools are suitable for use in different situations. When using statutory tools, bear in mind that there is no strict hierarchy to be followed when using tools, but that each tool does a different job. It may also be appropriate to use a combination of tools to achieve the desired outcome.

The tools outlined in this guide are all aimed at addressing the environmental consequences of a breach of either the EP Act or SP Act. They are used not to punish or deter people, but to make sure that environmental harm is minimised or prevented and that people comply with their obligations.

This guide does not discuss actions which are mainly aimed at punishing an offender or deterring future breaches, such as penalty infringement notices or warning notices.

Statutory tools

Environmental evaluation (Chapter 7 Part 2 EP Act)

Environmental evaluations (EEs) are an evaluation of an activity or event to decide the source, cause or extent of environmental harm being or likely to be caused, and whether a transitional environmental program (TEP) is needed. There are two types of EE's: environmental audits and environmental investigations. Environmental audits are used where there has been a contravention of an environmental authority (EA), development approval (DA), regulation, environmental protection policy (EPP) or a TEP. Environmental investigations are used where an event or activity is causing actual or potential environmental harm.

EEs are best used where you do not know the cause, nature or extent of a problem or the solution to a problem. They answer the questions "What is happening", and "What is the solution"? EEs require the person responsible for the problem to investigate (or commission someone to investigate) the problem and submit a report to DERM. They do not in themselves fix the problem, but give you the information you need to then decide what needs to be done about the problem. The information in the reports are often used to decide whether a TEP, environmental protection order (EPO), amendment to a DA condition or other action is needed to address the problem.

Some advantages of using an EE include that they require a person to carry out an investigation by a specified date; the person carrying out the investigation has to sign a statutory declaration confirming that the information in the report is true and correct; and that it is an offence for a person not to comply with the notice to carry out the EE.

Choosing the appropriate statutory tool to respond to non-compliance

For more information on environmental evaluations refer to the [Environmental Evaluations Procedural Guide](#). A template [notice to conduct or commission an environmental evaluation](#) is also available on Ecosteps.

Transitional environmental program (TEP) (Chapter 7 Part 3 EP Act)

TEPs are specific programs that achieve compliance by reducing environmental harm or detailing the transition to an environmental standard. The Department may require a person or public authority to prepare and submit for approval a draft TEP in the following circumstances:

- As a condition of an EA or DA
- If an activity is causing or may cause environmental harm
- If it is not practicable for someone to comply with an EPP or regulation on its commencement
- If a condition of an EA or DA has been contravened
- If a standard environmental condition of a code of environmental compliance for a chapter 4 activity has been contravened

TEPs are a good tool to use when it is known what needs to be done to achieve a solution to an environmental problem, and the solution is likely to take a long period of time (months to years) to implement. A TEP should not involve an extensive investigation to work out what needs to be done; this should be done by an EE before the TEP is approved.

Once approved, a TEP gives the holder immunity from prosecution for continuing harm during the life of the TEP. This allows the “breathing space” to do the works needed in order to bring them into compliance. It also means that you must be confident that the activities proposed in a draft TEP will be sufficient to bring the person into compliance.

For more information on Transitional Environmental Programs refer to the [Transitional Environmental Programs Procedural Guide](#).

Environmental protection order (Chapter 7, Part 5 EP Act)

An EPO is used to require someone either to take or to not take a certain specified action in order to prevent or minimise environmental harm. EPOs are a good tool to use when it is known what action needs to be taken and if the action needs to be undertaken over a relatively short timeframe. EPOs can be used in the following circumstances:

- If a person does not comply with a requirement to conduct or commission an EE
- If a person does not comply with a requirement to prepare a TEP
- If an EE shows that unlawful environmental harm is being or is likely to be caused by a activity
- To secure compliance with:
 - the general environmental duty;
 - an EPP;
 - a condition of an EA or DA;
 - a standard environmental condition of a code of environmental compliance for a chapter 4 activity;
 - a condition of a site management plan;

Choosing the appropriate statutory tool to respond to non-compliance

- an audit notice;
- a surrender notice;
- a rehabilitation direction;
- a regulation; or
- an accredited environmental risk management plan.

EPOs should not be used where extensive work needs to be undertaken over a long period of time (use a TEP) or an investigation is required to work out what is causing harm or what needs to be done to rectify it (use an EE). EPOs may only be used in order to prevent or minimise environmental harm.

As with all statutory tools, it is important that once an EPO is issued, you follow up to make sure that the person to whom it is issued is complying with its requirements. If they are not complying, you should take appropriate follow up action (which could range from an informal warning, to issuing a penalty infringement notice or recommending that a matter be referred to the Investigations Team for investigation with a view to possible court action).

For more information on EPOs refer to the [Environmental Protection Orders Procedural Guide](#). An [Environmental Protection Order](#) template is also available on Ecosteps.

Direction notice (Chapter 7, Part 5A EP Act)

Direction notices can be issued for offences relating to environmental nuisance (s 440 EP Act), for contravention of a noise standard (s 440Q EP Act), and for depositing prescribed water contaminants (s 440ZG EP Act). Because responsibility for most of these offences has been devolved to local government, departmental officers will generally only use direction notices where these offence have been committed by the State or a local government, a government owned corporation or an instrumentality or agency of the State or a local government. Direction notices can also be issued for contravening a provision of an accredited environmental risk management plan.

Direction notices can be issued if someone is committing an offence, or if they have committed an offence and it is likely that they will continue or repeat the offence. Direction notices cannot be issued if an offence has happened and it is not likely that the offence will be repeated. In other words, they are designed to make sure that an ongoing offence stops, or that an offence does not happen again.

A direction notice may only be issued if the matter relating to the contravention can be remedied, it is known what action should be taken and if it is appropriate to give the person an opportunity to remedy the matter.

For more information, refer to the [Direction Notices Procedural Guide](#). A [Direction Notice](#) template is available on Ecosteps.

Clean-up notice (Chapter 7, Part 5B EP Act)

Clean-up notices may be issued to ensure that a contamination incident (contamination of the environment that has caused or is likely to cause serious or material environmental harm) is cleaned up. Clean-up notices can be issued to a wider range of people than an EPO, and can be issued to someone who is not directly responsible for a contamination incident. Clean-up notices can be issued to:

- someone causing or permitting, or who caused or permitted, a contamination incident to happen;
- a person who, at the time the incident happened, was the occupier of the place where the incident happened;
- a person who, at the time the incident happened, was the owner or person in control of a contaminant involved in the incident.

Choosing the appropriate statutory tool to respond to non-compliance

For example, Company A operates a transport company. Company B consigns a load of chemicals to Company A, which loads it on to a truck operated by Mr C at the depot operated by Company A. During the loading, Mr C's negligence causes the chemicals to spill into a drain leading to a waterway. Serious environmental harm results. A clean up notice could be issued to Mr C (who caused the incident to happen), to Company A (which was the occupier of the premises where the incident happened) or to Company B (which was the owner of the chemicals involved in the incident).

The wide range of people who can be issued with a clean-up notice means that you can choose the most appropriate person to clean up the incident, depending on their capacity, resources and degree of responsibility. If someone who is not responsible for an incident is issued with a clean-up notice, they can recover any costs incurred by them from the person who was responsible.

To determine whether a contamination incident amounts to serious or material environmental harm consider the definitions of material environmental harm (section 16 EP Act) and serious environmental harm (section 17 EP Act).

A clean-up notice can require someone to:

- prevent or minimise contamination caused by the incident;
- assess the nature and extent of the environmental harm, or the risk of further environmental harm, caused by the incident;
- rehabilitate or restore the damage to the environment caused by the incident;
- or keep the administering authority informed about the incident or the actions taken under the clean-up notice.

For more information, refer to the [Clean-up Notice Procedural Guide](#). A [Clean-up Notice](#) template is also available on Ecosteps.

Cost recovery notice (Chapter 7, Part 5C EP Act)

A cost recovery notice may be issued if a clean-up notice has not been complied with and an authorised person or someone operating under the instruction of an authorised person has undertaken the clean-up actions required in the clean-up notice.

The Department may issue a written notice to recoup costs and expenses incurred in taking the action specified in the clean-up notice or in monitoring the compliance of the recipient with the provisions of the clean-up notice.

This is only a useful tool where a clean-up notice has been issued, a person has failed to comply with it, and the Department has undertaken work to clean up the site and has incurred costs in the clean up.

Show cause notice (Chapter 7, Part 3, Division 2 SP Act)

A show cause notice must be issued before an enforcement notice under the SP Act is issued (except in certain circumstances set out below). Show cause notices can be issued if the Department reasonably believes a person has committed or is committing a development offence under the SP Act. A show cause notice gives a person an opportunity to make representations regarding the offence before they are issued with an enforcement notice. The requirements for a show cause notice are set out in ss 588 and 589 of the SP Act.

If the assessing authority reasonably considers that it is not appropriate to give a show cause notice in the circumstances, the assessing authority may proceed directly to issuing an enforcement notice without giving a show cause notice. This may be appropriate where, for example, the enforcement notice needs to be issued urgently if it is to be effective.

Choosing the appropriate statutory tool to respond to non-compliance

Enforcement notice (Chapter 7, Part 4, Division 3 SP Act)

Enforcement notices may be issued where you **reasonably believe** that a person has committed, or is committing, a development offence under the SP Act (which includes offences such as carrying out assessable development without a permit, or contravening a development approval). Before you can issue an enforcement notice, you must issue a show cause notice unless it is not appropriate in the circumstances. For example, if an offence poses a threat to public health and safety, it may be appropriate to proceed directly to issuing an enforcement notice

If a show cause notice has been issued, you must consider any representations made in response to the show cause notice. You may only issue an enforcement notice if, having considered the representations, you consider that it is still appropriate to do so.

An enforcement notice requires someone to refrain from committing the development offence, or to remedy the commission of the offence. It may include requirements such as:

- to stop carrying out development;
- to stop a stated use of premises;
- restoring the premises to the way it was before the development started;
- taking action to ensure development complies with a development approval; or
- to prepare and submit to the assessing authority a compliance program demonstrating how compliance with the enforcement notice will be achieved.

Enforcement notices can be used where the incident is a development offence under the SP Act. They can also include a wider range of requirements than an EPO, because they are not limited by needing to be aimed at preventing or minimising environmental harm.

The requirements for an enforcement notice are set out in ss590-596 of the SP Act.

Procedural guide

Compliance

Covert and overt recording in compliance and investigation

This document sets out the circumstances in which appointed officers may covertly and overtly record a conversation or activity; sets the approvals required for the use of covert recording; and establishes guidelines to ensure the integrity of recorded evidence.

Background

This document outlines the appropriate use of audio and video recording devices by Department of Environment and Resource Management (DERM) employees in compliance and investigative activities. Audio and visual recording devices may be overt or covert and different approval requirements apply as set out in this guide. The DERM Code of Conduct must also be considered when using recording devices.

Compliance activities are a critical component of DERM business, and authorised officers regularly investigate breaches of DERM administered legislation which may lead to enforcement action. The use of audio and video recordings can provide valuable evidence for enforcement actions. Digital media is now an accepted technology in recording, storing and presenting or replaying data in court proceedings or tribunals. This may be in MP3 or JPEG format and is usually stored on a hard drive storage device which may be transferred easily and securely without risk of modification or contamination.

Digital audio and video recordings provide an accurate and true account of conversations and interactions between officers and another party. Therefore, they are an effective means to avoid allegations of harassment and can be used to negate any concerns involving threat, promise or inducement.

Definitions

Authorised officer means a DERM employee who is appointed under an Act and is eligible to exercise compliance and enforcement powers under that Act. DERM authorised officers include:

- inspectors appointed under the *Biodiscovery Act 2004*
- authorised persons appointed under the *Environmental Protection Act 1994*
- authorised officers appointed under the *Environmental Protection Biodiversity Conversation Act 1999* (C'th)
- forest officers appointed under the *Forestry Act 1959*
- inspectors appointed under the *Fisheries Act 1994*
- inspectors appointed under the *Great Barrier Reef Marine Parks Act 1975* (C'th)
- inspectors appointed under the *Historic Shipwrecks Act 1976*
- inspectors appointed under the *Marine Parks Act 2004*
- conservation officers appointed under the *Nature Conservation Act 1992*
- authorised officers appointed under the *Recreation Areas Management Act 2004*

Covert and overt recording in compliance and investigations

- authorised officers appointed under the *Vegetation Management Act 1999*
- authorised officers appointed under the *Water Act 2000*
- authorised officers appointed under the *Aboriginal Cultural Heritage Act 2005*
- authorised officers appointed under the *Torres Strait Islander Cultural Heritage Act 2005*
- authorised officers appointed under the *Land Act 1994*.

Covert recording is recording when one or more people being recorded are unaware that recording is taking place.

Overt recording is recording when all people being recorded are fully aware a recording is taking place.

Private act means showering or bathing; using a toilet; any activity when the person is in a state of undress; or a sexual activity not ordinarily performed in public.

Private place means a place where a person might reasonably be expected to be engaging in a private act.

Recording device has the same meaning as a listening device within the *Invasion of Privacy Act 1971*, and is defined as any instrument, apparatus, equipment or device capable of being used to overhear, record, monitor or listen to a private conversation simultaneously with its taking place. Examples of recording devices include tape recorders, digital voice recorders, mobile phones, still cameras, video cameras and telephone adaptations that enable recording of conversations.

Visual recording devices means any device capable of recording a photographic image including for example photographic stills and video recordings.

Policy and procedural statements

Overt recording

Authorised officers and other DERM staff may overtly record a conversation with a recording device when communicating with a member of the public or carrying out investigation and enforcement duties under DERM administered legislation. It is the responsibility of the officer making the recording to ensure that all parties to the conversation are aware the conversation is being recorded, and such awareness should be evident within the recording itself. Parties should also be advised that the recordings will be kept on a Government file and may be used as evidence. This should occur at first contact or the beginning of the conversation.

A copy of the audio or video recording should be offered to each party to the conversation or activity upon its conclusion and, where the offer is accepted, the copy should be delivered as soon as practicable after the event.

Approval for overt recording

While approval is not required to undertake overt recording, care must be taken that all recordings made as part of DERM business are made, stored and used in appropriately manner. Disclosure of personal information (which is often contained in recordings) is prohibited by the *Information Privacy Act 2009*. Routine use of overt recordings by any unit or branch must be identified in the relevant business plan or work procedures.

Covert recording

Audio

At no time may any officer make a sound recording of a conversation to which they are not a party (covert audio recording). To do so would be an offence under the *Invasion of Privacy Act 1971*. Covert recording of

Covert and overt recording in compliance and investigations

conversations to which the operator of the recording device is not a party may only be undertaken by police officers or persons with express statutory rights to do so.

The *Invasion of Privacy Act 1971* however, allows for the covert recording of private conversations by persons who are a party to the conversation. Permission is not required from the parties involved in a recorded conversation to use the conversation as evidence in a court; using a recorded conversation in other ways without permission is restricted and penalties apply.

DERM routinely uses remotely operated or unmanned video recording devices (for example, in wildlife monitoring). These devices often have audio capabilities and because of the restriction on covert audio recordings (outlined above), the audio capabilities must be disabled on unmanned visual recording devices.

Visual

As indicated above, an authorised officer may, with the necessary approval (Table 1), covertly record an activity using a video or photographic recording device without being a party to the activity or conversation, provided that any audio recording capabilities on the visual recording device are disabled prior to commencing surveillance. When visual surveillance is being used for reasons other than compliance (e.g. wildlife monitoring), the incidental capture of evidence in relation to the commission of an offence under DERM legislation can only be legally used if any audio recording function on the visual recording device was disabled at the time of the recording.

The use of signs advising members of the public that surveillance equipment is being used is not a legal requirement but may improve evidentiary value of recordings. A visual recording device may be used in a public place but must not be used in private places or to record persons undertaking private acts. State lands, including protected areas and State forests, are generally considered public places; however care must be taken to avoid unintentionally filming a person undertaking a private act.

Approval for covert recording

Appointed officers and other departmental officers may, with the necessary approval (Table 1), covertly record a conversation or activity to which they are a party when:

- the appointed officer is investigating whether parties are complying with DERM administered legislation; or
- the recording of the conversation or activity is likely to assist in the gathering of evidence regarding an alleged contravention of the legislation; or
- it is important that there is an accurate record of conversations or activities for safety/evidentiary reasons; or
- the use of overt recording may adversely affect the collection of evidence or interfere with an appointed officer in the execution of their duties.

The necessary approval to undertake covert recording (Table 1, below) must be sought and granted prior to commencing the recording.

Visual Recordings

It should be noted, that the *Criminal Code Act 1899* prohibits the visual recording of a person where there is a reasonable expectation of privacy. This includes the recording of people undertaking private acts or in places intended for private acts, for example a toilet facility.

Covert and overt recording in compliance and investigations

Approval requirements for covert recording

The approval requirements for covert recording are set out in Table 1.

Table 1 – Covert recording approval requirements

Queensland Parks and Wildlife Service (QPWS)		
Type of Covert Recording	Level of approval required	Method
Covert audio used to gather evidence for planned low to mid level compliance and enforcement considerations/actions	Assistant Director-General, QPWS	Approval must be in writing (including email) and may be given:
Covert audio used for day to day purposes other than for planned compliance activities (for example collection of information for statistical and advice use)	Regional Manager or Director	– as part of an approved compliance plan,
Covert video (audio disabled)	Regional Manager or Director	– via an agreed work procedure, or – on a case by case basis.
Other (RSD, ENRR etc)		
Type of Covert Recording	Level of approval required	Method
All	Assistant Director-General	Approval must be in writing (including email) and may be given:
		– as part of an approved compliance plan,
		– via an agreed work procedure, or – on a case by case basis.
State-Wide Investigations Team, Compliance and Investigations		
Type of Covert Recording	Level of approval required	Method
All	Director, Compliance and Investigations	Approval must be in writing (including email) and may be given:
		– as part of an approved investigation plan,
		– via an agreed work procedure, or – on a case by case basis.

Handling of surveillance equipment

If an authorised officer covertly records a conversation or activity, the covert recording must be noted in the authorised officer’s official notebook as soon as practicable.

Where a visual recording device will be left unmanned (for example, during ongoing monitoring of a site) it must have a log book that is kept with it at all times. The use and maintenance of the recording device must be recorded in the log book including:

- date, time and location of each use; and
- name and operational unit of the operator; and

Covert and overt recording in compliance and investigations

- a description of the activity undertaken.

The visual recording device must be installed and operated by a person experienced in the use of the equipment. New equipment must be field tested before use in compliance and investigation activities. New operators must be trained by an experienced operator and supervised in the use of the equipment before undertaking recordings for evidentiary purposes.

On each occasion a visual recording device is approved for unmanned use, prior to installation the equipment servicing must be up-to-date and the accuracy and operation of the equipment, including that the date and time set on the equipment must be checked. A record of these checks, including when and who undertook them must be entered into the log book.

When installing an unmanned visual recording device:

- record the details of the person who installed the equipment in the equipment log book;
- install the equipment so that a clear view of the subjects or location can be recorded, including important identifiers such as number plates; and
- make sure that the equipment is weatherproof, secure and protected to ensure evidence and valuable equipment is not lost.

Once installed an unmanned visual recording device should be checked on a regular basis and the checks recorded in the log book, including details of the condition and location of the equipment. While there is no set standard for the frequency with which checks should be undertaken, more regular checks improve evidence continuity.

In addition to equipment log books, the responsible business area (e.g. each QPWS region) must keep a register of locations subject to video or photographic surveillance for compliance or investigative purposes. The inclusion of wildlife and other environmental monitoring equipment in the register is encouraged but not mandatory.

Processing and storage of recordings

Once a recording has been made, the following steps must be taken:

- Upload the recording to the appropriate file on the network drive as soon as practicable. This network drive must be secure and access limited to ensure that the electronic files are not changed or tampered with. Copies of the recording must be made from the electronic file located in the network drive.
- Save the recording to a compact disk without any modification.
- Label the compact disc with the date, the names of the persons present and location of the recording.
- Enter the compact disc details into the exhibit register and place the disc into a locked exhibit room or storage facility.
- Ensure the original recording is labelled and stored appropriately.

The above requirements are important because recordings may be used by DERM in litigation proceedings. In the event that litigation proceedings are instituted, the person who made the recording may be required to make a statement.

Covert and overt recording in compliance and investigations

Communication of recordings

Care must be taken in the use or distribution of all recordings. Clearance from the DERM Litigation Unit is required if recordings are to be used for a purpose other than as evidence in litigation or made available outside of DERM. Recordings can be distributed if agreed to by all recorded parties.

The DERM Litigation Unit can be contacted on (07) 3330 5663.

Support

Support in the use of covert or overt recording can be given by Compliance and Investigations Support team within Compliance and Investigations. If assistance is required please refer to the Compliance and Investigations Intranet page for up to date contact information.

Approved By

Signature

Date

Director, Compliance and Investigations

Enquiries:

Compliance and Investigations
Ph. **3330 5536**

Signature

Date

Assistant Director-General, Queensland Parks and
Wildlife Service

Enquiries:

Queensland Parks and Wildlife Service
Ph. **3330 5270**

Signature

Date

Assistant Director-General, Regional Service
Delivery

Enquiries:

Regional Service Delivery
Ph. **3330 6302**

Dealing with unlicensed environmentally relevant activities (ERAs)

This procedural guide sets out the procedure to be followed in dealing with anyone found carrying out an environmentally relevant activity without an environmental authority, development approval or registration certificate.

Issue

From time to time Environmental Protection Agency officers may become aware of an environmentally relevant activity (ERA) being carried out without an environmental authority, development approval or registration certificate ("an unlicensed ERA"). What action should be taken?

Determination:

The following procedure should be followed in relation to an unlicensed ERA:

- After becoming aware that an unlicensed ERA is being carried out, an Agency officer should meet with the person responsible for carrying out the ERA and advise the person of the requirements under the *Environmental Protection Act 1994* ("EP Act"). The officer should ask questions to establish that an ERA is being carried out without the necessary approval and that there are no mitigating circumstances. A record of conversation must be made in the officer's official notebook. Interview processes and procedures are outlined in the procedural guide *Taking Statements* located on ecosteps.

The officer must be an "authorised person" under the EP Act.

The meeting/site visit should be followed up with a short letter that refers to the meeting/site visit and confirms:

- (a) the requirements under the EP Act;
- (b) the information which leads the EPA to believe that the person may be carrying out an ERA without the necessary approval (e.g. the site visit);
- (c) that if an unlicensed ERA is being carried out, the person needs to make a valid application within 14 days, including the payment of the appropriate fee; and
- (d) that enforcement action may be taken if the person is carrying out an ERA and does not obtain the necessary approval.

Application forms and guidelines should be enclosed with this letter or, alternatively, the person should be referred to the forms and guidelines available on the EPA's web site. It should be considered whether the application is required to be made under the *Integrated Planning Act 1997* to the relevant Local Authority.

The letter should be sent by registered mail or served on the person.

- In certain circumstances where the person is diligent and has genuine reasons for not being able to meet the 14 days requirement, this period may be extended to 28 days with the approval of the relevant District Manager.
- If the application is not received within the timeframe indicated in the letter (or the further agreed period), the officer will collect evidence including photographs and record interviews in an official notebook to establish that an ERA is continuing to operate without the necessary approval. A simple brief of evidence should be prepared within 28 days of the date for lodging the application. The briefs should be straightforward, requiring little of the officer's time to complete. The Regional Director should refer the brief to the earliest Legal Compliance Meeting for decision and recommendation.

This procedure does not limit the Agency from taking immediate enforcement action, without the sending of a warning letter, in special circumstances. Special circumstances include, but are not limited to, a person carrying out an unlicensed ERA that is causing material or serious environmental harm and is failing to comply with the general environmental duty.

Determining and influencing non-compliant behaviour

Motivations for Non-Compliance

This “Motivations for Non-Compliance” procedural guide, together with the [Behaviour Assessment Tool](#) in Ecosteps provides background information and a method for assessing and best managing compliance behaviour issues.

Background

The Department of Environment and Natural Resource Management (DERM) is responsible for protecting Queensland’s environment and managing its natural resources. DERM administers a number of pieces of legislation to achieve this goal and one of DERM’s key functions is to ensure that the community complies with the legislation. Whilst the former constituent parts of DERM had a long history of managing reactive compliance programs, DERM is now expanding its proactive compliance activities. The goal of the proactive compliance function is to be evidence based, targeted and transparent. This will ensure:

- there is a solid basis for making decisions to pursue a particular compliance program;
- DERM’s resources are targeted at those areas where they will be most effective; and
- the manner in which regulatory activities are undertaken, and the outcomes of investigations, will be publicly available.

Purpose

The aim of this “Motivations for Non-Compliance” procedural guide is to help officers target their proactive compliance efforts where they will be best used. This document will primarily be used by regional project managers at the project planning stage of projects listed in the Annual Compliance Plan. Each year, the Annual Compliance Plan lists proactive compliance activities DERM will undertake. This document will assist project managers to identify behaviour types and reasons for non-compliance at the start of the compliance project, then choose tools to most effectively change that behaviour. This guide should be used in conjunction with the [Behaviour Assessment Tool](#). The Behaviour Assessment Tool can be found in Ecosteps and is an interactive tool to help decide both the “shape” of behaviour of your regulated community and the best response to influence that behaviour.

Motivations for compliance and non-compliance

There are many reasons why people may choose to obey or not obey the law. These reasons fall broadly into the following four categories.

- 1. Intentional non-compliance** - this is where someone knows the law; knows that what they are doing is wrong; knows that there are penalties involved; and yet chooses not to obey. A simple example of intentional non-compliance is knowingly speeding. In this example, people are equipped to obey the law: in that cars are provided with speedometers, and streets are signed. It is also well known that police radars are used and that penalties will apply if caught, and yet, the offence is still committed. Hence, intentional non-compliance occurs where motivations outweigh the risks or benefits derived from doing the right thing. For instance, reasons for intentional non-compliance can include economic motivations, which can either be fees, like application costs for permits or licences, or costs associated with infrastructure or monitoring; and profits, which might be able to be increased through things like taking more water than allowed, or disposing of waste or chemicals inappropriately. It can also occur where the community perceives that there is only a low risk of detection; or where there is frustration, anger, or resistance to change. This is sometimes articulated as public protests, or acts of resistance, even where the chance of getting caught is almost guaranteed.
- 2. Opportunistic non-compliance** is very similar to intentional non-compliance; people know about the law and its penalty, and yet make an informed choice not to obey. The difference between opportunistic and intentional non-compliance is that this choice might change from instance to instance. For example someone who usually obeys speed limits may occasionally make an exception. He might drive faster on open roads or highways, particularly when there are no other cars present, or drive a few kilometres over the speed limit in familiar areas. People who opportunistically do not comply are influenced by their surroundings, and their behaviour will change from day to day. For instance, if a white van is parked on the side of the road ahead, most people will slow down. Similarly, if police presence is never noticed, it is possible for speeding to become more of a norm, and for these people to become intentional law breakers, who always drive too fast. Hence, behaviour in this instance is directly linked to the individuals' perception of capture and penalty. The reasons for intentional non-compliance therefore can be the number of investigations; whether others appear to be getting away with it; whether penalties and investigations are advertised; and whether it is believed that investigations occur and law breaking is penalised.
- 3. Accidental non-compliance** - This is where people make mistakes, or break the law by accident because they did not understand it, or how to meet their obligations. For example, if someone thought they were driving at the speed limit but their speedometer was not working correctly, or they did not know the speed limit in that particular area, they may drive faster than they were supposed to, but had they known they would have done the right thing. The reasons for accidental non-compliance can include a lack of understanding about obligations or administrative processes; a lack of access to information or advice; or a lack of access to tools or technology required.
- 4. Voluntary compliance** - in this situation, the person knows the law and obeys it. For example, where someone always drives at the speed limit, no matter where they are, or whether there are other vehicles or police around.

The motivation pyramid

A pyramid is usually used to represent the distribution of the population within these categories of behaviour types, with most people doing the right thing (voluntary compliance at the base of the pyramid), and the least number intentionally breaking the law (intentional non-compliance at the top of the pyramid).

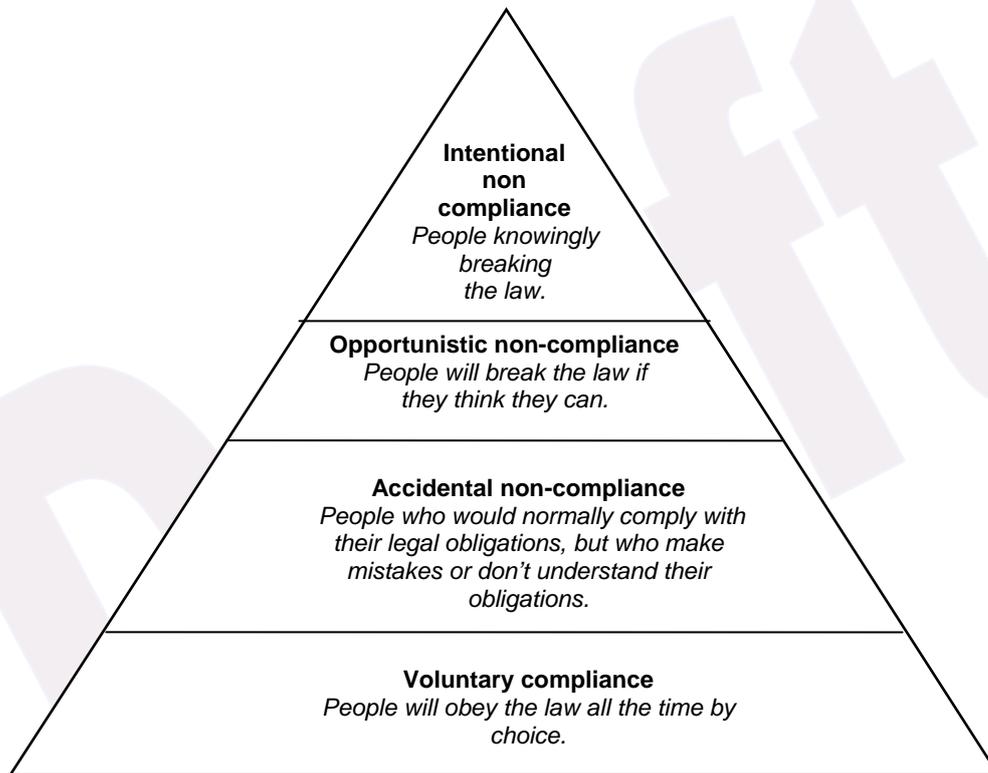


Fig 1. Motivation pyramid
(adapted from Neil Gunningham, Peter Grabosky and Darren Sinclair “Smart regulation: designing environmental policy”, 1998 at p.397)

Whilst a pyramid is used to pictorially represent compliance and non-compliance, in reality the placement of individuals in the pyramid for any issue will be influenced by a range of factors – such as whether you will get caught; whether anyone is watching; how important you think the law is; whether you are afraid of getting into trouble; or what you believe will be the impact or severity of your crime. Whilst there are some instances where you will move around in the compliance pyramid, there are others where you will stand firm. For instance, a person who may intentionally steal a work pen would never commit armed robbery or murder. Voluntary compliance with these laws is not even debated. So when trying to understand your regulated community you need to be aware that every person is different, and that their motivations for non-compliance will vary for each law and obligation, and whilst absolutely committed to one set of objectives, another might not be a priority. This means that it is possible for the shape of the compliance ‘pyramid’ to vary according to the distribution of the population within each level. Hence, it is possible for the ‘pyramid’ to be inverted (where there is mostly non-compliant behaviour), hexagonal, or square.

How to maximise compliance of your regulated community

There are a range of tools available to facilitate behaviour change, and to respond to non-compliance to maximise voluntary compliance. These can include enforcement activities, educational activities or incentives. In order to determine which tool is the most appropriate response, they need to be linked to the motivations for the non-compliant behaviour. This is why it is important to understand the behaviour of your regulated community.

When you are choosing a response to non-compliance, it is important to be as creative as possible, do not simply opt for the easy and obvious tools such as audits and recommending enforcement action. Consider tax incentives or fee simplification, using industry associations, peer pressure and supply chain pressure, or simplifying forms. The tools that will have the biggest impact are those that clearly state what needs to be achieved, make it easy to comply (for example, a simplified form) and make it popular to comply. In other words compliance becomes normal community behaviour.

The following comments are generalisations but in the main, smaller operations tend to have simple management structures and lower levels of expertise (including environmental and natural resource expertise). This can mean they respond better to education, training, building relationships, ensuring messages come from a credible source (the supplier or customer, rather than government), third party leverage (from banks, lawyers and insurance companies) and capacity building. Capacity building is particularly effective as it assists a person's ability and motivation to act. Larger operations on the other hand, tend to have more sophisticated management structures with more expertise or understanding of environmental management issues. Larger operations also tend to be more sensitive to reputation damage, including: impact on share price and potential investment opportunities, and standing with government. Larger operations tend to be easier to find because of their size and there are fewer of them. Because there is a higher volume of smaller operations, it can be difficult to investigate all of them.

Behaviour assessment tool

The Behaviour Assessment Tool has been developed to allow you to work out the shape of the pyramid within the particular community that you are regulating. Knowledge of how many individuals are within each category will enable you to choose which is the best strategy to deal with the non-compliant behaviour for that regulated community. You can access the [Behaviour Assessment Tool](#) by clicking on the link.

Approved

Signature

Date

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How to record Annual Compliance Plan Inspections in Ecotrack

This document provides guidance on how to enter compliance inspections in Ecotrack and its use is recommended for compliance projects identified under Annual Compliance Plans (ACP).

Introduction

The Compliance Activity (CA) record in Ecotrack is for recording and tracking *compliance assessments initiated by the Department of Environment and Resource Management (DERM)*. All compliance inspections for compliance projects identified in DERM's Annual Compliance Plans are to be recorded in Ecotrack as per the steps outlined in this document. Any compliance inspections not identified in DERM's Annual Compliance Plans are to be entered as a Complaint/Record (CR) record in Ecotrack (this includes complaints, incidents and notification of a compliance issue by a company).

Why record Compliance Inspections in Ecotrack?

Compliance data (including inspection data) recorded in Ecotrack is used for reporting, planning and management purposes. The more detailed and accurate the data, the more effective planning and management processes can be.

Compliance program outputs are regularly reported to management and the government; and include the number of complaints received and responded to on-time, number of reactive and proactive inspections by inspection type, number of enforcement measures issued and the client expenditure required to comply with those enforcement measures.

The compliance performance of each regulated industry is analysed to determine what industries to target in the Annual Compliance Plan (i.e. number of complaints and number of enforcement measures issued collectively for each industry).

The details of offences observed during compliance inspections is analysed to determine what illegal activities to target in the Annual Compliance Plan (i.e. high volume breaches in what locations).

The risk level of each regulated facility can be recorded in Ecotrack, which would assist in identifying the high-risk facilities warranting further/continued monitoring by the Department.

Compliance data recorded in Ecotrack also assists with enforcement tool selection and provides evidence of good decision making.

Compliance Inspection – Ecotrack Steps

Compliance Activity Fields

The Compliance Activity fields *Program Type, Compliance Program, Client, and Activity Location* are **critical** fields to be completed in Ecotrack. These fields are required to ensure accurate quarterly reporting of compliance programs.

How to record Annual Compliance Plan Inspections in Ecotrack

1. If the compliance inspection was conducted at licensed premises you must search for the permit record and create the Compliance Activity (CA) record from there. The client and activity location will automatically appear, and you can skip step 2.
 - i. Select **Permit – Permit Search** from the Ecotrack home page
 - ii. Enter the permit reference in the **Permit Ref** field and click on the search (magnifying glass) icon
 - iii. Click on the permit details icon (3 dots) for the Permit record to appear – ensure this is the correct permit (NB: you should link compliance inspections to the Registration rather than the Development Permit)
 - iv. Click on the Compliance Activity button (3rd from right) and a Compliance Activity record will open with the client and activity location details automatically appearing (check and remove any locations that aren't applicable to the compliance inspection by clicking **edit** then **remove row** (or Ctrl + R))
 - v. Go to step 3
2. Select **Compliance – Compliance Activity – Add New Compliance Activity** from the Ecotrack home page.
 - i. Enter the clients name in the **Name** field and click on the search (magnifying glass) icon
 - ii. Click on the **client detail icon** (3 dots) for the contact details to appear - ensure this is the correct location for the client. (If the search results find that there is no client under that name, you will need to create a new client by clicking on the **New** button and entering the details.)
 - iii. Click on the **Permit** Tab to ensure the correct licence for the client is listed
 - iv. Click on the **close** icon to close the screen
 - v. Click on the **Return Value** (return arrow symbol) for the client name, address and reference number to appear
 - vi. Enter the location of the compliance inspection in the **activity location** and click on the **search** (magnifying glass) icon. (This is the section where you will enter each different location on a licence as a compliance inspection has been completed. It is **critical** to create a running sheet action for each location inspected for it to be counted as an inspection.)
If the search doesn't return any records you will need to add the location details to Ecotrack.
 - i. Click on the **new** button to add a new location
 - ii. Enter the **location name** and **location type**
 - iii. Enter the location details (e.g. street address, lot and plan, tenure) within the relevant Tab
 - iv. Once all relevant fields and information have been entered, click on the **save** (disk symbol) button and click **ok** (**NOTE: once saved, changes cannot be made**)
 - v. Click on the **close** icon to close out of this screen
3. Enter all information for each heading on the right hand side of the screen.
 - i. **Program Type** – click on the **search** (magnifying glass) icon and select either **Coastal/Water, Environment, Mining and PG, Not Applicable or Wildlife Management** from the list

How to record Annual Compliance Plan Inspections in EcoTrack

Compliance Program – click on the **search** (magnifying glass) icon and select the relevant project from the current Annual Compliance Plan. The following are the compliance programs for 2011-12:

2011/Mining/P&G/CSG & LNG/Environmental Services this activity relates to inspections as part of CSG and LNG activities in the CSG/LNG compliance plan.

2011-12/Mining/P&G/UCG/Environmental Services this activity relates to inspections as part of UCG activities.

2011-12/ Environment/ SEQ ERA ecoBiz candidates/ Environmental Services this activity relates to inspections as part of this specific ACP project

2011-12/Environment/Environmental Management Practice Review project/Environmental Services this activity relates to inspections as part of this specific ACP project

2011-12/ Environment/NPI reporting/Environmental Services this activity relates to inspections as part of this specific ACP project

2011-12/Mining/P&G/ General Petroleum and gas/Environmental Services this activity relates to general petroleum and gas inspections that are not part of the CSG/LNG and UCG plans.

2011-12/Coastal/water/Erosion and sediment control/Environmental Services this activity relates to inspections as part of this specific ACP project

2011-12/Environment/Port of Townsville material handling/Environmental Services this activity relates to inspections as part of this specific ACP project

2011-12/Environment/Landfill gas migration/Environmental Services this activity relates to inspections as part of this specific ACP project

2011-12/Environment/ERA inspections/Environmental Services this activity relates to ERA inspections that are not linked to a specific ACP project

2011-12/Mining/P&G/Mine water management/Environmental Services this activity relates to inspections as part of this specific ACP project

2011-12/Mining/P&G/Mining Financial Assurance/Environmental Services this activity relates to inspections as part of this specific ACP project

2011-12/Coastal/water/Other/Environmental Services

2011-12/Coastal/water/Riverine/Environmental Services

2011-12/Coastal/ water/Agriculture-ERMP/Environmental Services

2011-12/Coastal/ water/Agriculture-record keeping/Environmental Services

- ii. **Status** – click on the **search** (magnifying glass) icon and select relevant status from the list
- iii. **Info Entered** – today's date will automatically appear
- iv. **Program Manager** – click on the **search** icon and select relevant name from the list
- v. **Responsible Office** – the responsible office will automatically appear (however if incorrect, click on the **search** (magnifying glass) icon and select relevant office from the list)

How to record Annual Compliance Plan Inspections in Ecotrack

- vi. **Subject** – enter any additional details (e.g. Inspection Type)
4. Click on the **Admin Tab** and in the **File Ref** field type in the file reference number
5. Click on the **save** icon (disk symbol) to save all the data entered and click **ok**

Running Sheet Fields

The Running Sheet fields *Date Commenced*, *Responsible Office*, *Action Type*, *Inspection Type* and *Outcome* are critical fields to be completed in Ecotrack. These fields are required to ensure accurate quarterly reporting of compliance programs.

6. Click on the **Running Sheet** button (3rd from left) to add the information collected from the compliance inspection (if all the entries in the Running Sheet entry are full, click on **edit** then **insert row** (or Ctrl + I) to add more lines)
7. Click on the **details** icon (3 dots) in the first empty line to add a new action (or if run out of lines Ctrl + I to insert lines)
8. Enter all information in each of the fields listed
 - i. **Source Ref** – the source ref will automatically appear
 - ii. **Date Commenced** – the date commenced will automatically appear (however if incorrect, click on the **search** (magnifying glass) icon and select date inspection commenced)
 - iii. **Officer Involved** – click on the **search** icon and select officer name from the list
 - iv. **Responsible Office** – the responsible office will automatically appear (however if incorrect, click on the **search** (magnifying glass) icon and select relevant office from the list)
 - v. **Action Type** – click on the **search** icon and select either Site **Inspection – Level A**, **Site Inspection Level B**, or **Site Inspection Level C** from the list (refer to procedural guide *Compliance Program – Audit Report* for inspection level definitions)
 - vi. **Inspection Type** – click on the **search** icon and select either **Proactive-Initial or Proactive-Follow up** from the list (*there are also reactive-initial and reactive –Follow up options but these are not to be used when recording a Compliance Activities, Proactive inspections are only recorded here*)
 - vii. **Enforcement Measure Type** – click on the **search** icon and select relevant enforcement measure from the list (only complete if relevant)
 - viii. **Referral To** – click on the **search** icon and select from the list (only complete if relevant)
 - ix. **Action** – type in a summary of details of inspection, including:
 - i. Conditions/activities/areas that were audited/inspected
 - ii. Non-compliance
 - iii. Reference to any Statutory Tools etc.
 - x. **Time Spent Hours** – click on the **search** icon and select relevant time from the list (refer to procedural guide *Compliance Program – Audit Report* for time definitions)
 - xi. **Time Spent Minutes** – click on the **search** icon and select relevant time from list (refer to procedural guide *Compliance Program – Audit Report* for time definitions)
 - xii. **Outcome** – click on the **search** icon and select relevant outcome from the list

How to record Annual Compliance Plan Inspections in Ecotrack

- xiii. **Outcome Description** – type in additional outcome information, including:
 - i. Reference to the inspection report
 - ii. Recommended Enforcement Action
 - xiv. **Due Date** – click on the **search** icon and select date from the list (NB: the due date to complete this action)
 - xv. **Date Completed** – click on the **search** icon and select the completion date from the list (NB: the date this action is completed)
 - xvi. If you wish to attach documents (**NOTE limit of 2mb**) e.g. inspection reports, monitoring results, photos etc, select the **Documents** icon (2nd from right) and attach relevant files by selecting create (a description of the document can also be entered in the comments field)
9. Click on the **save** button and click **ok**
 10. Click on the **close** icon to close the screen
 11. The running sheet summary page will appear (to view information or change any of the information select the **details** icon (3 dots) button)
 12. Click on the **close** icon to close the screen

Completion of Compliance Activity

13. The Compliance Activity Details screen will appear (the entering of the Compliance Inspection information in Ecotrack is now **complete**)
14. **Updates to Running Sheet** - ensure any status updates to the inspection are updated to the Running Sheet entries as required until the CA status can be changed to 'finalised'.
15. **Finalise** - once the CA record status is finalised update the status to '**finalised**' on the Compliance Activity screen. Print the report and Running Sheet entries and place on the relevant file.

Approved By			
		Date:	
Manager Compliance Planning and Projects, Compliance and Investigations Branch.		Enquiries: Compliance Planning and Projects Compliance and Investigations Ph. 3330 5560	

Procedural guide

Compliance and Investigations

Interviewing Potential Defendants

Essential Points

- Potential defendants should be interviewed at the earliest possible time to lock in their version of events and their explanation for WHY things happened the way they did.
- Often a second interview should be conducted to address in detail the elements of the potential charges and to fully explore any excuse, justification or explanation for non-compliance given by the person being interviewed.
- PREPARATION is the key to a successful interview of a potential defendant.
- Circumstances allowing, an interview of a potential defendant should be overtly tape-recorded.
- All statements made by a potential defendant, regardless of when, where or how, should be recorded by tape-recorders or in notebooks.
- The most important questions in an interview are the ones that explore the excuse, justification or explanation for non-compliance given by the person being interviewed.

Purpose

Conducting an interview with the person whom you believe to be responsible for a breach of legislation or in the case of a company, a person capable of speaking on the company's behalf, can be critical in establishing what has happened, who is responsible and why. It also gives an opportunity to the person being interviewed to explain their side of the story.

Preparation

Prepare for the interview to the extent possible given time constraints.

Preparation can include familiarising yourself with possible offences, the elements of those offences, any defences to those offences and powers able to be used by authorised offices; under the relevant legislation. It can also include identifying and familiarisation with policies, guidelines or procedures of the Agency that may be relevant.

Identify the likely defendant(s). Where a body corporate is involved this may require searches to determine the identity of the operator of a business. Prepare any physical evidence i.e. photographs or documents you may wish the interviewee to identify or comment on. If the person to be interviewed has any relevant licences be sure to check the conditions attached and if possible bring a copy of the licences and conditions along to the interview. Anything shown to a person being interviewed should be initialled by that person as evidence that they have seen it. Anything created by a person being interviewed (e.g. a sketch) should be retained as an exhibit.

There are different ways to prepare for an interview. Some people like to write out all the questions they want to ask in longhand. Some people prepare an outline of the matters they wish to cover in the interview along with some key questions. If the issues to be covered are lengthy, it is sometimes wise to divide the issues between

two interviewers. Sometimes a second investigator has the task of listening to the answers and asking follow-up questions. What is important in every interview is that:-

1. The interview is conducted fairly and not in an oppressive fashion.
2. There is sufficient flexibility in the process for the interviewers to explore issues raised by the interviewee.
3. That the interviewers explore the excuse, justification or explanation for non-compliance given by the person being interviewed.

Do not give advance notice of the questions to be asked or post to the interviewee the questions and receive the answers in writing back.

The Interview

For a Tape Recorded Interview

Formally announce the fact that you propose to tape record the interview, produce the tape recorder and use it in plain sight. All participants must be aware that the interview is being recorded [refer to EPA policy on covert recordings].

Formally reintroduce yourself: My name is X and I am a Y officer with the Environmental Protection Agency and an authorised officer under the Z Act. If you have an identity card this should be produced for inspection. Have your corroborating officer introduce himself as well. Formally ask all other people present to identify themselves for the recording. Announce where you are and the time. Have the interviewee confirm the time.

Should it be necessary at any time to suspend the interview then this fact should be announced along with the time before turning off the tape. Do not discuss the matter in any way whilst the tape is off. When the interview is recommenced again announce the time and have the interviewee confirm that nothing concerning the matter was discussed whilst the tape was off.

For more details refer to the procedural guide on "When and How to Issue a Caution".

For a hand recorded interview

Announce that you will be making a written record of the interview and produce the notebook in which you will record the interview. Be sure to note all persons present along with the time the interview commenced. Record all questions and answers verbatim.

When the interview is finished ask the interviewee to read your notes and if he agrees with their contents to sign the bottom of each page. Then have him or her sign a declaration at the end of the interview to the effect that they have participated in the interview of their own free will and that the answers were not given as the result of any threats, promises or inducements. You should then sign your notes along with your corroborator. Should the interviewee refuse to do so this should be noted along with any reason advanced by them as to why they will not. Make a note as the time the interview concludes.

For both Tape Recorded and Hand Recorded Interviews

Announce the purpose of the interview and ask the interviewee whether they are prepared to be interviewed about the matter: eg. We are investigating an incident at A whereby B occurred we would like to interview you concerning this matter. Are you prepared to take part in this interview? Do not engage in any substantive conversation about the subject matter prior to the interview.

It may be appropriate at this point to administer a caution please refer to the procedural guide on "When and How to Issue a Caution".

Start with asking the interviewee their name, address and occupation. The course of the interview will often be dictated by the amount of cooperation shown by the interviewee however it is best to begin broadly with general open questions such as "what can you tell me about A?".

From a broad start to try to pin down particulars. Still use open questions, a good way to ensure this is by utilising questions that begin with What, Where, When, Who, How and Why.

When interviewing evasive witnesses it is sometimes better to ask the witnesses why they did something, instead of asking them if they did the thing. This is more likely to elicit an honest indication of what they have in fact done.

In all cases, where it has been established during the course of the interview that a person has done something, it is essential to ascertain why they acted in this way. The reasons for ascertaining the person's intention is that it places the whole of their conduct in context, allows a proper consideration of whether or not they have a defence at law and locks down their version of events so that subsequent alteration of the evidence is difficult.

When introducing physical evidence for the witness to look at (e.g. a document, picture or object) make it clear so that anyone reading the transcript will know what you were showing to the witness. Do not identify it yourself. Ask whether they recognise the thing and if so what it is. If possible then mark the item with a letter and /or number so that it can be identified later as being the object referred to in the interview.

If statements have been obtained from other witnesses who contradict a version of events put by the interviewee wait until after they have finished telling their version of events before telling them what the other witness says and asking for a comment. The same approach should be adopted if the interviewee contradicts themselves.

It is also important to establish what EPA policy documents, such as guidelines or operational policies, the interviewee may have had regard to and the extent, if any, they have relied upon those documents.

Be sure only to ask one question at a time. If an interviewee is asked a multipart question it can be difficult or impossible to determine what part of the question they are answering.

Do not be afraid to have the interviewee clarify or expand on an answer. One of the objects of the interview is to gather information.

At the end of the interview ask the person whether there is anything more that they would like to say about the matter. Confirm that they have participated in the interview of their own free will and that no threat, promise or inducement was made to them.

Particular pitfalls/problems

Lawyers/other parties

If a person wants their lawyer with them when they are interviewed, you should not object to their presence, if to do so would be unfair. As to other people the person would like to be present, you will need to use your judgement. If the other person is a material witness then they should not be present particularly if they also a potential defendant. Interviewing multiple people simultaneously is inherently difficult and their statements are frequently inadmissible in court.

If the witness has a support person with them, do not allow the other person to answer on the interviewee's behalf. Politely but firmly inform the other person that they may observe the interview and in the case of a lawyer advise their client but they may not answer on their behalf. Should this happen, make sure that the interviewee adopts the statement made by the other person.

Keep in Control - you are conducting the interview and you ask the questions and the interviewee answers them. Take your time and keep your cool. An interviewee may become agitated or angry during the course of the interview, do not allow yourself to become upset in response. If you begin to raise your voice, start to bully the interviewee you will potentially void the interview and bring the EPA into disrepute.

During interviews under compulsion the interviewee (or their lawyer) may repeatedly ask what the relevance of a question is in order to determine whether they are compelled to answer the question. In this situation the investigator should say:-

“It is not my role to detail the relevance of a question nor to determine whether the basis for requiring your client to answer questions is defensible at law. Further I do not decide what charges may or may not be brought against your client. I do not know how you will answer the questions. I am not legally qualified to assess whether the answer will be incriminating. You must decide whether you think you might have committed an offence and if so, choose whether you wish to claim privilege. I will not adjudicate on that claim, but that does not mean that the claim will not be challenged at a later time. Do you understand?”

For more detail refer to the procedural guide on “When and How to Issue a Caution”.

Promises, Threats and Inducements

It has long been a rule of evidence that admissions by an accused made as the result of a promise, threat or inducement will not be received into evidence.

A promise can be as simple as “things will go better for you if you cooperate” or “if you just tell us what happened it is likely no further action will be taken”. Defendants sometimes develop a dependence and friendship with investigators. Whilst it is OK to be empathetic to the interviewee’s feelings and sometimes advisable, you should be careful not to mislead them and perform your duties professionally.

Threats such as charging the person with a more serious offence or revoking licences or even of physical violence are not just wrong but also will leave you liable to civil and/or criminal penalties in addition to departmental disciplinary action. Ensuring that a person is comfortable and offered a drink and food is a good way of avoiding an allegation of implied threats.

An inducement is a catchall description meaning to cover anything that might persuade a person to make an admission other than by the exercise of their free will. Advising the interviewee that you are simply the investigator and don’t decide what should happen, is a good way of avoiding an allegation that you offered an inducement.

A good rule of thumb is to remember neither carrot nor stick.

What will happen now?

This question is commonly asked during or at the end of an interview. The only answer that can be given is that once you have finished investigating the matter the information will be provided to others in the EPA who will decide what is to happen. Any other answer will risk having you make a promise/inducement.

Disclaimer:

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Environmental Protection Agency should satisfy themselves independently and by consulting their professional advisors before embarking on any proposed course of action.

Procedural guide

Compliance and Investigations

Investigation Planning

This procedural guide is intended to assist Agency officers in adequately planning for investigations, particularly potentially significant legal compliance actions.

Essential Points

- Each investigation should have a plan.
- The complexity of the investigation will determine the complexity of the plan.
- Plans should include objectives, elements of possible offences and investigative strategies, tasks, timeframes, any reporting and review requirements; and any co-ordination between Divisions.
- Environmental outcomes should be considered in creating an investigation plan.

Defining the Investigation

It is important at the outset of an investigation to establish a focus for, and set limits on, an investigation, to ensure that finite resources are used effectively to achieve environmental outcomes. Identification of the objectives and potential environmental outcomes for the investigation are essential in this regard. It is important at the outset to identify any relevant timeframes, both internally such as those provided for in the procedural guide 'Potentially significant legal compliance actions within the EPA', and those provided for by legislation (statutory time limits for commencing proceedings). An early review of available information also assists in ensuring that officers' time is well spent in the investigation, rather than collecting information already available to the Agency, either on file or in the public domain. Prioritisation of steps in the investigation assists in ensuring the investigation is as efficient and effective as possible. The identification of the relevant skills/knowledge required for the investigation; and the identification of the skills/knowledge present in available officers to assist in the investigation, ensures that the right tasks are allocated to the right people. It also helps in the early identification and management of areas where assistance may need to be sought from other units, or Divisions. A background information review is beneficial and assists in planning an effective investigation. Background information includes: any relevant licences, permits or approvals; relevant maps over the subject area; historical file data concerning other incidents or site history; any relevant company searches; any relevant title searches; and company information available in the public domain (such as internet sites).

Planning the Investigation

Investigation planning is essential to ensure that finite resources are used effectively in achieving environmental outcomes and that the investigation is carried out in a methodical and thorough way. This helps to ensure all the relevant evidence is identified and collected in a timely manner. The need for return site visits, and additional interviews is minimised. The investigation plan essentially sets out what needs to be done and how to do it; it is the road map of the investigation.

Step 1 – Identify objectives

This is one of the most important aspects of the investigation plan and should be well defined and clear. Objectives can be as simple as determining the existence of a prima facie case for a breach of the relevant offence. On the other hand, objectives can be more complex where the goals of an investigation may also include other elements such as ensuring a site is cleaned up.

Step 2 – Identify offences

It is important to identify the potential offences that may be involved. This serves two purposes; it focuses the investigation and it allows the effective planning of the investigation to ensure all the required evidence is identified. This ensures officers know what they need to obtain from the outset of the investigation.

After identifying the relevant offences, the next action is to examine the components of the offence (also known as the elements of the offence). This is called elementising an offence. This is important as it breaks down the offence into its components and allows officers to understand what exactly must be proved. It is necessary to obtain evidence in relation to each element of the offence. The standard of proof for criminal offences is that of “beyond a reasonable doubt”.

There are some elements, which are common to every offence, such as time, date, place and a person. Apart from the common elements, each word or phrase of the offence must be examined to see if it involves a particular issue of law or fact. For example:

Offence: *A person must not contravene a condition of the authority*

Elements:-

<i>Time, date and place</i>
<i>A person (can be an individual or company)</i>
<i>Must not contravene (if the term is not defined in the Act refer to a dictionary, which provides that it is to violate, infringe or transgress)</i>
<i>A condition (e.g. A2-1)</i>
<i>Of the authority (an environmental authority i.e. MIMXXXXXX)</i>

Step 3 – Identify evidence required

The next step is to identify the types of evidence that would be needed to prove the elements of the offence and negate any potential defences. It is important to identify any evidence that may only be available for a limited amount of time (e.g. physical evidence can dissipate). Consideration should be given here also to any existing material held by the Agency on files, or already provided to the Agency by the alleged offender. It may be that some of the evidence needed is already in our possession and this evidence should be identified e.g. any applicable licences, permits or approvals. It is also useful to identify any background information such as general discussion of the processes undertaken on the site; identification of any previous incidents, or previous enforcement action.

By way of example, elements such as time, date and place could be proved by the observations of the investigator and witnesses, any relevant records (such as records of flow), maps etc. An element such as the person (a person can be a company) may be proved by observations of the investigator or witnesses. Other evidence may include company searches. Evidence of contravention can be provided by a number of different sources such as observations of witnesses, photographs or satellite images, admissions by the person or

someone authorised to speak of behalf of and make admissions for the company, supervisor's reports or other company records, experts reports or statements etc. What particular evidence is required will depend on the factual circumstances of each case. It will be necessary to review the evidence required periodically, as the investigation proceeds, and as evidence is obtained. An example of how to complete this aspect of the Investigation Plan is provided below.

Elements of the Offence	Existing Evidence	Avenues of Inquiry/Evidence to be obtained

Step 4 – Identify project team

Consider what skills and knowledge are required for the investigation. This step involves identifying the people to be involved in the investigation and ensures that all the relevant skills and knowledge are provided and that the investigation is adequately resourced.

Step 5 – Identify tasks and timeframes (including consideration of safety issues)

It is very important to identify what tasks need to be undertaken to collect the evidence required. Do experts need to be involved? What interviews need to occur? What documents are needed? Is a search warrant required? Who needs to do what? Any strategies for the overall investigation should be considered in this step. All tasks in the compliance process need to be considered, including for example the preparation of the brief of evidence.

In this step it is also necessary to identify the timeframes within which these tasks need to be done to fit within the overall investigation timeframes established when you defined the investigation. This step also includes the identification of any particular resourcing (staff and equipment) needs for the investigation, such as the use of staff from the Herbarium or Environmental Sciences Division. It also includes an overall consideration of any relevant personal protective equipment needed and any safety issues that may arise within the course of the investigation.

Step 6 – Identify procedures

The next step is to establish whether there are any relevant procedural guides or policies that may apply to the investigation or any individual tasks within the investigation. This covers both procedures concerning work by the investigators and procedures concerning actions taken by the alleged offender. For example, a guideline on levels of contaminants in a tailings dam may exist or the guideline on interviewing a potential defendant may be relevant.

Step 7 – Finalise the Investigation Plan

The investigation plan is a plan that will need to be reviewed/updated as the investigation proceeds.

Disclaimer

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Procedural guide

Compliance and Investigations

Making a Complaint and Summons

Essential Points

- A complaint is made by outlining the basis of the complaint and referring to the provision said to be offended to a JP who then issues a summons.
- A person should only make a complaint if they have a reasonable belief that the offence contained in the complaint was committed. Note that the person does not have to form a legal opinion on whether the court will convict the person charged of the offence alleged.
- The Complaint and Summons must be filed with the Court within three days after the issuing of the JP's summons.
- The Complaint and Summons must be served and an oath as to service deposited to and taken by a JP and then filed with the Court.
- Complaints normally must be made within one year of the offence.

What is a Complaint and Summons?

A complaint is a document signed before a Justice of the Peace ("JP") signifying that a complaint has been made to the JP and upon the making of the complaint the JP issues the JP's summons. The summons requires the attendance of the defendant before the Court to answer the charge or charges set out in the complaint. The person who makes the complaint to the JP is known as the complainant.

Complaints can also be sworn but this is only necessary if a warrant is to be issued. It is anticipated that this will occur so rarely that if necessary specific instructions can be sought.

How to make a complaint and have a summons issued

- Following an investigation the decision will have been made to institute a prosecution.
- You will be provided with copies of the complaint and the summons.
- The first step is to find a JP. Counter staff at Magistrates Courts are JP's and can assist but there is no legislative prohibition against using a JP who is employed by the EPA.
- Having found a JP, the complainant must outline the basis of the complaint, that is to briefly but succinctly describe what has occurred and what provision it is alleged that this conduct offends against.
- The JP must be satisfied that the allegations are sufficient to found the offence. Note this does *not* mean that the JP needs to review the evidence just that what is alleged would appear to amount to an offence.
- The JP then issues his summons that you will have to give to the JP for his signature.
- The Complaint and Summons must then be filed in the Magistrates Court Registry within three days of the issuing of the summons. Note the complaint and summons does not need to be served prior to the filing.
- The Registry will be the one for the court to whom the defendant has been summons to appear.

Service

- Having made the complaint and the JP having issued his or her summons it is now necessary to serve the complaint and summons on the defendant as soon as possible.
- Wherever possible, personal service is preferable.
- The copy of the complaint and summons with the oath of service completed on its back should be filed with the court. This can be the copy required to be filed within three days of the issuing of the summons if service is affected in that time.

Trouble Shooting

Assuming that the complaint has been properly drafted and has everyone's names properly spelt and in the right places (eg. the complainant is not named as the defendant), and that the information in relation to the address for service is accurate at the time of service. Then the only real difficulty lays in two areas the complaint being out of time and the complaint not being properly made.

Time

- The *Justices Act 1886* provides that in the absence of any other legislative provision that a complaint must be made within one year from the time the matter of complaint arose.
- Note that this refers to the making of the complaint and not service or even the issuing of the complaint.
- The EP Act provides that a summary proceeding must start either within a year of the commission of the offence or within a year of it coming to the knowledge of the complainant and within two years of the commission of the offence.
- A complainant that is out of time can upon objection being taken to it be dismissed with costs against the complainant.
- Note that if it is proposed to proceed on indictment and have the matter eventually dealt with in the District Court then no legislative time limits apply.

Complaint not properly made

- An objection can successfully be taken to a complaint if it can be shown that the complainant has failed to outline the nature of the complaint and simply has had the JP sign the complaint as if witnessing the complainant's signature.
- Whilst no objection can be taken to a complaint simply because of the fact that the complainant and the JP work in the same department or even the section, care still needs to be taken. A JP has to act independently if the JP works in a subordinate position to the complainant a Court may have sufficient doubt as to the JP's having considered the matter independently rather than at the dictation of the complainant.
- A good idea if using a JP who also works for the EPA is to find one who is of equal or greater classification and/or who works in a different section and who reports to a different superior than you.

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Procedural guide

Compliance and Investigations

Obtaining and Executing Warrants

This document provides guidance as to the procedures to be followed for obtaining and executing warrants in relation to any of the legislation administered by the Department. Authorised officers MUST NOT make an application for a warrant or attempt to execute a warrant without the required approval set out in this document.

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Essential Points

Warrants **MUST NOT** be applied for or executed without the prior approval of an employee in one of the following positions:

- Director, Compliance and Investigations
- General Manager, Operations, Environment and Natural Resource Regulation
- Assistant Director-General, Operations and Environmental Regulator Division
- Associate Director-General, Operations and Environmental Regulator Division
- Regional Service Director, Regional Service Delivery Division

Only an authorised officer (appointed under the relevant legislation) can apply for and execute a warrant.

Warrants should not be executed without the presence of a member of the Investigations Team.

Executing warrants is a standard step in the conduct of an investigation. However, it is an activity that can easily create a conflict situation and attract public and media interest. It is therefore important to carefully plan the execution of a warrant. It is also critically important to manage the execution of the warrant and subsequent related investigative steps to limit conflict and manage the public interest issues.

Failure to execute a warrant appropriately can result in evidence being found to be inadmissible in court and damage the prospects of successful criminal and civil litigation.

Communication surrounding the execution of warrants is critical:

- The Assistant Director-General, Operations and Environmental Regulator must be advised of the proposed execution of a warrant **PRIOR TO** the warrant being executed. Further guidance regarding the form and content of briefing material is provided below.
- At least one Situation Report (SitRep) must be provided to the Assistant Director-General, Operations and Environmental Regulator during or after the execution of the warrant.
- Communication and interaction with any person present at the place where a warrant is executed must be managed by the officers executing the warrant so that execution of the warrant is to the extent possible cooperative and conflict is minimised.
- The Warrant holder, Manager Investigations and/or Director Compliance and Investigations should consult with the Media Unit prior to executing the warrant to determine a media strategy, which may include the preparation of a proactive or reactive media statement.

If a decision has been made to execute a warrant, the Department will be in the course of fulfilling its responsibilities to investigate an alleged offence in relation to the legislation it administers. It is not appropriate to enter into a formal agreement with an alleged offender, the occupier of a place where a warrant is being executed or any representative of those persons regarding the way in which the warrant will be executed. An Information Sheet as to the way in which departmental officers ordinarily execute warrants (particularly where this involves the seizure of electronic materials) can be provided to such persons. The steps set out in the Information Sheet generally assume that the other party will be cooperative. If cooperation is not forthcoming, the Department will determine the appropriate alternative steps.

Failure to deal with claims of legal professional privilege and, particularly in the case of seizure of electronic material, relevance, can damage the prospects of successful criminal and civil litigation.

The execution of a warrant can only be covertly recorded with the **PRIOR APPROVAL** of the Director Compliance and Investigations, Assistant Director-General or Associate Directorate General (in accordance with the Covert Recording Procedural Guide.)

What is a warrant?

A warrant under the legislation administered by DERM is a form of order granted by a magistrate upon a sworn application, which authorises the applicant to enter a premises with necessary and reasonable help and force to exercise their powers under the relevant Act, which may include searching for and seizing particular evidence for which the warrant has been issued.

Warrants under legislation administered by DERM

Each of the Acts administered by DERM contain different requirements to ground an application and different procedural requirements for obtaining warrants. In the case of the *Nature Conservation Act 1992*, it provides for two different types of warrants, each with different requirements. When applying for a warrant, it is important to carefully consider and follow the provisions of the relevant legislation. Legislation can be accessed online at www.legislation.qld.gov.au?OQPChome.htm.

Warrants for a place – *Environmental Protection Act 1994*

A warrant for a place is used to obtain evidence of offences suspected to have been committed against the *Environmental Protection Act 1994*. A warrant is only granted if a magistrate is satisfied that there are reasonable grounds for suspecting:

- that a particular thing or activity may provide evidence of the commission of an offence against the *Environmental Protection Act 1994*; and
- the particular thing or activity is or may be at the place within seven days of the making of the application.

The application must set out the reasonable grounds for the suspicion. A suspicion that something exists is more than a mere idle wondering whether it exists or not; it is positive feeling of actual apprehension or mistrust amounting to a slight opinion, but without sufficient evidence.

Monitoring warrants – *Nature Conservation Act 1992*

A monitoring warrant is used for the purpose of finding out whether the *Nature Conservation Act 1992* is being complied with. It does **NOT** allow evidence to be seized. It will only be granted if a magistrate is satisfied that it is reasonably necessary that the conservation officer have access to the place for the purpose of finding out whether the Act is being complied with. A monitoring warrant **CANNOT** be issued for residential premises.

Offence related warrant – *Nature Conservation Act 1992*

An offence related warrant is used to obtain evidence of offences suspected to have been committed against the *Nature Conservation Act 1992*. A warrant is only issued if a magistrate is satisfied that there are reasonable grounds for suspecting:

- that a particular thing may afford evidence of the commission of an offence against the Act; and
- that the particular thing is or may be in or on the place within seven days of the making of the application.

Warrant – *Forestry Act 1959*

A warrant under the Forestry Act is used to obtain access to a premises that is used as a dwelling in order to seize forest products or quarry material that have been got or interfered with contrary to the Act, or equipment,

documents or other things that are evidence of such getting or interfering. A warrant is only issued if a magistrate is satisfied that there is reasonable cause to suspect:

- (i) that forest products or quarry materials are at the place; and
- (ii) those forest products or quarry materials have been got or interfered with contrary to the Act.

Templates

There are template forms for applications for warrants and warrants available on Ecosteps (for legislation administered by the former EPA) and from the Investigations Team, Compliance and Investigations Branch, Environment and Natural Resource Regulation.

Warrant applications and court process

Application

Warrants **MUST NOT** be applied for or executed without the prior approval of an employee in one of the following positions:

- Director, Compliance and Investigations
- General Manager, Operations, Environment and Natural Resource Regulation
- Assistant Director-General, Operations and Environmental Regulator Division
- Associate Director-General, Operations and Environmental Regulator Division
- Regional Service Director, Regional Service Delivery Division

The preferred course is to request approval from the Director, Compliance and Investigations via memorandum, email or phone (with follow up confirmation email). If the Director, Compliance and Investigations is unavailable and a warrant is urgently required, it is appropriate to escalate to one of the other officers and to seek advice and assistance from the Director, Litigation. "Urgent" means that evidence will be lost, or material or serious environmental harm or other another significant adverse impact is likely, if the application is delayed until the Director Compliance and Investigations is available.

- The authorised officer applying for the warrant is to prepare both the application for the warrant and the warrant.
- The grounds of the application **MUST** show a nexus or connection between the place, the evidence sought and the offence(s) nominated.
- The grounds should be set out in a chronological or otherwise logical order and the paragraphs should be numbered.
- The grounds should address the requirements for the particular type of warrant being applied for (see above).
- The offences nominated in the application and the warrant should be included as section number and name of Act. The full wording of the offence should then follow.
- All available, accessible and relevant DERM information should be considered in terms of the grounds for the application.
- The application must include both a street address and the lot on plan description of the premises, as well as a description of the premises, for example, "Industrial premises owned by J Bloggs Pty Ltd".

- The Search Warrant Register kept by the Investigations Team should be consulted prior to completing the application to ascertain whether there is any relevant intelligence about the premises or occupier. Any relevant information should be referred to in the warrant application.
- The application is required to be sworn in the presence of a Justice of the Peace, Commissioner for Declarations or solicitor. It may be sworn in front of the magistrate.

Court process

- The authorised officer making the application should make contact with the nearest Magistrates Court to find out when an application for warrants will be heard.
- Departmental officers attending court are to be mindful that they are representing the Department and should be dressed accordingly and portray a professional image. (Refer also to the Code of Conduct.)
- The authorised officer **MUST** take his or her authorised officer identification card to Court.
- The authorised officer **MUST** take a copy of the relevant Act to Court.
- Departmental officers are to address a magistrate as “Your Honour.”
- The practice in most Magistrates Courts is to hear applications for warrants in private in chambers (the magistrate’s office). The following procedures apply if the application is being heard in open court:
 - Upon entering and leaving the Court, officers are to follow appropriate court etiquette (such as bowing towards the Coat of Arms as a courtesy).
 - Officers are to correctly swear as to the contents of the warrant. Officers are to be guided by the clerk of the Court or Magistrate as to which oath or affirmation to swear. The form of the basic oath is *“I swear that the contents of this document and any further information I may supply either orally or in writing are true and correct, so help me God.”*
 - In the instance of officers being asked complex or legally-based questions that they are unable to answer, officers should request an adjournment and a make immediate contact with the Director Compliance and Investigations, Director Litigation or a principal lawyer in relation to the issue.

Warrant execution

Briefing up

- The Assistant Director-General, Operations and Environmental Regulator must be advised of the proposed execution of a warrant **PRIOR TO** the warrant being executed. For routine matters (for example, where significant conflict, public interest or media interest) is not anticipated, briefing will take the form of dot points sent by email to the Director, Compliance and Investigations and Assistant Director-General. For all other matters, briefing will be by Associate Director-General Briefing Note.
- The relevant Senior Director (QPWS) or Regional Service Director (Regional Service Director) **MUST** also be advised of the intended execution of the warrant.
- At least one Situation Report (SitRep) must be provided to the Assistant Director-General, Operations and Environmental Regulator during or after the execution of the warrant. In the case of complex warrant scenarios (such as where multiple related warrants are executed at the same time, and/ or a large number of exhibits are seized, and/ or the execution of the warrant has significant consequences for the occupier of the place, and/ or there is significant conflict, public interest or media interest) then multiple SitReps (by email) and or formal briefings may be required. The Manager Investigations should determine this in consultation with the Director, Compliance and Investigations.

Planning, Safety and Operational Orders

- The warrant holder (and other officers involved in execution of the warrant if appropriate) should familiarise himself or herself with the premises the subject of the warrant by conducting a covert drive past of the address, consulting other departmental staff who have previously attended the address and viewing maps of the area.
- If the subject premises may contain environmental hazards, environmental officers or scientific staff **MUST** be consulted prior to executing the warrant. A job safety analysis **MUST** also be conducted.
- If it is likely that the occupier of the premises will refuse entry, or if it is likely that the occupier will be aggressive towards DERM officers, the assistance of the Queensland Police Service **MUST** be sought.
- A warrant action plan or operational order **MUST** be completed and provided to the Manager Investigations **PRIOR TO** the execution of the warrant.
- A briefing should be conducted in accordance with the SMEAC formula (Situation, Mission, Execution, Administration and Logistics, Command and Communication). The action plan or operational order should be used in the briefing stage.
- The main outcome of the briefing is that all attending staff should be aware of their respective roles and responsibilities (executing officer, property officer, searching officers, assisting officers, scientific officers, miscellaneous officers) during the execution of the warrant.
- In the execution of large-scale warrants, consideration should be given to conducting a separate briefing with Team Leaders and delegating responsibility and tasks to such persons.
- A search warrant bag containing appropriate search-related resources should be prepared, checked and taken on search warrants.
- An appropriate form-up point or parking spot should be used in attending the subject premises.
- Officers attending the execution of warrants **MUST** notify a non-attending staff member of their whereabouts for operational safety purposes.

Execution

- If an officer's health or safety is threatened at any time during the execution of the warrant, officers **MUST** immediately leave the premises.
- The warrant holder **MUST** inform the Manager Investigations (or other person as per the Operational Order) when they have entered the premises, and again when they leave.
- Appropriate PPE **MUST** be worn during the execution of the warrant.
- On arriving at the premises, the warrant holder should introduce him/herself as the warrant holder, introduce any other persons accompanying him/her, explain the purpose of the warrant and the powers under it.
- Official notebooks should be used for recording observations, occurrences and events in relation to the warrant.
- Officers should electronically record the entire execution of the warrant. Unless operational circumstances require otherwise, the warrant execution should be overtly recorded with the knowledge of all people present.
- Consideration should be given to video recording the execution of the warrant.
- Officers **MUST** display their authorised officer identification cards with them when executing warrants.

- Officers questioning alleged offenders in relation to an offence should first caution the alleged offender about their right not to answer questions or make statements that may tend to incriminate them. The caution should be electronically recorded. Refer to the procedural guide on cautioning published on EcoSteps.
- For operational and administrative reasons, the warrant holder of the operation should be introduced as such (and identified as the lead person) during the execution of the warrant.
- Officers should ask for cooperation from the occupiers of the premises (and any employees or other persons present) as necessary during the execution of the warrant. If an occupier of the premises refuses to give reasonable help for the exercise of powers under the warrant, officers should warn them that it is an offence to obstruct an authorised officer during the performance of his or her duties.
- A copy of the warrant **MUST** be given to the occupier of the premises. The original warrant should be on hand and shown on request, but not physically given to the occupier of the premises.
- The basic details of the warrant should be read out to the occupier of the premises (outline the offence(s), the property sought, the expiry date of warrant, and the powers under the warrant).
- The execution of the warrant should not be stopped simply because the occupier or occupier's solicitor requests (over the telephone or in person) that the execution stop. In these circumstances they should be referred to the Director Litigation or a principal lawyer, Litigation Branch.
- The property seizure guidelines should be followed when seizing property. A centrally designated exhibit point at the site and an appointed exhibit officer should be used in the management of exhibits.
- The warrant holder (and other officers involved) must make detailed notes of the warrant execution. Notes of the time, specific location and the officer locating any seized property should be made. Full continuity notes should be maintained. Photos of exhibits in situ and the general layout of the searched site should be taken, and sketches made as appropriate.
- A property seizure receipt must be completed for all property seized under a warrant, and must be given to the occupier of the premises before officers leave the premises. The receipt should be signed by the occupier of the premises.
- Any damage caused during the execution of the warrant must be noted and recorded, and the record signed by the occupier.
- The warrant holder (the person who applied for the warrant) **MUST NOT** leave the premises while the warrant is still being executed. Returning to the premises after having left them may be unlawful.
- The execution of the warrant should conclude by telling the occupier that the execution of the warrant has ended and that the officers are leaving the premises.

Execution: Computer hardware and electronic documents

It is increasingly common for "documents" to be in electronic form. As such, it has become regular investigative practice to seize electronic material, often by utilising an information technology forensic specialist to create "images" of data. The following guidance applies to that practice:

- Care should be taken with computer equipment, as data can be lost or corrupted if it is not handled appropriately. Advice should be sought from an IT expert.
- An alternative to seizure of computer hardware is the imaging of electronic data.
- When determining whether to seize IT hardware or image data officers should:

- **PRIOR TO** seizure establish that the hardware or image includes material that is relevant to the investigation (see further guidance below); and
 - consider what action is likely to be most cost-effective; and
 - consider what action is likely to be most effective in conducting the investigation; and
 - give particular consideration to the likely disruption caused to business or other activities as a result of seizure; and
 - during the execution of the warrant, but without compromising the investigation, consider how to minimise any such disruption.
- With respect to relevance, it is critically important that the IT equipment be inspected to determine whether electronic material on each piece of equipment is relevant and within the ambit of the warrant. If possible, this should be done with an IT Expert.
 - Other regulators have failed at prosecution due to electronic data being seized without relevance first being established. It is possible that all material seized in such a way (such as by imaging all electronic material) will later be considered inadmissible.
 - When IT experts are crafting search strings to establish whether electronic material is relevant, it is important that the search string does not allow for “false hits”. For example, if executing a warrant in relation to a facility known as “Townsville Harbour” in relation to alleged disposal of spent abrasive blasting waste, a search for documents with that string of words is not adequate as it is conceivable that all manner of irrelevant material will contain those words. However, it may be appropriate to look for a string such as “abrasive blasting waste disposal”. The warrant holder and IT expert should determine appropriate search strings together.

Dealing with claims that documents are legally professionally privileged and/ or irrelevance

- The warrant holder should not invite (expressly or impliedly) a claim of legal professional privilege. However, if a claim of legal professional privilege (or “privilege” generally) is made, the warrant holder should do the following:
 - Receive (that is, listen to and note) the claim of privilege.
 - Ask the person making the claim to indicate the grounds upon which the claim is made and in whose name the claim is made (ie, who does he or she claim privilege attaches to).
 - Hard copy documents in which respect of which legal professional privilege is made should be placed in a separate container (for example, a box). A list of the documents (identifying sufficient general information as is required to identify it, for example, “Letter from T Brown, Lawyers to A Smith Pty Ltd dated 1 June 2009”) should also be prepared and be endorsed by the warrant holder and preferably also the person claiming privilege. The list should go into the box with the documents, which should then be sealed. The person claiming privilege should be allowed to copy the documents before they are placed in the box if he or she wishes, and if that is possible and practicable.
 - The list and the box should be marked and endorsed to the effect that the documents are not seized under the warrant, and should be delivered as soon as possible into the custody of the Clerk of the Court in the Magistrates Court District in which the warrant was granted pending resolution of the claim of privilege. If the Clerk of the Court or Court staff refuse to take possession of the box, the warrant holder should telephone and seek the advice of the Manager Investigations, Director Compliance and Investigations or Director Litigation.

- If the claim of privilege is in relation to electronic material (when an entire hard drive is being imaged) then it is preferable that the warrant holder arranges for the IT expert to effectively isolate those documents, produce hard copies of them and deal with them in accordance with the procedures above for hard copy documents. In that case, it is preferable that analysis of the imaged electronic data occurs in the presence of the warrant holder and person claiming privilege to enable the claims of privilege to be dealt with appropriately. If necessary, seek advice from the Manager Investigations and/or the IT expert.
- If during the execution of the warrant it is claimed that documents sought to be seized under warrant are irrelevant (as they are considered relevant by the warrant holder), those documents **MAY** be appropriately marked to that effect. If the warrant holder considers the documents are relevant and within the scope of the warrant the material should be seized. Determinations on admissibility (including whether the documents are relevant or have any probative value) is a matter for the Court at a later time.

Post- warrant

- A de-briefing should be conducted at the conclusion of the warrant at an appropriate location.
- All seized property should be handled with care. Contamination and continuity issues should be considered at every stage of property handling and management. Seized property should be placed in the exhibits facility at the Investigations Unit in accordance with operational policy.
- Images of electronic material must be kept securely.
- The result of the execution of the warrant should be included in the Search Warrant Register.
- The Manager Investigations should be briefed in relation to the outcome of the warrant.
- The warrant should be completed with the appropriate details relating to its execution.
- Comprehensive file notes/notebook entries should be made in regard to the execution of the warrant.
- The original warrant should be treated as an exhibit and retained for court purposes.
- The recordings made of the execution of the warrant are to be treated as exhibits. A copy of the recordings should be made for back-up and transcription purposes.

Common mistakes and avenues for disputing admissibility of evidence obtained under warrant

Common Mistakes

- Execution of warrant is not recorded electronically. Check batteries prior to executing the warrant.
- Warrant is executed at incorrect address. Illegal and incorrect search addresses are not only embarrassing, they can lead to formal complaints or legal proceedings being brought against the Department.
- Property seized from the premises is not handled correctly, or is left behind, or is lost. Due care must be exercised in dealing with exhibits and seized property.
- Property seizure receipts not being completed and left with occupier. This can lead to disputes about what was actually seized.
- Officers not introducing themselves on tape. This creates difficulties during the transcription process.

- Suspects not being cautioned when appropriate. Admissions may not be admissible in court proceedings.
- Premises being searched when no person is at the premises. Allegations of impropriety can be made against the Department. Officers should contact a relevant person to be present during the search, for example a company representative, police officer, or Justice of the Peace. The warrant must not be executed unless a relevant person is present.
- Execution of the warrant does not occur within the time specified in the warrant. Ensure that the magistrate granting the warrant has correctly completed the expiry date and signed the warrant.

Avenues for contesting warrants

- The nominated address on the warrant must be correct and thoroughly descriptive.
- The offence must be one that is suspected to have already occurred, and not one that will occur in the future.
- The grounds for the warrant must show a nexus being between the nominated offence(s), the subject premises and the evidence sought. Warrants may not be "fishing expeditions".
- All aspects relating to the grounds of the warrant can be disputed in court in order to argue that evidence should be excluded. Reasonable suspicion is a subjective test – "must amount to a positive feeling of actual apprehension or mistrust amounting to a slight opinion, but without sufficient evidence".
- The application must be sworn correctly under oath or affirmation.
- A distinction must be made between whether the evidence is at the premises, or may likely be at the premises within the relevant time set out in the legislation. The grounds must differentiate between these two alternative aspects.
- The search must not continue once all of the nominated evidence has found. Once the warrant has been executed and the evidence sought is located, the warrant ceases. Continued searches in this instance can be legally challenged.
- Officers must state their name and position, and display their authorised officer identification card.

Alternate means of applying for a warrant

In urgent or special circumstances, and where permitted by the relevant legislation, a warrant may be applied for by phone, fax, radio or other form of communication.

Assistance

The legislation generally allows the warrant holder to use reasonable assistance in executing it. This means that other persons can assist in the execution of the warrant. If resistance is expected during the execution of the warrant, the assistance of the Queensland Police Service **MUST** be sought prior to the execution of the warrant.

If resistance is encountered during the execution of the warrant, and there is **ANY** risk of violence, the officer **MUST** immediately leave the premises and contact the Queensland Police Service.

It is prudent to contact the local police station before a warrant is executed even if no resistance is expected, to advise them of the time and place you will be executing the warrant in case difficulties are encountered.

Consideration should also be given as to whether other DERM officers or external experts should be taken to the premises to assist with technical matters (for example, sample taking or species identification).

Approved By

[Redacted Signature]

Signature

1 October 2009

Date

A/Director Compliance and Investigations

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Obtaining evidence that a company has committed an offence

The objective of this guideline is to clarify how evidence is to be collected and what evidence is required to prove that a company has committed an offence.

Essential points

- Identify the company and the people that directly or indirectly control the company.
- Establish the chain of command and the identity of the most senior person that has both a supervisory responsibility for the events in question and authority to speak on behalf of the company.
- Establish the instructions given to any employees and the level of supervision.
- Companies have no privilege against self-incrimination unless given it by legislation.
- Be aware that with larger companies, the board of directors may be genuinely eager to assist investigators in remedying inappropriate conduct in the workplace.

General rules on liability

There are some general rules to identify whether someone is responsible for a criminal or other act. You must identify the actual act or omission the subject of the investigation or query, in order to be able to identify who is responsible for that act or omission.

Once you know the act or omission, identify who did the act, or had the responsibility to take an action (in cases of offence arising from an omission to take an action). A company is liable for acts or omissions committed by its officers or employees when they were acting in the course of their employment.

What is a company?

A company is an artificial legal entity which is granted certain of the legal rights and capabilities of a real person.

A business name is **not** a separate legal entity capable of being sued.

While companies have their own legal identity, it is through people that they make decisions and take actions. Identifying which people have made decisions or taken actions is important for working out whether a company has committed an offence.

There are a number of groups of people who make up a company. **Shareholders** are the owners of the company, and hold one or more shares in the company. A company will not normally be liable for the acts or omissions of its shareholders. **Employees** take actions on behalf of a company, and a company can be liable for things that its employees do or fail to do. Employees (except very senior employees) normally cannot speak on behalf of a company – that means that things that employees say when being asked questions about an alleged offence will not normally be admissions of the company. **Directors and executive officers** are the

Obtaining evidence that a company has committed an offence

controllers of a company. They have the authority to speak on behalf of a company, so that any admissions that they may make while being asked questions are admissions of the company itself. Directors and executive officers may also be personally liable for offences committed by a company.

Who can speak for a company?

Who can speak on behalf of the company often depends on the size and nature of the company's operations.

Directors, executive officers (such as the chief executive officer) and some senior employees are able to speak on behalf of the company. A person can also be authorised to speak on behalf of the company.

In asking questions of people in a company, you should ask them whether they have authority to speak on behalf of the company. You can also ask questions to identify their role in the company, who they report to and the nature of their responsibilities as a way of establishing whether they have sufficient authority within the company to speak on behalf of it.

Proving a company has committed an offence

Identify the company

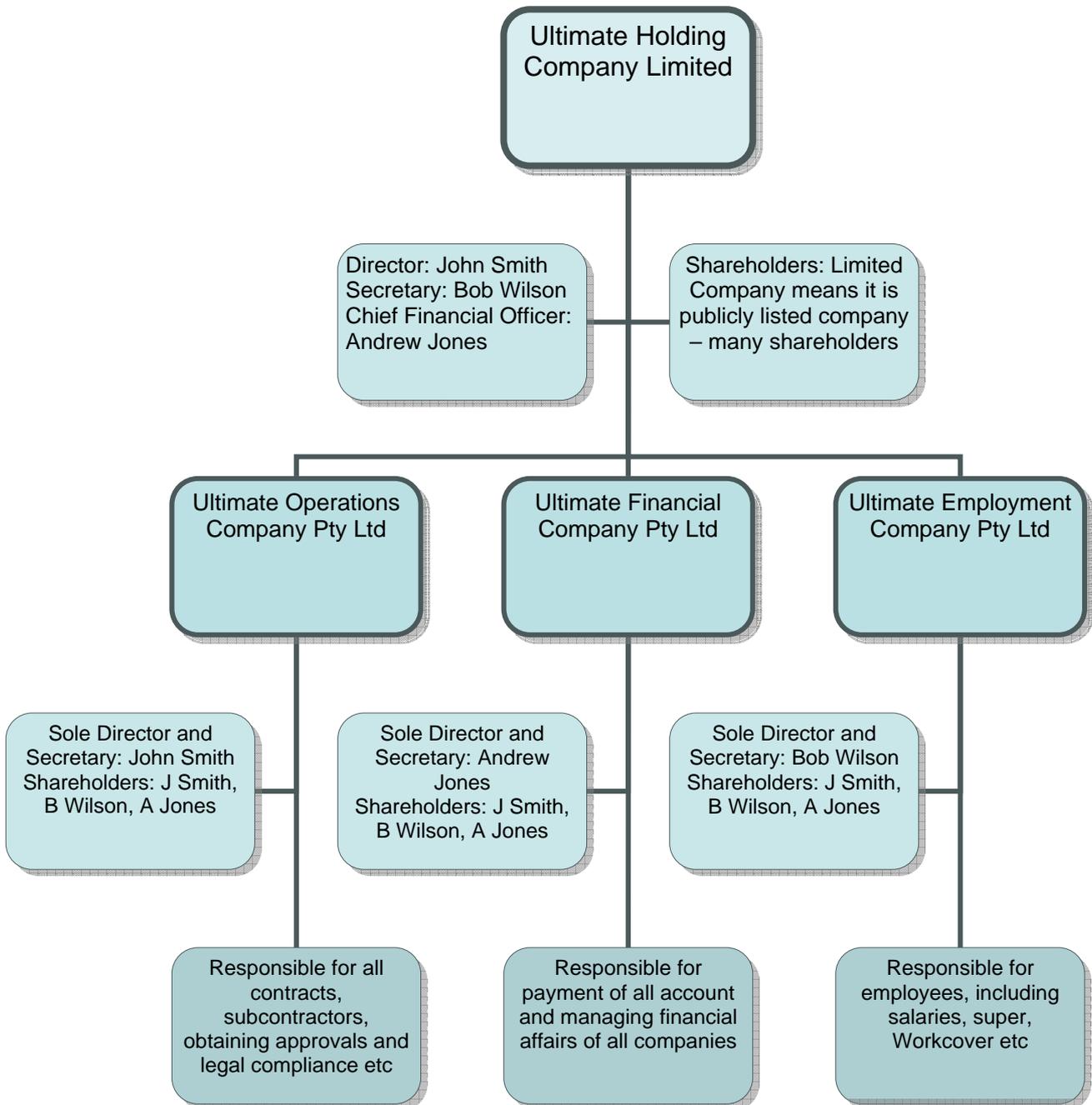
You can identify what company you are investigating by:

- interviewing workers on site to identify their employer and superiors;
- looking at employees' pay slips and group certificates;
- if the offence occurred on private land, by determining the ownership of the land;
- if a business name has been identified, by performing a business name search;
- searching licences issued by the department or relevant local authority; and
- searching motor vehicle registrations.

Often for tax reasons, businesses split their identity between companies. If this appears to be the case, collect as much information as you can (including doing company searches, identifying related entities and holding/subsidiary companies) and seek legal advice.

Obtaining evidence that a company has committed an offence

Where your investigation involves multiple companies, you should prepare a chart to explain who sits where, for example:



Obtain a company search

A company search will tell you important information about the company such as the identity of the directors, secretaries and shareholders, whether the company is a wholly owned subsidiary of another company (or is a holding company itself), the registered office of the company and other important information.

Interview the company, employees, agents and subcontractors

Points to consider when dealing with a small company with not many employees include:

- Speak to the most senior officer possible (such as the managing director or general manager).

Obtaining evidence that a company has committed an offence

- Establish that he or she can speak on behalf of the company.
- Ask what is the nature of the business conducted by the company.
- Establish that the company was at the place of the offence (for example, was engaged to clear bush along the boundary of a national park).
- Ask whether the company is undertaking work on behalf of another person. If so, ascertain who this is and whether there is any formal agreement about the activity.
- If the act or omission has been done by someone other than the person that you are speaking to, determine whether the person is an employee, subcontractor or agent of the company, or is some other officer or director of the company.
- Determine the extent of instructions given to employees, subcontractors or agents and the level of supervision.
- If admissions are made by employees these should be put to the representative of the company to confirm or adopt.
- If the relevant act or omission was done by an employee or agent of the company determine whether the act or omission was within the scope of that person's authority. If employees ignore directions or procedures put in place by the company, this may mean that the company is not liable for the employee's actions.

Points to consider when dealing with large companies with many employees or multiple offices include:

- Talk to the people doing the work – find out who do they report to. Try to find out what the chain of command is in the company (investigate from bottom up when on site) and what their relationship is with the company (such as subcontractor or employee).
- Determine who is the most senior person in the area who can speak to you (this can be done through on site investigations, a company search and other enquiries).
- If you are not at the main office of the company, ask whether the person you are speaking to has the authority to speak on behalf of the company in relation to the matter being investigated.

Environmental officers

Persons appointed by companies to ensure that the company complies with environmental legislation can be a good source of information, and you should consider asking them questions about the incident, and similar past incidents and the systems that are in place to manage environmental risks.

For more complex matters, you may also consider interviewing former environmental officers to see whether they had made recommendations relevant to the matter being investigated.

Use of compulsory powers and the privilege against self-incrimination

In the absence of a specific legislative provision, a company does not have the right to decline to answer questions or to provide information or documents under a compulsory legislative power on the basis that to do so might tend to incriminate it.

If required to produce a document under section 466 of the *Environmental Protection Act 1994* a company could not refuse on the grounds that the contents of the document might tend to incriminate it. However a company could decline to answer a question it was required to answer under section 465 of that Act as section 476

Obtaining evidence that a company has committed an offence

provides that it is a reasonable excuse for a person to fail to answer a question on the grounds that answering it may tend to incriminate the person.

Executive officers may be able to decline to answer questions on the basis of self-incrimination as they are potentially liable for offences committed by the company.

Always be conscious that other individuals could also be personally responsible for an offence, which means that they have a right to decline to answer questions. **Disclaimer**

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Approved By



16 December 2009

Manager Strategy and Planning
Department of Environment and Resource
Management

Enquiries:
Strategy and Planning Team
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Procedural guide

Compliance

Penalty Infringement Notices – Offence Codes – Environmental Protection

This document lists the offences codes that officers will use when filling out a penalty infringement notice (PIN) in relation to an alleged offence under the Environmental Protection Act and subordinate legislation detailed below. The offence code field is one of the mandatory fields in the PIN. Please refer to the Procedural Guide on Infringement Notices for further guidance concerning the issuing of PINs. **Please ensure you have the most up to date version of this document and reference to the relevant offence section in the relevant act is ALWAYS required.**

Environmental Protection Act 1994 and subordinate legislation

Code	Section	Offence Description	Penalty	
			Units	\$
Environmental Protection Act 1994				
EPA01	s 435(2)	Contravention of development condition of DA	5 (Ind)	500
EPA02	s 435(2)	Contravention of development condition of DA	20 (Corp)	2000
EPA03	s 430(3)	Contravention of condition of environmental authority	5 (Ind)	500
EPA04	s 430(3)	Contravention of condition of environmental authority	20 (Corp)	2000
EPA05	s 432(2)	Contravention of TEP	5 (Ind)	500
EPA06	s 432(2)	Contravention of TEP	20 (Corp)	2000
EPA07	s 361(2)	Contravention of condition of EPO	5 (Ind)	500
EPA08	s 361(2)	Contravention of condition of EPO	20 (Corp)	2000
EPA09	s 434(2)	Contravention of condition of site management plan	5 (Ind)	500
EPA10	s 434(2)	Contravention of condition of site management plan	20 (Corp)	2000
EPA11	s 363E	Failure to comply with a direction notice	10 (Ind)	1000
EPA12	s 363E	Failure to comply with a direction notice	20 (Corp)	2000
EPA13	s 369	Performing waste management works without an approval	25 (Ind)	2500
EPA14	s 369	Performing waste management works without an approval	40 (Corp)	4000
EPA15	s 369C	Contravening a waste management works approval	25 (Ind)	2500
EPA16	s 369C	Contravening a waste management works approval	40 (Corp)	4000
EPA17	s 435A(2)	Contravention of a standard environmental condition of a Code	5 (Ind)	500
EPA18	s 435A(2)	Contravention of a standard environmental condition of a Code	20 (Corp)	2000

Code	Section	Offence Description	Penalty	
			Units	\$
EPA19	s 444A	Failure to notify Chapter 4 activity has stopped	5 (Ind)	500
EPA20	s 444A	Failure to notify Chapter 4 activity has stopped	20 (Corp)	2000
EPA21	s 426(b)	Operating a level 2 mining project without an environmental authority	5 (Ind)	500
EPA22	s 426(b)	Operating a level 2 mining project without an environmental authority	20 (Corp)	2000
EPA23	s 426A(b)	Operating a level 2 petroleum activity without an environmental authority	5 (Ind)	500
EPA24	s 426A(b)	Operating a level 2 petroleum activity without an environmental authority	20 (Corp)	2000
EPA25	s 427(1)	Operating a chapter 4 activity without a registration certificate	5 (Ind)	500
EPA26	s 427(1)	Operating a chapter 4 activity without a registration certificate	20 (Corp)	2000
LP01	s 440D(1)	Unlawful deposit — more than 200 L of litter	16 (Ind)	1600
LP02	s 440D(1)	Unlawful deposit — more than 200 L of litter	64 (Corp)	6400
LP03	s 440D(1)	Unlawful deposit — dangerous littering	4 (Ind)	400
LP04	s 440D(1)	Unlawful deposit — dangerous littering	16 (Corp)	1600
LP05	s 440D(1)	Unlawful deposit — 20 to 200 L of litter	4 (Ind)	400
LP06	s 440D(1)	Unlawful deposit — 20 to 200 L of litter	16 (Corp)	1600
LP07	s 440D(1)	Unlawful deposit — litter from a vehicle	3 (Ind)	300
LP08	s 440D(1)	Unlawful deposit — litter from a vehicle	12 (Corp)	1200
LP09	s 440D(1)	Unlawful deposit — other litter	2	200
EPA27	s 440Q(1)	Contravention of a noise standard	10 (Ind)	1000
EPA28	s 440Q(1)	Contravention of a noise standard	20 (Corp)	2000
EPA29	s 440ZG	Depositing prescribed water contaminants in waters etc.	10 (Ind)	1000
EPA30	s 440ZG	Depositing prescribed water contaminants in waters etc.	20 (Corp)	2000
EPA31	s 440ZI(1)	Release of certain substances from boats into non-coastal waters	10 (Ind)	1000
EPA32	s 440ZI(1)	Release of certain substances from boats into non-coastal waters	20 (Corp)	2000
EPA33	s 440ZJ(1)	Release of sewage from boats into non-coastal waters	10 (Ind)	1000
EPA34	s 440ZJ(1)	Release of sewage from boats into non-coastal waters	20 (Corp)	2000
EPA35	s 440ZJ(2)	Release of sewage from boats into non-coastal waters — mooring	10 (Ind)	1000
EPA36	s 440ZJ(2)	Release of sewage from boats into non-coastal waters — mooring	20 (Corp)	2000
EPA37	s 440ZK(1)	Depositing rubbish from boats into non-coastal waters	10 (Ind)	1000

Code	Section	Offence Description	Penalty	
			Units	\$
EPA38	s 440ZK(1)	Depositing rubbish from boats into non-coastal waters	20 (Corp)	2000
GREAT BARRIER REEF PROTECTION				
RP01	s 83(1)	Failure to keep required records	3 (Ind)	300
RP02	s 83(1)	Failure to keep required records	12 (Corp)	1200
RP03	s 84(1)	Failure to keep relevant primary documents	3 (Ind)	300
RP04	s 84(1)	Failure to keep relevant primary documents	12 (Corp)	1200
RP05	s 86	Failure to comply with production requirement	3 (Ind)	300
RP06	s 86	Failure to comply with production requirement	12 (Corp)	1200
RP07	s 92	Failure to submit an ERMP	5 (Ind)	500
RP08	s 92	Failure to submit an ERMP	20 (Corp)	2000
RP09	s 101(1)	Failure to amend an ERMP	3 (Ind)	300
RP10	s 101(1)	Failure to amend an ERMP	12 (Corp)	1200
RP11	s 105(2)	Failure to submit and annual report	3 (Ind)	300
RP12	s 105(2)	Failure to submit and annual report	12 (Corp)	1200
Environmental Protection Regulation 2008				
LANDFILL				
EPR01	s 21(1)	Delivering waste to a waste facility from outside scheduled area	2	200
EPR02	s 21(3)	Inappropriate burial of untreated clinical waste at a waste facility	2	200
EPR03	s 85(2)	Failure of occupier of reporting facility to give information	2	200
EPR04	s 85(7)	Failure to comply with notice	2	200
EPR05	s 87(2)	Failure of occupier to keep information for 3 years	2	200
EPR06	s 87(4)	Failure of occupier to keep information as specified	2	200
EPR07	s 129	Paying reduced annual fee when not eligible	2	200
EPR08	s 130	Failure to keep records for reduced annual fee	2	200
EPR09	s 131(3)	Failure to give information or documents	2	200
EPR10	s 132	Failure to notify of change of eligibility	2	200

Code	Section	Offence Description	Penalty	
			Units	\$
Environmental Protection (Waste Management) Regulation 2000				
CONDUCT AT WASTE FACILITIES				
WM04	s 12(1)	Unlawful disposal - waste facility	2	200
WM05	s 13	Burning waste at waste facility	2	200
WM06	s 14(1)	Use of waste facility without consent	1	100
WM07	s 15(2)	Failure to comply with directions or give information	1	100
WASTE TRANSPORT WITHIN QUEENSLAND				
WM08	s 23(1)	Failure to give information to waste transporter (Generator)	2	200
WM09	s 23(2)	Failure to give information to administering authority (Generator)	2	200
WM10	s 23(3)	Failure to give keep record information (Generator)	2	200
WM11	s 24(1)	Failure to carry information (Transporter)	2	200
WM12	s 24(2)	Failure to give information to waste receiver (Transporter)	2	200
WM13	s 24(3)	Failure to notify of discrepancy (Transporter)	2	200
WM14	s 24(4)	Failure of waste transporter to keep information (Transporter)	2	200
WM15	s 25(1)	Failure of receiver to record information	2	200
WM16	s 25(2)	Failure to give information to administering authority (Receiver)	2	200
WM17	s 25(3)	Failure to notify of discrepancy (Receiver)	2	200
WM18	s 25(4)	Failure of waste receiver to keep information	2	200
WASTE TRANSPORT INTO QUEENSLAND				
WM19	s 28(1)	Transport without consignment number	2	200
WM20	s 28(3)	Failure to carry information (Transporter)	2	200
WM21	s 28(4)	Failure to give information to waste receiver (Transporter)	2	200
WM22	s 28(5)	Failure to notify of discrepancy (Transporter)	2	200
WM23	s 28(6)	Failure of waste transporter to keep information	2	200
WM24	s 29(1)	Failure of receiver to record information	2	200
WM25	s 29(2)	Failure to give information to administering authority (Receiver)	2	200
WM26	s 29(3)	Failure to notify of discrepancy (Receiver)	2	200
WM27	s 29(4)	Failure of waste receiver to keep information	2	200
WASTE TRANSPORT FROM QUEENSLAND				
WM28	s 32(1)	Failure to record and give information to waste transporter (Generator)	2	200
WM29	s 32(2)	Failure to give information to administering authority (Generator)	2	200
WM30	s 32(3)	Failure of waste generator to keep information	2	200
WM31	s 33(1)	Failure of waste transporter carry information	2	200
WM32	s 33(2)	Failure to notify of discrepancy (Transporter)	2	200

Code	Section	Offence Description	Penalty	
			Units	\$
GENERATOR RESPONSIBILITIES FOR TRACKABLE WASTES				
WM33	s 41(1)	Trackable waste given to unlicensed transporter	16.5	1650
CLINICAL WASTE				
WM34	s 43	Operating without clinical and related waste management plan	2	200
WM35	s 45	Failure to maintain waste management plan	1	100
WM36	s 46(1)	Failure to segregate waste	1	100
WM37	s 47	Design requirements for waste containers not met	2	200
WM38	s 48(1)	Use of unlicensed waste transporter	16.5	1650
WM39	s 49(2)	Failure to dispose of sharp in container	2	200
WM40	s 49(4)	Failure to dispose of sharp in container at premise that generates clinical waste	4	400
WM41	s 49(5)	Failure to ensure sharp not accessible to another person	4	400
WM42	s 50(a)	Failure to set area aside for storage of waste	2	200
WM43	s 50(b)	Failure to store waste in correct area	2	200
WM44	s 51(1)	Storage of Clinical Waste not to create nuisance	4	400
WM45	s 52	Failure to ensure treatment and disposal of clinical waste	16.5	1650
WM46	s 53	Use of waste chute for movement of clinical waste	2	200
PCB				
WM47	s 57(1)	Unlicensed dilution or treatment of PCB waste	16.5	1650
WM48	s 58(1)	Failure to send PCB waste for treatment within 1 year	4	400
WM49	s 58(3)	Failure to send PCB waste treatment when practicable	4	400
WM50	s 59	Disposal of PCB waste at landfill	16.5	1650
WM51	s 61(1)	Failure to give notice of PCB material	1	100
WM52	s 61(2)	Failure to give notice of PCB material – information change	1	100
WM53	s 62(1)	Failure to prepare emergency plan	0.5	50
WM54	s 64(1)	Use of equipment containing concentrated PCB	4	400
WM55	s 65	Use of equipment containing scheduled PCB	4	400
WM56	s 66(2)	Failure to deal with equipment no longer in use within 1 year	4	400
WM57	s 66(4)	Failure to deal with equipment no longer in use when practicable	4	400
DESIGN RULES AND WASTE TRANSPORT				
WM58	s 67(2)	Use of non-complying equipment	4	400
WM59	s 68	Failure to load to prevent waste release	2	200

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satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Power to enter land, vehicles or dwellings

The objective of this guideline is to clarify how you should exercise your powers in undertaking functions of the Department.

Essential points

- In addition to any powers granted by legislation, you have the same rights as an ordinary member of the public.
- Before resorting to the use of powers granted under legislation see if the person being dealt with will cooperate. It is a trap to think that statutory powers make investigations easy. Good manners, an inquisitive mind and hard work are always far more effective than statutory powers.
- The powers of an authorised person under the Department's various legislation can be limited by the person's instrument of appointment. Look at your instrument of appointment to ensure that you possess the power to take a particular course or action.
- When exercising your powers, you must either produce your identity card or have it clearly displayed.

Powers of an authorised person generally

Outside legislative provisions an authorised person retains the same rights as a member of the public, including liberty to go where a member of the public can go and the freedom to speak to people. One of the most effective investigation tools can be to simply ask nicely. If you want to know who someone is or wish to see something or how to obtain a copy or image of something, ask. A simple 'do you mind...' can work wonders. Of course if the answer is "No" then recourse can be had to the powers under the relevant legislation. Seeking the cooperation of the person can, however, be quicker and easier.

In terms of an authorised person's right to enter upon premises other than under legislation, the public has the right to enter and be on public land. In relation to private land where a business is being conducted which is open to the public (a shopping centre, for example) a general licence exists to allow people to enter. In relation to private homes, in the absence of signs to the contrary a presumed licence exists to allow persons to enter upon the property in order to contact the occupiers of the property.

Powers of entry to land or structures

Under the various legislation administered by the Department, powers are granted to authorised persons (and other specified persons) to enter land in certain circumstances.

Annexure A is a table outlining various powers of entry under legislation administered by the Department. This table does not include all powers of entry, but provides general guidance on when these powers can be exercised. **Always check the specific provisions of the legislation before entering land using a power.**

What you can do when you enter land

What you are authorised to do following entry depends on what the particular legislation says, and if powers are authorised by a warrant, what the warrant says. **Always check the specific provisions of the legislation before exercising a power.**

Common powers that are able to be exercised include:

- enter the land, place or structure;
- inspect, measure, test, photograph or film any part of the place or anything at the place;
- take samples (including extracting a sample for further analysis) or copies of documents;
- take into or onto the place any equipment and materials that are reasonably required to exercise your powers;
- require a person to assist, provide information or answer questions during the exercise of the power of entry. There are a number of specific limitations and qualifications on this power, which are outlined in the particular legislation you are administering – ensure you comply with your particular legislative provisions; and
- install, check or maintain monitoring equipment.

Damage to property and compensation

Where damage is caused to someone's property during the exercise of power to enter a place, you need to ensure that the damage done is fully documented (including photographs and notes), to ensure that any compensation paid to the person arising from the damage is limited to that damage caused by the Department.

If damage occurs, you must inform your manager as soon as possible.

Your conduct as a public servant

As you are employed by the State Government, you are a public servant. Your conduct as a public servant is regulated under certain legislation and codes including:

- [Public Sector Ethics Act 1994](#);
- [Public Service Act 2008](#); and
- the Department's [code of conduct](#).

In exercising your functions as an officer of the Department, always ensure that you comply with your duties and obligations arising under these statutes and codes.

As guiding principles, your conduct should:

- serve the community and the government, always with the public interest and Departmental priorities in mind;
- maintain impartiality and integrity;
- comply with the 'ethics principles', being:
 - respect for the law and the system of government;
 - respect for persons;
 - integrity;

- diligence;
- economy; and
- efficiency;
- seek to improve the quality of service delivery to the community and government;
- ensure the effective, efficient and appropriate use of public resources;
- promote equality and diversity;
- observe and comply with laws;
- not reflect adversely on the reputation of the public service.

You should continually refresh your knowledge about your obligations, to both protect yourself against inadvertently breaching those obligations and to ensure that the Government continues to observe those principles in the exercise of your powers as a public servant.

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Approved By



16 December 2009

Manager Strategy and Planning
Department of Environment and Resource
Management

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Annexure A – powers of entry

The following table outlines a number of statutes administered by the Department. This table does not include all legislation that authorises the exercise of powers for entry to premises, vehicles or dwellings etc. **You must check the legislation to ensure you have the power before you undertake entry.**

Legislation	Who?	Under what circumstances	Powers after entry
Aboriginal Cultural Heritage Act 2003	Authorised officer	<p>May enter if:</p> <ul style="list-style-type: none"> the occupier consents to the entry; or it is a public place and the entry is made when the place is open to the public; or the entry is authorised by a warrant. <p>A warrant may only be issued if there are reasonable grounds for suspecting:</p> <ul style="list-style-type: none"> there is a particular thing or activity (the <i>evidence</i>) that may provide evidence of an offence against this Act; and the evidence is at the place, or may be at the place within the next 7 days. 	<p>For enforcing compliance with this Act, the authorised officer may:</p> <ul style="list-style-type: none"> search any part of the place; or inspect, measure, test, photograph or film any part of the place or anything at the place; or take a thing, or a sample of or from a thing, for analysis or testing; or take an extract from, or copy, a document at the place; or take into or onto the place any person, including an Aboriginal party or representative of an Aboriginal party, the authorised officer reasonably requires for exercising a power under this Act; or take into or onto the place any equipment and materials the authorised officer reasonably requires for exercising a power under this Act; or require the occupier of the place, or a person at the place, to give the authorised officer reasonable help to exercise the authorised officer's powers under the above paragraphs; or require the occupier of the place, or a person at the place, to give the authorised officer information to help the authorised officer ascertain whether this Act is being complied with.

Legislation	Who?	Under what circumstances	Powers after entry
<u>Coastal Protection and Management Act 1995</u>	Authorised person	<p>In the absence of an urgent circumstance, entry is permitted:</p> <ul style="list-style-type: none"> • to obtain the agreement of the occupier or, if there is no occupier, the owner of the land; or • if the officer gives at least 7 days notice to the person occupier/owner of: <ul style="list-style-type: none"> ○ the authorised person's intention to enter the land; and ○ the reason for entering the land; and ○ the day and time when the authorised person proposes to enter the land. 	<p>The power to enter land includes power to:</p> <ul style="list-style-type: none"> • re-enter the land; and • remain on the land for the time that is reasonable and necessary for the purpose of the entry; and • take assistants, vehicles, materials, equipment or things that are reasonable and necessary for the purpose of the entry. <p>The power to enter may be exercised to:</p> <ul style="list-style-type: none"> • inspect or survey the land or works on the land; or • dig and bore into the land to find out the nature of the soil; or • do everything necessary for paragraphs the above including, for example: <ul style="list-style-type: none"> ○ measuring, photographing or filming anything on the land; or ○ taking samples of or from anything on the land.
<u>Environmental Protection Act 1994</u>	Authorised person	<p>General power of entry</p> <p>An authorised person may enter a place if:</p> <ul style="list-style-type: none"> • The occupier consents to the entry and, if the entry is for exercising a power under chapter 7, part 5B or 8 of the 	<p>General</p> <p>An authorised person who enters a place, or enters or boards a vehicle may:</p> <ul style="list-style-type: none"> • search any part of the place or vehicle; or • inspect, examine, test, measure, photograph or film the place or vehicle or anything in or on the place or vehicle; or • take samples of any contaminant, substance or thing in or on the place or

Legislation	Who?	Under what circumstances	Powers after entry
		<p>EP Act, its owner consents; or</p> <ul style="list-style-type: none"> • it is a public place and the entry is made when the place is open to the public; or • it is a place to which an environmental authority relates and the entry is made when: <ul style="list-style-type: none"> ○ the mining or chapter 5A activity to which the authority relates is being carried out; or ○ the place is open for conduct of business; or ○ the place is otherwise open for entry; or • it is a place to which a registration certificate, a development approval subject to a development condition or a code of environmental compliance relates and the entry is made when— <ul style="list-style-type: none"> ○ the chapter 4 activity to which the certificate, approval or code relates is 	<p>vehicle; or</p> <ul style="list-style-type: none"> • record, measure, test or analyse the release of contaminants into the environment from the place or vehicle; or • take extracts from, or make copies of, any documents in or on the place or vehicle; or • take into or onto the place or vehicle any persons, equipment and materials the authorised person reasonably requires for the purpose of exercising any powers in relation to the place or vehicle; or • install or maintain any equipment and materials in or on the place or vehicle the authorised person reasonably requires for the purpose of conducting a monitoring • program for the release of contaminants into the environment from the place or vehicle; or • require the occupier of the place, or any person in or on the place or vehicle, to give to the authorised person reasonable help for the exercise of the powers mentioned above; or • if the authorised person enters or boards a vehicle—by written notice given to the person in control of the vehicle, require the person: <ul style="list-style-type: none"> ○ to take the vehicle to a stated reasonable place by a stated reasonable time; and ○ if necessary, to remain in control of the vehicle at the place for a reasonable time; <p>to enable the authorised person to exercise the powers mentioned above.</p>

Legislation	Who?	Under what circumstances	Powers after entry
		<ul style="list-style-type: none"> being carried out; or ○ the place is open for conduct of business; or ○ the place is otherwise open for entry; or • it is a place where an industry is conducted and the entry is made when— <ul style="list-style-type: none"> ○ the place is open for conduct of business; or ○ is otherwise open for entry; or ○ the entry is authorised by a warrant; or ○ for land mentioned in chapter 7, part 5B or 8— the entry is authorised by an order under section 458; or • the authorised person may enter the place under section 453, 454 or 455. <p>Environmental harm</p>	<p>Finding source of contaminant</p> <p>An authorised person may enter land for the purpose of finding out or confirming the source of the release of the contaminant.</p> <p>Contaminated land</p> <p>An authorised person may, under this section, enter the land to conduct a preliminary investigation.</p> <p>To do work</p> <p>You need an Order of a Magistrate before entry to do work in the absence of a specific power to enter and conduct work – see section 458 EP Act.</p>

Legislation	Who?	Under what circumstances	Powers after entry
		<p>Entry may occur if unlawful environmental harm has occurred.</p> <p>Contaminated land</p> <p>May enter land if the administering authority believes on reasonable grounds land is contaminated land.</p> <p>Necessary or desirable access</p> <p>If it is necessary or desirable to cross land to access other land (i.e. landlocked land), entry may occur – see section 455 EP Act.</p> <p>Warrant for entry</p> <p>Entry may be obtained via a warrant.</p>	
<p><i>Forestry Act 1959</i></p>	<p>Any person performing duties under this Act or otherwise authorised by the chief executive in writing</p>	<p>Entering land</p> <p>The person may without any previous notice enter upon any land or waters whatsoever for the purpose of inspecting any forest products thereupon or therein, whether growing or otherwise, or for giving effect to any of the provisions of this Act and upon such entry</p>	<p>Make surveys and examine any timber or other forest products and any quarry material</p> <p>Do anything necessary for ascertaining the suitability of the land or waters for any forestry purposes or for the purposes of this Act.</p> <p>Power to seize timber, vehicles etc.</p>

Legislation	Who?	Under what circumstances	Powers after entry
		<p>carry out such purpose.</p> <p>Entering a dwelling</p> <p>A forest officer enters any part of a place, must first obtain permission of the occupier to enter that dwelling.</p> <p>Alternatively, a justice may issue a warrant to enter the dwelling, if there is reasonable cause to suspect:</p> <ul style="list-style-type: none"> • that there are in any place forest products or quarry material; and • that such forest products or quarry material have been got or interfered with contrary in any respect to this Act. 	
<p>Land Act 1994</p>	<p>Authorised person</p>	<p>For the purpose of the Land Act 1994 or the <i>Vegetation Management Act 1999</i>, may enter on land at any reasonable time.</p>	<p>Upon entry, may:</p> <ul style="list-style-type: none"> • inspect the land and the uses made of the land; • photograph or film anything on the land; • take samples of or from anything on the land; • for lease land, licence land or permit land for agricultural, grazing or pastoral purposes, establish on the lease land, licence land or permit land sites (each a

Legislation	Who?	Under what circumstances	Powers after entry
			<p><i>monitoring site</i>) to monitor compliance with:</p> <ul style="list-style-type: none"> ○ this Act; or ○ the lease, licence or permit; or ○ a land management agreement; or ○ a remedial action notice; or ○ a remedial action order; <ul style="list-style-type: none"> • place a marker to show where a monitoring site is; • install or place at a monitoring site a device (<i>a monitoring device</i>) to carry out the monitoring; • read a monitoring device; • check the accuracy of, or repair or replace, a monitoring device; • do anything reasonable and necessary to exercise a power above.
<p><u>Marine Parks Act 2004</u></p>	<p>Inspector</p>	<p>General power to enter</p> <p>An inspector may enter a place if—</p> <ul style="list-style-type: none"> • its occupier consents to the entry; or • it is a public place and the entry is made when it is open to the public; or • the entry is authorised by a warrant; or 	<p>The inspector may do all or any of the following:</p> <ul style="list-style-type: none"> • search any part of the place; • inspect, measure, test, photograph or film any part of the place or anything at the place; • mark or seal a container or other thing at the place; • open a container if the inspector considers it is necessary for exercising a power; • take a sample of or from anything at the place; • take an extract from, or copy, a document at the place;

Legislation	Who?	Under what circumstances	Powers after entry
		<ul style="list-style-type: none"> • it is an authority holder's place of business stated in the authority and is: <ul style="list-style-type: none"> ○ open for carrying on the business; or ○ otherwise open for entry; or ○ required to be open for inspection under the authority. <p>A warrant can be issued by a Magistrate to authorise the entry.</p>	<ul style="list-style-type: none"> • take into or onto the place any person, equipment and materials the inspector reasonably requires for exercising a power under this division.
<p><u>Nature Conservation Act 1992</u></p>	<p>Conservation officer</p>	<p>General power of entry</p> <p>A conservation officer may:</p> <ul style="list-style-type: none"> • enter any place at any reasonable time of the day or night; and • exercise the powers set out in section 147 Nature Conservation Act 1992. <p>This power may be exercised only if:</p>	<p>General powers</p> <p>The following powers can be exercised:</p> <ul style="list-style-type: none"> • search any part of the place; • inspect, examine, photograph or film anything in or on the place; • take extracts from, and make copies of, any documents in or on the place; • take into or onto the place such persons, equipment and materials as the conservation officer reasonably requires for the purpose of exercising any powers in relation to the place; • require the occupier or any person in or on the place to give to the conservation officer reasonable assistance in relation to the exercise of the powers mentioned

Legislation	Who?	Under what circumstances	Powers after entry
		<ul style="list-style-type: none"> • the occupier of the place consents to the entry or exercise of the power; or • a warrant under section 148 Nature Conservation Act 1992 authorises the entry or exercise of the power; or • the place is a place to which the public are admitted (whether or not for consideration) and the entry is made when members of the public attend or the premises are open for admission by the public; or • the place is premises, or the part of premises, that: <ul style="list-style-type: none"> ○ are licensed under a regulation and the entry is made when the premises are open for conduct of business or otherwise open for entry; and ○ are not used exclusively for residential purposes. <p>Entry on offence or evidence</p>	<p>in the above paragraphs;</p> <ul style="list-style-type: none"> • the powers mentioned in the following provisions— <ul style="list-style-type: none"> ○ section 151 Nature Conservation Act 1992; ○ section 152 Nature Conservation Act 1992; ○ section 154(1)(b) to (e) Nature Conservation Act 1992; • Seize evidence. <p>Power on offence or evidence</p> <p>If the conservation officer enters the place and finds the evidence, the following provisions have effect:</p> <ul style="list-style-type: none"> • the officer may seize the evidence; • the officer may keep the evidence for 6 months or, if a prosecution for an offence against this Act in the commission of which the evidence may have been used or otherwise involved is instituted within that period, until the completion of the proceeding for the offence and any appeal in relation to the proceeding; • if the evidence is a document—while the officer has possession of the document, the officer may take extracts from and make copies of the document, but must allow the document to be inspected at any reasonable time by a person who would be entitled to inspect it if it were not in the officer’s possession.

Legislation	Who?	Under what circumstances	Powers after entry
		<p>If there are reasonable grounds for suspecting that there is in a place a particular thing (<i>the evidence</i>) that may afford evidence of the commission of an offence against this Act, the officer may—</p> <ul style="list-style-type: none"> • enter the place; and • exercise the powers set out in section 147. <p>Where the entry is not by consent, a warrant is required.</p>	
<p><u>Queensland Heritage Act 1992</u></p>	<p>Authorised person</p>	<p>An authorised person may enter a place if:</p> <ul style="list-style-type: none"> • its occupier consents to the entry; or • it is a public place and the entry 	<p>An authorised person may exercise any of the following powers:</p> <ul style="list-style-type: none"> • search any part of the place; • inspect, examine, photograph or film anything in the place; • take extracts from, and make copies of, any document in the place;

Legislation	Who?	Under what circumstances	Powers after entry
		<p>is made when it is open to the public; or</p> <ul style="list-style-type: none"> • the entry is authorised by a warrant; or • it is a place of business and is: <ul style="list-style-type: none"> ○ open for carrying on the business; or ○ otherwise open for entry. <p>Alternatively, entry can occur under a warrant.</p>	<ul style="list-style-type: none"> • take into the place any persons, equipment and materials the authorised person reasonably requires for exercising a power under this division; • require a person in the place to give the authorised person reasonable information or help and provide reasonable facilities to exercise the powers mentioned in the above paragraphs.
<p><u>Torres Strait Islander Cultural Heritage Act</u></p>	<p>Authorised officer</p>	<p>An authorised officer may enter a place if:</p> <ul style="list-style-type: none"> • its occupier consents to the 	<p>The authorised officer may:</p> <ul style="list-style-type: none"> • search any part of the place; or • inspect, measure, test, photograph or film any part of the place or anything at the

Legislation	Who?	Under what circumstances	Powers after entry
2003		<p>entry; or</p> <ul style="list-style-type: none"> • it is a public place and the entry is made when the place is open to the public; or • the entry is authorised by a warrant. <p>An ordinary warrant can be obtained or a special warrant if there are urgent or other special circumstances requiring a non-written (or faxed copy) of a warrant.</p>	<p>place; or</p> <ul style="list-style-type: none"> • take a thing, or a sample of or from a thing, for analysis or testing; or • take an extract from, or copy, a document at the place; or • take into or onto the place any person, including a Torres Strait Islander party or representative of a Torres Strait Islander party, the authorised officer reasonably requires for exercising a power under this Act; or • take into or onto the place any equipment and materials the authorised officer reasonably requires for exercising a power under this Act; or • require the occupier of the place, or a person at the place, to give the authorised officer reasonable help to exercise the authorised officer's powers under the above paragraphs; or • require the occupier of the place, or a person at the place, to give the authorised officer information to help the authorised officer ascertain whether this Act is being complied with; or • seize evidence.
Vegetation Management Act 1999	Authorised officer	<p>An authorised officer may enter a place if:</p> <ul style="list-style-type: none"> • an occupier of the place consents to the entry; or 	<p>The authorised officer may:</p> <ul style="list-style-type: none"> • search any part of the place; or • inspect, measure, test, photograph or film any part of the place or anything at the place; or

Legislation	Who?	Under what circumstances	Powers after entry
		<ul style="list-style-type: none"> • it is a public place and the entry is made when it is open to the public; or • the place is the subject of: <ul style="list-style-type: none"> ○ a development approval; or ○ a lease, licence or permit under the <i>Land Act 1994</i>; or ○ a stop work notice or restoration notice; or ○ an enforcement notice under the Sustainable Planning Act 2009 relating to the contravention of a vegetation clearing provision; and • the place is entered during daylight hours; or • the entry is for the purpose of giving an occupier a stop work notice requiring the occupier to immediately stop committing a vegetation clearing offence; or • the entry is authorised by a warrant; or • a person proposing to conduct a 	<ul style="list-style-type: none"> • take a thing, or a sample of or from a thing, at the place for analysis or testing; or • copy a document at the place; or • take into or onto the place any person, equipment and materials the authorised officer reasonably requires for the exercise of certain powers under the <i>Vegetation Management Act 1999</i>; or • require an occupier of the place, or a person at the place, to give the authorised officer reasonable help to exercise the authorised officer's powers under the above paragraphs; or • require an occupier of a place, or a person at the place, to give the authorised officer information to help the authorised officer ascertain whether the Act or a vegetation clearing provision is being complied with. <p>If the authorised officer enters the place under section 30(1)(d) <i>Vegetation Management Act 1999</i> for the purpose of giving an occupier a stop work notice, the authorised officer may only:</p> <ul style="list-style-type: none"> • give the occupier the stop work notice; and • take into or onto the place any person the authorised officer reasonably requires for giving the notice.

Legislation	Who?	Under what circumstances	Powers after entry
		<p>native forest practice at the place has given the chief executive a notice under section 19Q <i>Vegetation Management Act 1999</i> for the place; or</p> <ul style="list-style-type: none"> • a person proposing to clear regulated regrowth vegetation under the regrowth vegetation code at the place has given the chief executive a clearing notification for the place. <p>Entry can also be made under a warrant.</p>	
<p><u>Water Act 2000</u></p>	<p>Authorised officer</p>	<p>An authorised officer may, at any reasonable time, enter land to:</p>	<p>Upon entry, the authorised officer may:</p>

Legislation	Who?	Under what circumstances	Powers after entry
		<ul style="list-style-type: none"> • monitor compliance with the Water Act 2000, including to: • to construct monitoring equipment on the land; • check the accuracy of, or repair or replace, the device; • calculate or measure the water taken, interfered with or used; • ensure the conditions of the authorisation or the provisions of a plan under this Act for the taking of, interfering with or use of the water are being complied with; • if there is monitoring equipment on the land: <ul style="list-style-type: none"> ○ to read the equipment; or ○ to recalibrate, repair or replace the equipment; or • there is no monitoring equipment on the land — to calculate or measure on the land rainfall, water flow, water levels other resources or for 	<ul style="list-style-type: none"> • search any part of the place; • inspect, measure, test, photograph or film any part of the place or anything at the place; • take a thing, or a sample of or from a thing, at the place for analysis or testing; • copy a document at the place; • regulate or prevent the taking of water or other resources under this Act so as to comply with the quantity authorised to be taken under this Act; • take all steps and do all acts and things necessary for advancing the purposes of this Act; • take into or onto the place any person, equipment and materials the authorised officer reasonably requires for the exercise of a power under this division; • require the occupier of the place, or a person at the place, to give the authorised officer reasonable help to exercise the authorised officer's powers under the above paragraphs; • require the occupier of a place, or a person at the place, to give the authorised officer information to help the authorised officer ascertain whether the Act is being complied with.

Legislation	Who?	Under what circumstances	Powers after entry
		<p>assessing the effects of water use or other resources on land and water; or</p> <ul style="list-style-type: none"> • if there has been unauthorised drilling, unauthorised taking of, interfering with or use of water or other resources, unauthorised interference with the physical integrity of a watercourse, lake or spring, then the authorised officer may enter land to find out, or confirm whether, an unauthorised activity mentioned is happening or has happened; • for other purposes including if: <ul style="list-style-type: none"> ○ its occupier consents to the entry; ○ it is a public place and the entry is made when it is open to the public; ○ the entry is authorised by a warrant; or ○ it is a place of business to which this Act relates and the 	

Legislation	Who?	Under what circumstances	Powers after entry
		<p>entry is made when the place is open for business or otherwise open for entry.</p>	
<p><i>Wet Tropics World Heritage Protection and Management Act 1993</i></p>	<p>Authorised officer</p>	<p>An authorised officer may enter or board a vehicle if:</p> <ul style="list-style-type: none"> • a vehicle is being, or has been, used in the commission of an offence against this Act; or • a vehicle, or anything on or in a vehicle, may afford evidence of the commission of an offence against this Act. <p>Entry can be authorised via a warrant.</p>	<p>An authorised officer who enters a place, or enters or boards a vehicle may exercise any of the following powers:</p> <ul style="list-style-type: none"> • search any part of the place or vehicle; • inspect, examine, photograph or film anything in or on the place or vehicle; • take extracts from, and make copies of, any documents in or on the place or vehicle; • take into or onto the place or vehicle any persons, equipment and materials that the authorised officer reasonably requires for the purpose of exercising any powers in relation to the place or vehicle.

Risk Assessment (ERA and non-ERA industry / business activities)

This document provides guidance on completing a risk assessment of ERA and non-ERA (licensed and unlicensed) business or industry activities for inspection prioritisation or compliance reporting purposes and is to be used in conjunction with the [risk assessment tool](#)¹. This risk assessment guide is recommended for use in compliance projects identified under Annual Compliance Plans aimed at delivering upon the Agency Goal – Enable sustainable development and improvement of business and industry’s environmental performance.

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¹ The *Risk Assessment Tool* can be found in Ecosteps and is a tool that calculates the risk as per the steps in this procedural guide

Introduction

The release, be it licensed or otherwise, of contaminants into the environment has the potential to result in adverse human and/or ecological impacts. Risk assessment, in the context of industrial activity, is the process of systematically identifying credible hazards to human and ecological health and analysing the likelihood and severity of the potential consequences. Risk management involves a further and essential step of implementing action to manage the resulting level of risk.

Risk is defined using the following model:

$$\text{Site Risk} = \text{Hazard (Consequence)} \times \text{Exposure (Likelihood)}$$

Risk Assessment

Risk assessment is used extensively both in Australia and overseas as a factor in government approvals on the acceptability of new developments such as approvals for new Environmentally Relevant Activities (ERA's) or other business and industry activities. Risk assessment processes are also increasingly being used by governments to identify, prioritise and justify compliance activities and compliance and enforcement actions.

This procedural guide utilises risk assessment concepts such as, hazard, likelihood and consequence (see Appendix A) to assist Agency staff in setting site priority and inspection level. The steps outlined below guide you through the risk assessment process.

Risk Assessment Steps

To establish the level of risk an ERA or non-ERA business or industry facility or site poses, take the following steps:

1. Likelihood

Considering the type of activity occurring at a site, the characteristics of the identified risks, and the performance of the business operator, use *Table 1 - Likelihood Matrix* to determine the likelihood of environmental harm occurring. Refer to Table 1.1 to determine the client performance and then identify the Aggregate Environmental Score (AES). When assessing a site with multiple ERA's use the highest AES of all ERA's occurring at that site. When focussing on a specific ERA for the site, use the AES of that ERA.

Table 1 – Likelihood Matrix (based on client performance and client activity)

Client Performance	Client Activity Definitions ²				
	Non-ERA (known)	Non-ERA (unknown) OR AES (0-25)	AES (26-50)	AES (51-125)	AES (126-325)
Unknown	Possible	Possible	Likely	Almost certain	Almost Certain
Poor	Unlikely	Possible	Possible	Likely	Almost Certain
Moderate	Rare	Unlikely	Possible	Likely	Likely
Good	Rare	Rare	Unlikely	Possible	Likely
Very Good	Rare	Rare	Unlikely	Possible	Possible

² Aggregate Environmental Score (AES) are listed in Schedule 2 of the *Environmental Protection Regulation 2008* and in the *Risk Assessment Tool*

Table 1.1 – Likelihood – client performance descriptors

	Client Performance
Unknown	No inspections logged in Ecotrack = site performance unknown
Poor	Serious environment harm or major non-compliance; OR Material environment harm or repeated minor non-compliance For example, PIN, EPO, TEP, EE issued
Moderate	Evidence of environmental nuisance or minor non-compliance For example, Warning Notice/Letter issued
Good	Inspection conducted and site compliant
Very Good	Inspection conducted and site compliant Evidence of best practice

2. Consequence

Considering the types and quantities of emissions released from a site (NPI Risk Score), and the value of the surrounding environment type, use *Table 2 - Consequence Matrix* to determine the severity of the consequence occurring. Refer to Table 2.1 to determine the value of the predominant surrounding environment type and then identify the NPI Risk Score. When assessing Mobile and Temporary activities where locations are not known consider the most likely predominant surrounding environment type. Refer to Appendix C for assistance with Wetlands and Biodiversity Ecomaps layers. Client activity risk is based on NPI reporting data – whether a site releases emissions, whether emission rates/types are known, and the quantity and types of emissions released. Refer to Appendix B for NPI site Ecomaps layers.

Table 2 – Consequence Matrix (based on environment type and client activity)

Predominant Surrounding Land Use (Environment Type)	Client Activity Risk				
	Non-NPI site (no emissions or emissions known) Risk Score 1 ³	NPI Risk Score 2	NPI Risk Score 3	NPI Risk Score 4	Non – NPI site (emissions unknown) OR NPI Risk Score 5
Highly Significant Value	Severe	Severe	Major	Catastrophic	Catastrophic
Significant Value	Minor	Severe	Severe	Major	Catastrophic
Moderate Value	Insignificant	Minor	Severe	Major	Major
Low Value	Insignificant	Insignificant	Minor	Severe	Major
Very Low Value	Insignificant	Insignificant	Minor	Severe	Severe

³ Low risk compared to Non – NPI site (emissions unknown) OR NPI Risk Score 5 which is high risk

Table 2.1 – Consequence – environment type

	Predominant Surrounding Environment Type
Highly Significant Value	Site located within 100 metres of a wetland AND either within 100 metres of an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment
Significant Value	Site located within 100 metres of a wetland or within 100 metres of an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment
Moderate Value	Site located between 100 metres and 200 metres from a wetland system, wetland drainage, or a wetland spring OR between 100 metres and 200 metres from an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in Biodiversity Planning Assessment
Low Value	Site located between 200 metres and 500 metres from a wetland OR between 200 metres and 500 metres from an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment
Very Low Value	Site located greater than 500 metres from a wetland OR greater than 500 metres from an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment

3. Environmental Risk

Determine the level of risk by combining the results of Table 1 (likelihood) and Table 2 (consequence) by using *Table 3 - Environmental Risk Matrix*.

Table 3 – Environmental Risk Matrix (ERA and non-ERA industry / business activities)

		Consequence				
		Insignificant	Minor	Severe	Major	Catastrophic
Likelihood	Almost certain	3 / Moderate	3 / Moderate	4 / High	5 / Very High	5 / Very High
	Likely	2 / Low	3 / Moderate	3 / Moderate	4 / High	5 / Very High
	Possible	1 / Very Low	2 / Low	3 / Moderate	4 / High	4 / High
	Unlikely	1 / Very Low	1 / Very Low	2 / Low	3 / Moderate	4 / High
	Rare	1 / Very Low	1 / Very Low	2 / Low	3 / Moderate	3 / Moderate

4. Inspection

Determine the inspection type and frequency for the site using the result from Table 3 by using *Table 4 - Inspection Frequency*.

Table 4 – Inspection Frequency

The frequency of compliance inspections for premises is to be determined by the individual Region. The frequency and level of inspection required at a facility is based on the type of activity/activities undertaken on

Risk Assessment (ERA and non-ERA) industry / business activities

site; the types and quantities of emissions released from a site the proximity of the site to environmentally sensitive areas; and the proximity of the site to areas of social vulnerability.

The compliance inspections conducted by the Regions will take into account the level of environmental impact or risk that may be involved and the environmental outcomes that may be achieved.

Environmental Risk	Inspection Frequency (min)	Inspection Level
1 / Very Low	As issues arise	A
2 / Low	As issues arise	A or B
3 / Moderate	Biennially	B
4 / High	Annually	B or C
5 / Very High	Annually – Taskforce	C

Inspection Type

Inspections of differing degrees of detail are conducted, and will be either compliance inspection Level A; compliance inspection Level B; or compliance inspection Level C.

A / Basic Inspection

Level A Inspections are compliance inspections at the lowest level of detail for Agency interests. They tend to be targeted to a particular environmental issue, are inspections of low risk, non complex and non-regulated sites, or are planned inspections where little is known of the premises and an initial risk assessment of the site is necessary. Such inspections may comprise a quick visual check of a premises or a more detailed assessment of only a portion of the operations such as, for example, stormwater management. Level A Inspections can also be undertaken as follow-up inspections to establish compliance with enforcement actions (e.g. a Transitional Environmental Program or Environmental Protection Order) taken by the EPA at a given site. (Refer to [Preliminary Assessment Form / Level A Inspection Checklist](#) in Ecosteps).

B / Condition Inspection

Level B Inspections are the most common level of inspection undertaken at licensed premises. A licensed premise will usually have a statutory document issued by the EPA for the activity – a development approval. Compliance with any EPA issued statutory documentation is assessed as a minimum (usually an assessment of performance against approval conditions), however Level B Inspections may also include assessment of other documentation (such as a site based management plan) and the taking of samples. (Refer to [Compliance Audit Report](#) in Ecosteps).

C / Audit

Level C Inspection is the highest and most detailed level of compliance assessment that the EPA will undertake. They are expected to be pre-planned and scoped, involve a multi-disciplinary team for a specified period of time, and examine compliance with all aspects of issued statutory documents and the broader legislation. Extensive documentary evidence of compliance is expected. Level C Inspections will usually include the taking of samples or performance of onsite monitoring to determine or validate the presence or absence of environmental impacts. (Refer to [Compliance Audit Report](#), [Audit Plan](#) and [Compliance Program Audit Checklist](#) in Ecosteps).

Risk Assessment Examples

Example 1

A pre-inspection file review of annual returns and supporting information for a pesticide manufacturer indicates that the business has advised the EPA that soil and groundwater samples in the vicinity of its stormwater discharge are showing levels of Chlorpyrifos present above environmental threshold values. The business is located adjacent to an undisturbed freshwater stream. The presence of contamination suggests the business has inappropriate stormwater controls in place or an incident has recently occurred. There is both a risk that the business is in breach of its development approval conditions relating to stormwater controls (non-compliance risk) and a risk of environmental harm occurring (fish kill).

A further review of the file indicates that the business operator was operating in compliance at the time of the last site inspection (2 years earlier). However, until a more recent site inspection is undertaken, the operator's current performance remains unknown.

Referring to Table 1 and Table 1.1, determine the *likelihood* of a risk event occurring. The development approval indicates that the pesticide manufacturer has an approval for ERA 7(b) Chemical Manufacturing and therefore an AES of 114. The compliance performance of the business is "unknown" (Table 1.1), so Table 1 gives the likelihood of environmental harm occurring or the business operating in breach of environmental legislation as ALMOST CERTAIN.

An Ecomaps survey of the site and surrounding environment indicates that the site is within 100 metres of wetland drainage (but not within 100 metres of an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment). The site reports to the NPI and has an NPI Risk Score of 4.

Referring to Table 2 and Table 2.1, determine the *consequence* of a risk event occurring, or hazard having an impact. Table 2 gives the consequence of environmental harm occurring or the business operating in breach of environmental legislation as MAJOR.

Using the results from Table 1 (almost certain) and Table 2 (major) in Table 3 gives an overall risk for this industry/business site of 5/Very High. Level C audits should be conducted annually for this site (see Table 4).

Example 2

DERM has received a number of complaints from the community about odour originating from a landscape supplies and compost manufacturing business described as foul and similar to dynamic-lifter type fertilizer. The presence of odours suggests the business may be receiving or selling products that DERM is not aware of or undertaking composting activities inappropriately. There is both a risk that the business is in breach of its development approval conditions, including those relating to odour releases (non-compliance risk) and a risk of environmental nuisance occurring.

Referring to Table 1 and Table 1.1, determine the *likelihood* of a risk event occurring. The development approval indicates that the soil conditioner has an approval for ERA 53 and therefore an AES of 18. There appears to be an environmental nuisance at the site, so the operator's performance is "moderate" (Table 1.1). Table 1 gives the likelihood of an event occurring as UNLIKELY.

An Ecomaps survey of the site and surrounding environment indicates that the site is located within 100 metres of an area mapped as State Significance in the Biodiversity Planning Assessment (but not within 100 metres of a wetland or within 100 metres of an area mapped as very high or high in the Aquatic Conservation Assessment). The site reports to the NPI and has an NPI Risk Score of 2.

Risk Assessment (ERA and non-ERA) industry / business activities

Referring to Table 2 and Table 2.1, determine the *consequence* of a risk event occurring or hazard having an impact. Table 2 gives the consequence of environmental nuisance occurring or the business operating in breach of environmental legislation as SEVERE.

Using the results from Table 1 (unlikely) and Table 2 (severe) in Table 3, gives an overall risk for this industry/business site of 3/MODERATE. Level B site inspections should be conducted biennially for this site (see Table 4).

Appendix A

Risk Assessment Concepts

Hazard is the potential for mishap or harm. A hazard is not necessarily dangerous. Danger implies a reasonable likelihood of a mishap or harm actually happening. A hazard is simply the potential for that to happen; if sufficient precautions are taken to prevent the potential from being realised, then the hazard may be “safe”.

Risk is the chance of something happening that will have an impact upon objectives (for example, to prevent harm to the environment). It is measured in terms of consequences and likelihood.

Consequence is the outcome of an event or situation expressed qualitatively or quantitatively, being a loss, injury, and disadvantage or gains (e.g. a frequency of an overflow or release during a 1 in 10 year storm event).

Likelihood is a qualitative description of probability or frequency. Likelihood may be a probability (e.g. a 1% probability of an overflow or release of contaminated water during a storm event), or a frequency (e.g. a frequency of an overflow or release being a 1 in 10 year storm event).

Risk assessment as defined in AS/NZS 4360:2004⁴, is the overall process of risk identification, risk analysis and risk evaluation. Risk assessment is an integral component of the **Risk Management** process. Risk management can be applied at many levels in an organisation. It can be applied at a strategic level and at tactical and operational levels. It may be applied to specific projects, to assist with specific decisions or to manage specific recognised risk areas.

The main elements of the Risk Management process are the following:

- (a) Establish the context – Establish the external, internal and risk management context in which the risk management process will take place. Criteria against which risk will be evaluated should be established and the structure of the analysis defined.
- (b) **Identify risks** – Identify where, when, why and how hazard events could prevent, degrade, delay or enhance achievement of the objectives.
- (c) **Analyse risks** – Identify and evaluate existing controls. Determine consequences and likelihood and hence level of risk. This analysis should consider the range of potential consequences and how these could occur.
- (d) **Evaluate risks** – Compare estimated levels of risk against pre-established criteria and consider the balance between potential benefits and adverse outcomes. This enables decisions to be made about the extent and nature of treatments required and about priorities.
- (e) Treat risks – Develop and implement specific cost-effective strategies and action plans for increasing potential benefits and reducing potential impacts.
- (f) This element of the Risk Management process is addressed via DERM’s tools and strategies outlined in the Department’s Enforcement Guidelines.
- (g) Monitor and review – It is necessary to monitor the effectiveness of all steps of the risk management process. This is important for continuous improvement.

Risk Assessment

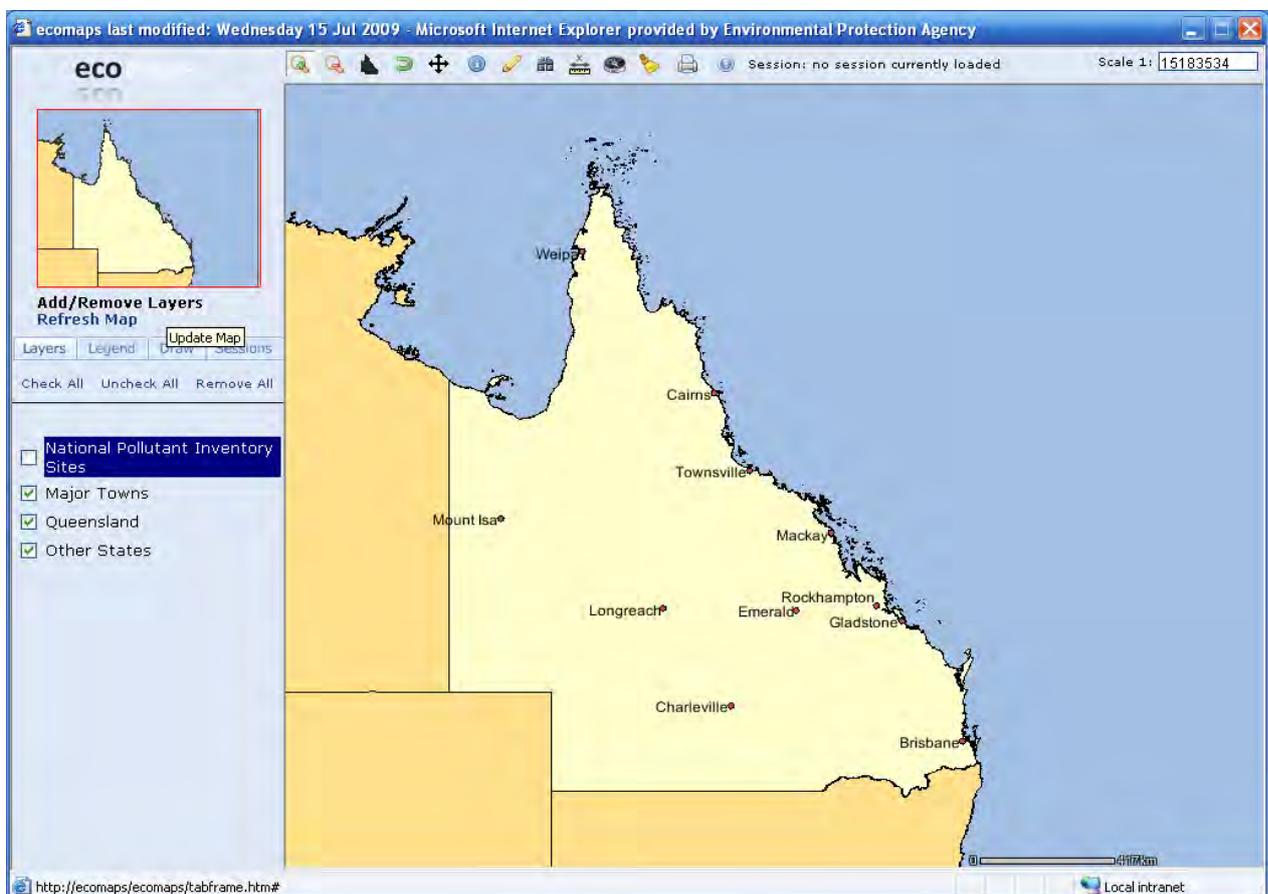
This element of the Risk Management process is addressed via DERM’s ongoing commitment to follow-up compliance inspections and enforcement action to address environmental risk associated with ERA and non-ERA industry and business activities. Risks and the effectiveness of treatment measures need to be monitored to ensure changing circumstances do not under or overstate the risk potential of a managed activity.

⁴ AS/NZS 4360:2004, Risk Management, Standards Australia

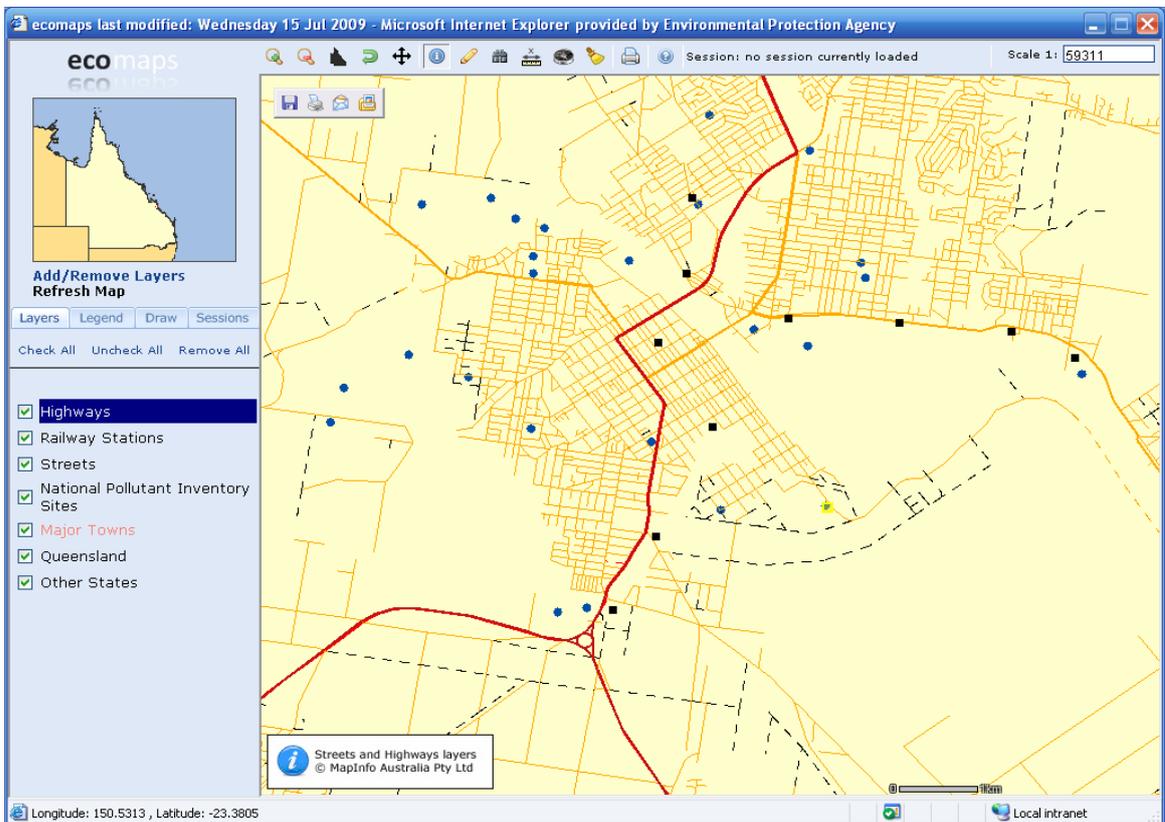
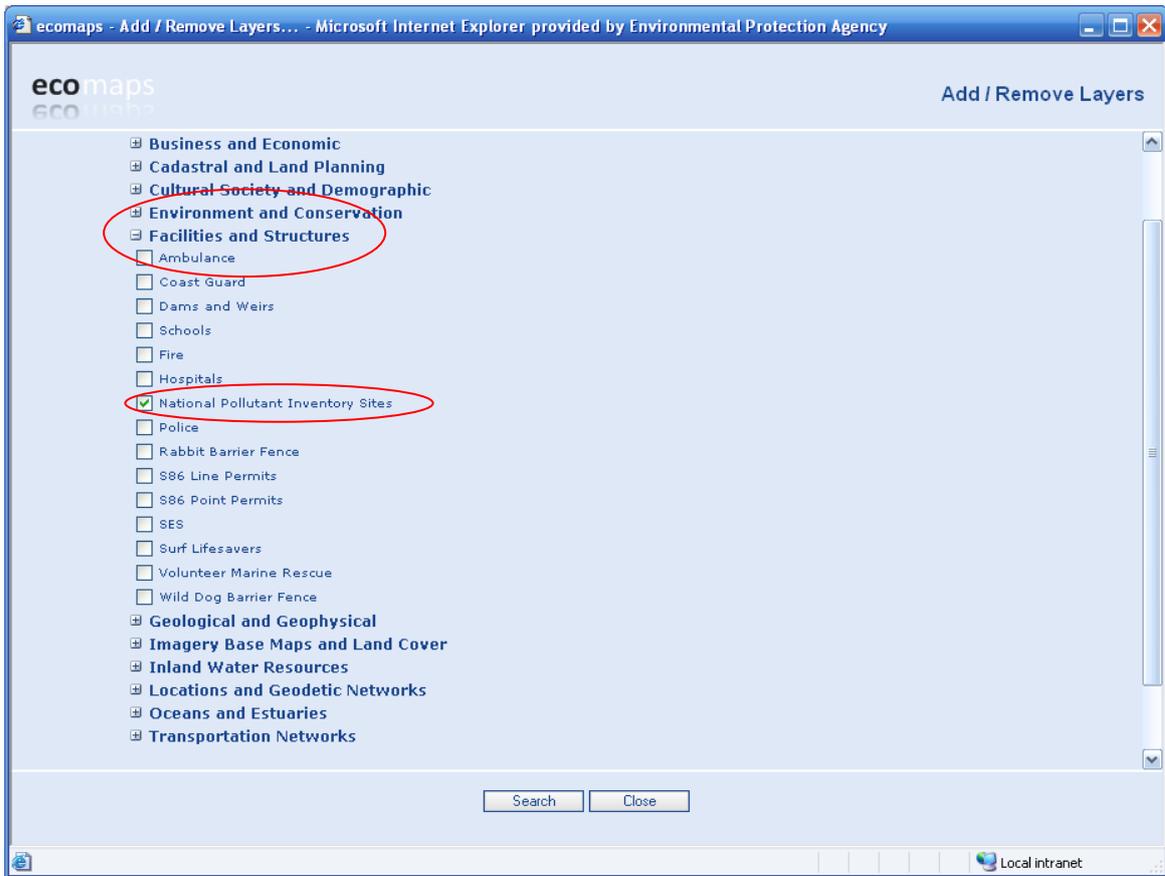
Appendix B

How to obtain NPI Scores

- Open [Ecomaps](#) (click on link)
- Select add/remove layers
- Select “Facilities and Structures” then tick “National pollutant inventory sites”
- Close add/remove layers window
- Ensure “National pollutant inventory sites” is ticked on left hand side and click on refresh maps
- Zoom into desired area. Select “locate” button in top menu then select “built environment” if searching by address or select “administrative” if searching by lot plan.
- Locations listed on NPI are highlighted BLUE
- Click on “Information” button in top menu and “Identify by” window will open
- Select “Point select” then click on desired location (blue dot)
- Query/selection result window will open listing site and NPI Risk Score



Risk Assessment (ERA and non-ERA) industry / business activities



Query/Selection Results - Microsoft Internet Explorer provided by Environmental Protection Agency

eco maps Info Results

Save Results Print Results Close Results

National Pollutant Inventory Sites

No.	Name	Address	ANZSIC Classification	Risk Score	Reports
1	DIGGERS PARK LANDFILL (CLOSED)-ROCKHAMPTON CITY COUNCIL	DIGGERS PARK NORMANBY ST ROCKHAMPTON QLD	Waste Disposal Services	4	25257
2	PELTOPHORUM STREET LANDFILL (CLOSED)-ROCKHAMPTON CITY COUNCIL	PELTOPHORUM ST NORTH ROCKHAMPTON QLD	Waste Disposal Services	4	25258

Queensland

No. Feature

1 Queensland Mainland

No Features Found in the following layer(s):

- Highways
- Railway Stations
- Streets
- Major Towns
- Other States

Appendix C

How to obtain Wetlands and Biodiversity Ecomaps layers

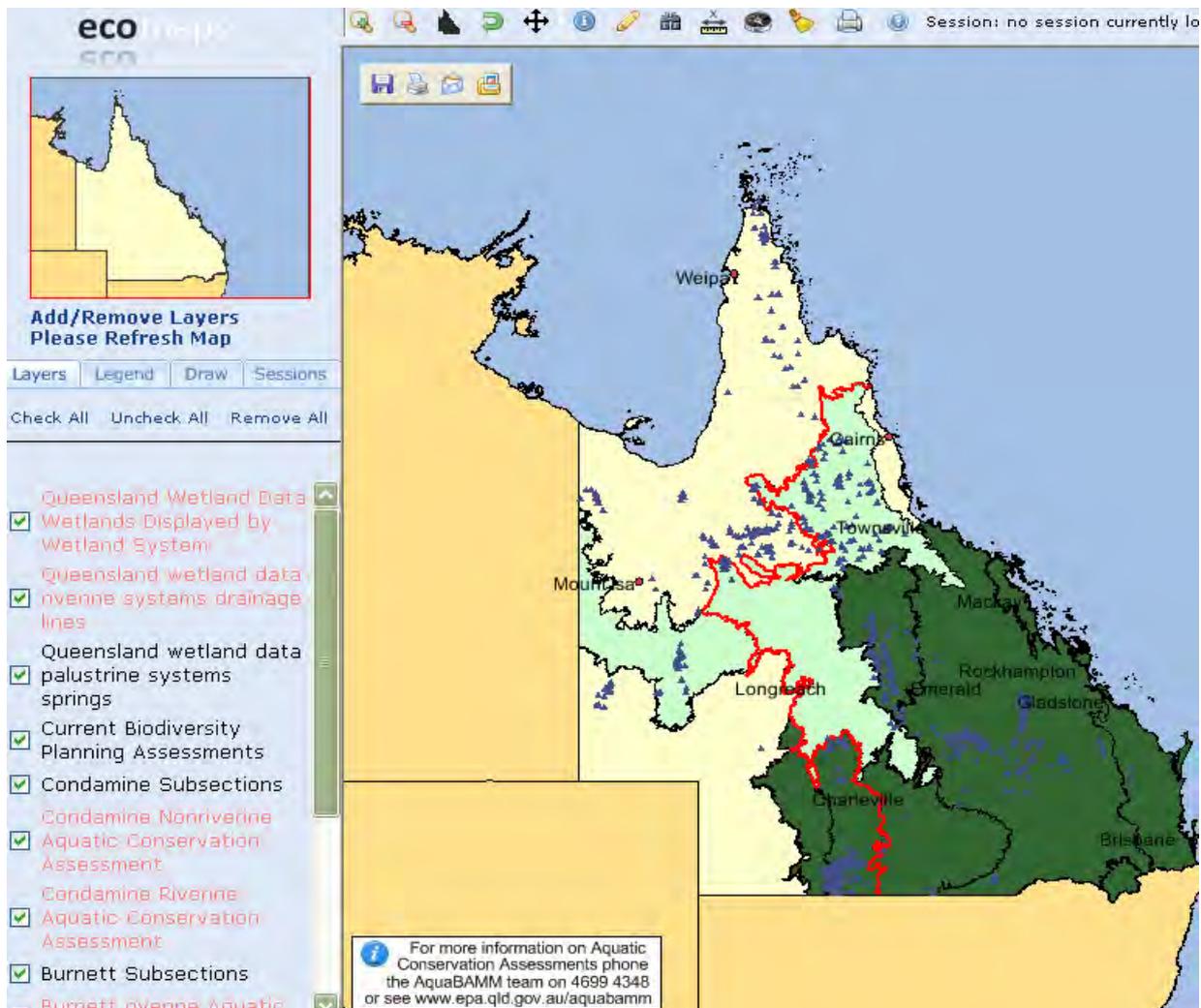
- Open [Ecomaps](#) (click on link) or select the GIS (green) button from the Permits screen in Ecotrack and it will take you to the exact location in Ecomaps
- Select add/remove layers
- Select **“Biologic & Ecologic”**
- Select **“Aquatic Conservation Assessments”** and tick relevant area (if in doubt tick them all)
- Select **“Biodiversity Planning Assessments”** and tick the relevant area (if in doubt tick them all)
- Select **“Wetland Programme”** then tick:
 - Queensland Wetland Data Wetland Displayed by Wetland System
 - Queensland Wetland Data riverine systems drainage line
 - Queensland Wetland Data palustrine system springs



- Close add/remove layers

Risk Assessment (ERA and non-ERA) industry / business activities

- Ensure relevant layers are ticked on the left hand side and refresh maps
- Select “legend” tab to identify the areas of State or Regional significance and very high or high in the Aquatic Conservation Assessment
- Zoom into desired area (this step is not required if you have accessed Ecomaps via Ecotrack). Select “locate” button in top menu then select “built environment” if searching by address or select “administrative” if searching by lot plan.
- Click on “information” button in top menu and “identify by” window will open
- Select “point select” then click on desired location (yellow/green dot)
- Query/selection result window will open listing wetlands information



Procedural Guide

Compliance and Investigations

Seizure

The purpose of this procedural guide is to provide officers with guidance on exercising the power to seize property pursuant to legislation administered by the Department

Essential points

- Property is seized only to preserve evidence of an offence or to prevent the commission, continuation, or repetition of an offence.
- Property **must not** be seized as a punishment or threat.
- Property seized normally must be returned. Compensation may be ordered by a court for loss or expense suffered as the result of property being seized.
- Care must be taken to make a record of what was seized, what condition the seized item was in and whether steps were taken to minimise the inconvenience to the person caused by the seizure. The person from whom the property was seized should sign this record.
- Care must be taken to ensure that the property seized is preserved in exactly the condition it was at the time of the seizure.

Power to seize property

Some legislation administered by the Department gives officers authorised under that legislation the power to seize property in certain circumstances. Before seizing any property, you **must**:

- know which Act you are acting under;
- be sure that the Act gives you the power to seize property;
- check the reasons for which you can seize the property (for example, to preserve evidence of an offence); and
- have satisfied all requirements for exercising the power (for example, have you lawfully entered the place where the property is located?).

Purpose of seizure

Property is seized to preserve evidence of an offence. Reasons why property may be seized include the following:

1. The property is needed for testing and a sample will not suffice or it is too difficult to obtain a sufficient sample (for example, residue at the bottom of a container).
2. To ensure that the property will be available for use as an exhibit in court if a prosecution is commenced.
3. The property is evidence and it may be used to commit, continue or repeat an offence.

Property **must not** be seized simply by way of punishment whether for the suspected offence or for a perceived lack of cooperation on behalf of the owner during an investigation. Most importantly, property **must not** be seized as a threat in order to secure cooperation whether during a search or an interview.

Before seizing property

Before seizing property, ask yourself the following questions:

- Do I have the power to seize the property?
- Have I considered alternatives to exercising the power of seizure?
- Is it reasonable in all the circumstances for me to seize the property?
- Is it safe for me to seize the property? **If your safety cannot be assured, you must NOT seize the property.**
- Am I able to transport the seized property, and keep it safe and secure following seizure?
- If I am not able to transport the seized property, am I able to render the property inoperable (if applicable), prevent it from being interfered with by the owner, and ensure that it is kept safe and secure?

If possible, take photographs of the property to be seized, to establish the condition of the property before it is seized. This will help to prevent disputes about whether the property is damaged while in the Department's custody.

Seizure of wildlife

For specific requirements relating to the seizure of wildlife under the *Nature Conservation Act 1992*, refer to the procedural guide ["Seizure of wildlife"](#) located on Ecosteps.

After seizure

You must give the person from whom the property was seized a receipt for the seized property. Check the provisions of the Act under which you are seizing the property to determine whether there is any information that is required to be included in the receipt. If there are no specific requirements set out in the Act, the receipt should include at a minimum a description of each item seized, its condition, the date, time and place of seizure and the name of the officer seizing the property. If possible, have person from whom the property is seized sign the receipt.

The receipt must be given to the person from whom the property is seized. If that is not possible, leave the receipt at the place where the property was seized. Also check the Act under which you are seizing the property for any particular requirements for giving receipts where the person entitled to the property is not present. Keep a copy of the receipt for the file.

Some Acts give the person from whom the property is seized rights to inspect the property, or to take copies of documents that have been seized. Ensure that you are familiar with any such requirements for the Act under which you are seizing the property.

The Department has a responsibility to ensure that seized property is cared for. You must ensure that the property is securely and safely stored. Because the property may be used as evidence, you must ensure that chain of custody procedures are followed and that property is kept in a secure, locked location.

If the seized property is to be left in situ, you must ensure that it is secured and protected from the elements.

Return of seized property

Seized property must be returned within a certain time period. Check the Act under which you have seized the property to determine the date by which the property must be returned. Make a diary note of that date, and return the property on or before that date. Note that if a prosecution is commenced and the seized property is required as evidence in the prosecution, the Department may usually retain the property until the conclusion of

the prosecution and any appeal.

Damage and compensation

Most Acts provide for the payment of compensation for property that is damaged by Departmental officers. This can include damage that occurs after property is seized. Compensation may also be payable if the person from whom the property is seized suffers loss because of the seizure.

If seized property is damaged either before, during or after seizure you must inform the person from whom the property was seized about the damage. Check the Act under which the property was seized for any particular requirements about notification. You must also inform your manager or supervisor. If the damage is significant, you should also consider informing the Litigation Branch.

Disclaimer

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved By:

[Redacted signature]

21/12/09

Manager Strategy and Planning
Department of Environment and Resource
Management

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Procedural guide

Compliance and Investigations

Taking Statements

What is a Statement?

A statement is simply a written document containing the evidence a person can or will give as a witness in a matter. An informal statement simply contains the witnesses evidence and preferably is signed by the witness, it does not have to follow any particular format and can contain inadmissible evidence eg hearsay. A formal statement is one that follows the requirements of section 110A of the *Justices Act 1886* and is capable of being tendered in a committal proceeding in the Magistrates Court. It is best if statements follow these requirements.

Precise, detailed and signed statements are a very powerful way for investigators to ensure that witnesses remain committed to their version of events. In many cases a precise, detailed and signed statement is more powerful than a tape-recorded interview.

Statements are used by lawyers to form a view of what evidence a witness is likely to give in court, to assist witnesses in recollecting their evidence and to deal with witnesses that change their evidence without reasonable explanation.

Contents

A statement should contain the following.

The name, occupation and address of the person making the statement. Note if the person is reluctant to have their address identified it is sufficient to state that the address is known to the investigating authority.

The statement should then set out, preferably in chronological order, those matters which the witness can give evidence. The statement should be broken up into numbered paragraphs.

Formal statements should only contain admissible evidence. In most cases this will simply be what the witness has seen and heard and if relevant smelt, tasted and touched. There should be no hearsay and unless the maker of the statement is an expert no opinion evidence.

The descriptions of what the witness did should be in their own words and not yours. If they are recounting what they said or if permissible what was said to them, it should be made clear whether or not what is recounted is purported to be a verbatim account or has been paraphrased. A good way of doing so is using a form of words like: 'then I said words to the effect of...'

For a formal statement the bottom of each page of the statement should be signed and witnessed. The pages should be numbered in the following manner: this is page x of a statement comprising z pages.

At the end of a formal statement either of the following needs to appear:

"I A.B. do solemnly and sincerely declare that the contents of this statement are true to the best of my knowledge and belief and I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the Oaths Act 1867."

Or

"I acknowledge by virtue of section 110A(5)(c)(ii) of the Justices Act 1886 that:

- (1) This written statement by me dated and contained in the pages numbered 1 to ... is true to the best of my knowledge and belief; and
- (2) I make this statement knowing that, if it is admitted as evidence, I may be liable to prosecution for stating in it anything that I know to be false.”

The declaration or acknowledgement should be signed and dated by the person making the statement along with a description of where it was signed.

Before asking a person to sign their statement ensure that they read it and ask them if they wish to add or change any details.

If a statement is being taken from a person that could potentially be charged, then the investigator must:-

- a) Consider cautioning the witness; and
- b) Ask the witness why they did what they did.

The advantage of asking a witness why they did what they did is that it prevents them from developing an alternative excuse at the time of the trial and allows the investigator to check out the excuse to see whether it has substance.

Normally a record of interview of a potential defendant should be conducted immediately or as soon as reasonable. Note that the record of interview does not have to be formal, but an informal record of interview should be followed up with a formal record if enforcement action is favoured.

If the record of interview is tape recorded, the original tape should be preserved and a copy used for transcription.

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Procedural Guide

Compliance

Understanding Legal Entities

This procedural guide is to be used to assist with understanding the individuals/businesses that the Department of Environment and Resource Management (DERM) regulates and the importance of making certain that licences/permits and/or statutory notices are issued to the correct legal entity to ensure their enforceability.

General

The legislation administered by the Department of Environment and Resource Management (DERM) as it relates to licensing and compliance activity refers to the clients regulated by DERM as “a person”.¹

Section 32D of the *Acts Interpretations Act 1954* provides that references to “a person” generally include an individual and a corporation.²

Licences, permits and notices can only be issued to **legal entities**, generally an individual or a corporation (or multiple individuals and/ or corporations).

It is therefore a critical part of administrative decision-making that you understand who you are dealing with. This will enable you to correctly apply the legislation; and to correctly draft, address and serve licenses, permits and notices.

This Procedural Guide is deliberately focused on commercial clients, rather than individuals, such as independent visitors to protected estate.

Statutory Notice Requirements

When issuing a notice pursuant to legislation, it is critical that you first look at the requirements set out in the legislation not only to identify who the notice can be issued to, but also to ensure that you have followed all other procedural requirements.

Depending upon the type of notice and legislation involved, there are a number of entities to whom a notice could potentially be addressed to. You must first ensure that you know who you need to deal with. The *Good Decision-Making Guide* published by the Queensland Ombudsman and the Department’s *Enforcement Guidelines* can assist you with this process.

You should also refer to any Procedural Guides that relate to the specific licence, permit or notice you are dealing with.

What is the effect if a notice is not issued to a legal entity?

If a licence, permit or notice is not issued to the correct legal entity (or entities), then it is not enforceable. This means that DERM may not be able to take legal action in the event of non-compliance at a later stage.

¹ It is critical to refer to the legislation. There are instances where the legislation refers to “corporations” specifically or describes the regulated client in other terms.

² In some cases, the contrary intention (ie that “person” means a natural person only) is manifested in the legislation.

Understanding Legal Entities

What is a legal entity?

- A legal entity is an entity on which a legal system confers rights and imposes duties.
- A legal entity includes a natural person (“an individual”), and artificial bodies such as a company (also commonly referred to as a “corporation”), a body corporate and an incorporated association. Incorporation of a company, body corporate or association has the effect of creating a legal “person”.
- For other entities created by legislation (statutory bodies), you will need to refer to the specific legislation to understand its status.

What is not a legal entity?

- A business
- A partnership
- A joint venture
- A division of a corporation
- A management committee that is not a body corporate
- A community group that is not an incorporated association
- An unincorporated association
- Trusts that are not bodies corporate
- Any unincorporated body

Understanding Business Structures and Terms

Many of the clients DERM regulates are commercial. In other words, they carry out activities and/or otherwise conduct business for fee or profit.

However a **business is not a legal entity**. It is the person or incorporated body that carries on the business venture that is a legal entity, and to which notices can be issued.

The information in this section is designed to help you understand the most common business structures and the terms used to describe them. In some instances it refers to provisions in the *Environmental Protection Act 1994* (EP Act) as the legislation is commonly applied to commercial clients carrying on environmentally relevant activities. The principles apply equally to all of the other legislation administered by DERM.

As a preliminary point, in most (not all) instances, DERM deals with **individuals** and **companies**.

This can be a complicated area of the law. If you are in doubt, you should seek further advice from the Litigation Unit within DERM (details are on ROBIN).

Sole Trader

This is one of the simplest business structures. It is where an individual (the sole trader) owns and controls the business as an independent individual. There is no requirement for a sole trader to register a business name, although he or she can do so.

When dealing with a sole trader, you are dealing with an individual.

Licences, permits and notices **must** be issued in the name of the person. It is optional to also include the business name or trading name.

Example 1

John Smith operates a drum reconditioning facility at 123 Main Road, Brisbane, Qld, 4123. The facility is known as “Smith’s Drum Exchange”.

Understanding Legal Entities

Correct Name

Mr John Smith

Or

Mr John Smith trading as Smith's Drum Exchange

Or

Mr John Smith T/as Smith's Drum Exchange

Wrong Name– do not use business name only

Smith's Drum Exchange

Partnership

A partnership is two or more people carrying on a business in common with a view to profit. This partnership can be (but is not always) established by a partnership deed or partnership agreement. **A partnership is not a legal entity.** DERM deals with the legal entities (they can be individuals and/ or companies) that make up the partnership.

Example 2

John Smith and Paul Thomson operate a drum reconditioning facility at 123 Main Road, Brisbane, Qld, 4123. The facility is known as "Smith's Drum Exchange".

Correct Name

Mr John Smith and Mr Paul Thomson

Or

Mr John Smith and Mr Paul Thomson trading as Smith's Drum Exchange

Or

Messrs John Smith and Paul Thomson (in partnership) T/as Smith's Drum Exchange

Wrong Name– do not use business name only

Smith's Drum Exchange

Example 3

John Smith and Thomson's Drums Pty Ltd operate a drum reconditioning facility at 123 Main Road, Brisbane, Qld, 4123. The facility is known as "Smiththom's Drum Exchange".

Correct Name

Mr John Smith and Thomson's Drums Pty Ltd T/as Smiththom's Drum Exchange

Understanding Legal Entities

Or

Individual names as outlined in example 2 is also be acceptable

Wrong Name – do not use business name

Smiththom's Drum Exchange

Joint Venture

A joint venture (JV) is an association of persons for particular trading or other financial endeavours with a view to mutual profit. Commonly they can be used to undertake a commercial activity such as a development project. **JVs are not legal entities.** Rights are conferred on, and duties/liabilities flow to the joint venturers. DERM deals with the legal entities that are the joint venturers, in other words those that make up the JV (they can be individuals and/ or companies).

Example 4

Qld Big Road Builders Pty Ltd and Qld Tunnelling Ltd successfully win a tender to build a tunnel from the Gold Coast to the Sunshine Coast. The project is known as "The Brisbane Bypass Tunnel". The two companies trade as "The Brisbane Bypass Alliance".

Correct Name and Address

Qld Big Road Builders Pty Ltd and Qld Tunnelling Ltd

Or

Qld Big Road Builders Pty Ltd and Qld Tunnelling Ltd Joint Venture

Or

Qld Big Road Builders Pty Ltd and Qld Tunnelling Ltd Joint Venture t/as The Brisbane Bypass Alliance

Wrong Name– do not use joint venture name only

The Brisbane Bypass Alliance

Trusts

A trust is an arrangement and relationship where a person holds property for the benefit of another. A trust can impose an obligation upon a person (the "trustee") to deal with property for the benefit of another person (the "beneficiary"). A trustee may be a natural person or a body corporate. **Trusts are not legal entities.** When dealing with trusts, DERM deals with the trustee, and in particular the person or company that is the trustee.

Co-operative

A co-operative is given legal standing and effect in Australia through state government legislation, being the *Cooperatives Act 1997* and regulations. It is a business enterprise organised, owned and controlled by the persons who use its services. Some sugar mills are structured as co-operatives.

Example 5

Understanding Legal Entities

Correct Name (as listed on ASIC and is incorporated)

Mackay Sugar Co-operative Association Ltd

Companies

Companies and corporations are a creation of law, and are separate legal entities. As stated above under the *Acts Interpretation Act 1954* a company is a legal 'person'.

A corporate body that is registered under the *Corporations Act 2001* may be a licence holder. Corporate bodies registered under the *Corporations Act 2001* are issued an Australian Company Number (A.C.N.) and are required to provide this. They are registered with Australian Securities and Investment Commission (ASIC). The A.C.N. will form part of the corporate body's Australian Business Name (A.B.N.).

A public company has "Limited" (Ltd) after its name. A private company has "Propriety Limited" (Pty Ltd) after its name. Private companies have a minimum of 1 Director. In a public company, the board runs the day to day business in accordance with its constitution.

Directors have duties, and the owners are the shareholders or "members", who influence the company through voting rights. Under the *Environmental Protection Act 1994* there are provisions that extend executive officer liability to those people who influence the company and/ or are in positions of control. This extends beyond the directors.,

It is important to ensure that the correct and full title of companies is used on any paperwork, as there can sometimes be a number of companies with similar names. To help avoid confusion, the company's A.C.N. should be included after its name.

Incorporated Association

An association (incorporate or not) is any group of persons who have agreed to join together in pursuit of one or more common objects or purposes.

Incorporation of an association or club means that it becomes a legal entity in its own right (similar in effect to incorporation of a company), which is separate from the individual members. Put another way, the association is considered at law to have a distinct identity that continues regardless of changes to the membership. This type of association has rules and is a separate legal entity. Any notice would be issued to the association itself.

Unincorporated Association

DERM does not often deal with unincorporated associations. An unincorporated association is not separate from its members and it would be rare for DERM to deal with the individuals that make up this association (e.g. sporting club). Any notice would need to be sent to the individuals that together form the association.

Body Corporate

The major difference between a body corporate and an unincorporated body is that a body corporate is a legal identity separate from the people who are members of the body corporate.

A body that is not a corporate body does not have a separate legal identity to its members and therefore its members must carry any liability incurred by the association.

Understanding Legal Entities

Business Names

A business name is a name under which a legal entity conducts its business. Business names are sometimes called “trading names”. It is important to remember that **a business is not a separate legal entity**. A licence or notice should be issued to the registered owner of the name (often called “registered proprietor”) if it is registered. Not all business names are registered. The registered owner is the individual or corporate body that can be held responsible for activities carried out under that business name.

For example -

XYZ Pty Ltd (a corporation)

XYZ Pty Ltd trading as ABC Paints (a corporation which operates under trading name)

John Smith trading as ABC Paints (an individual who operates under a trading name)

In this example, a licence or notice should not be issued to ABC Paints as it is only the trading name used by a legal entity (individual or corporation) and not a legal entity on its own.

Pitfalls

An applicant at the time of an application for an Environmental Authority (EA), Development Approval (DA) or Registration Certificate is the first source of information for details on who to issue a notice to, but it is important to be aware of the terms above and understand who it is that should be named on the document.

However, it is also important to check that the entity who applied for a licence, for example, is in fact the same that is operating currently. Sometimes there are changes in ownership and DERM is not always notified. Or it may be that the holder of a DA is different to the person operating on the land. When in doubt, it is best to carry out a search on ASIC (company names and details) or CITEC (title searches for ownership of property) - see below under “searching”. Another important consideration is time. When issuing a notice be sure to understand the time period for which you wish to regulate and who was in charge at that time of the alleged non-compliance. This may alter who is to be served and issued with the notice.

In understanding **WHO** DERM regulates, it is important to assess each situation on its own merits and be aware of all potential parties involved. Do not assume they will be the same.

Difficulties can also arise where there are **multiple parties** who may be responsible for a particular non-compliance. An example would be where you have a main company as well as a contractor conducting an activity. Another common example is where one family owned company owns land, and another family owned company (with the same office holders and members) carries on the business activity on the land. In this instance it is necessary to make enquiries to establish where legal / environmental responsibility lies. Where there are **two or more entities**, it is usually necessary to issue multiple notices. For example, where two parties were equally responsible for a particular non-compliance, the same notice may be issued to both (but addressed to the separate entities). If there are different levels of responsibility, the requirements of the notices may differ to reflect this. You still may wish to send copies to the respective parties.

In some circumstances a company may be in **liquidation**. When this occurs an administrator is appointed to manage the affairs of the company. Therefore should a notice need to be issued, you must serve the company as well as the administrator. Details should be available from a CITEC search or for further advice send a request to the Litigation Unit within DERM (details on ROBIN)

Understanding Legal Entities

Searching

For company searches, use ASIC – it is a free service but is only limited and does not always provide all the detail you require.

<http://www.search.asic.gov.au>

For other searches, such as business names, company and land title searches, as well as motor vehicle registration searches – use CITEC. There is a fee for this searches and most divisions will have there own log in and password.

<http://www.confirm.citec.com.au/>

Using CITEC

The starting point will depend upon the situation and what you need to know. The name that you may recognise is the business name or trading name, through doing a **business name search**, this will confirm the trading name and who is carrying out the business. If the search indicates that a business is carried on by a company, then a company search is often the next logical step.

A **company search** will provide information on the director/s, the registered office (for service of documents), the shareholder/members and details of any external administration

A **land title search** may be useful in a range of situations, such as understanding who owns the land on which licensed or unlicensed activities are taking place.

Addressing Statutory Notices – Who?

See examples provided above

For an individual, address the notice to their full name.

E.g John Smith

For a corporation, address notice with the full organisation name and the ACN

E.g Bolten Industries Pty Ltd (ACN 555 662 481)

Serving Statutory Notices – Where?

Under the *Acts Interpretation Act 1954* –

For an individual at their last known place of business or residence (usually place of business if it is a DERM matter which we regulate)

For a corporation, serve the notice at the registered office (as listed on CITEC or ASIC search). It may also be necessary to serve a copy at the principal place of business, especially if the main office is in another State. It is also important to be aware of other parties involved, such as lawyers or consultants and depending on the circumstances serving a copy with these parties may be useful and/or practically necessary.

Service of notices –Registered post to track and confirm receipt (signed receipt option). For letters, normal post is sufficient.

Understanding Legal Entities

Issuing Notices to Government Bodies

Statutory notices can be issued to both state and local government bodies. Under Section 22 of the *Environmental Protection Act 1994* it is outlined that the Act binds all persons, which includes the State, other States and the Commonwealth.

If a situation arises where enforcement action is to be taken against these bodies, it is important to be aware of the parties involved and brief up where appropriate. Speak with your Supervisor for guidance. Generally notices may not need to be briefed to the top level when involving local governments but where a State Government Department is involved it is likely that a brief to the Director-General and /or Minister is to be done, so that they are aware of the proposed action and approval may also be required from them. This also extends to when there has been any non-compliance of previous enforcement action that involves these bodies (such as failure to undertake or complete works in accordance with a notice). The Ombudsman's *Good Decision Making* guide and the Department's *Enforcement Guidelines* are both important documents that must be considered in this process.

In issuing a notice to a State Government Department or Agency, it should be addressed to the Chief Executive of the Department. State Departments are government entities and therefore it is advisable to address to the individual in charge of the governing body. For full names and details of the Acts each Department administers, refer to the Administrative Arrangements Order (No 1) 2009 (accessed via the Department of the Premier and Cabinet Website - <http://www.premiers.qld.gov.au/publications/admin-arrange-order.aspx>).

Where a corporation is a government owned body the notice is to be issued to the relevant corporation. An ASIC search will assist with obtaining the correct details of the Government Owned Corporation (GOC). While these types of corporations are owned by Government bodies, such as Ergon for example, they are incorporated and therefore legal entities in their own right. For further information refer to *Government Owned Corporations Act 1993* and *Corporations (Queensland) Act 1990*.

Issuing Notices to Local Government

Under the *Local Government Act 1993*, as per section 35 and 36 any proceedings brought against a local government are to be brought in the name of the relevant council e.g Brisbane City Council.

The name of a local government is the 'City of', 'Town of ' or 'Shire of' followed by the name of the local government area; or the name of the local government area followed by 'City', 'Town' or 'Shire' (s.34).

Where there are local government business units, such as Gold Coast Water within Gold Coast City Council, the correct name to be used is the name of the Council (Gold Coast City Council, in the above example).

Other Tips

- Ensure details are correct
- When in doubt obtain legal advice
- Keep detailed records
- Be careful about spelling mistakes or typos on licences/permits or notices

Procedural Guide

Compliance and Investigations

Use of official note books

The objective of this guideline is to clarify when and how authorised persons should use an official note book. Where it is not reasonably practicable to use an official note book, you need to ensure that accurate, comprehensive and contemporaneous notes are made of any incident and that those notes are saved and stored on file.

Reasons for taking notes

Taking notes of incidents is important for ensuring that there is a record for later reference, and to assist in proving what happened during an incident.

Note-taking not only helps in remembering the details of an incident later, but it assists in focusing on relevant points and to make later processes more efficient (such as preparing briefing notes or giving evidence in court).

If an authorised person is investigating an incident or complaint and is later called on to give evidence about it, your notes can be relied on in court only if they are accurate and contemporaneous (made at the same time as the incident or as soon as possible after it). Without these notes, you will need to rely on your memory of the incident without any assistance.

Part of the role of an authorised person is to use his or her official notebook when taking notes. If for some reason it is not possible to use the official notebook it is important that:

- accurate and contemporaneous notes are taken (on whatever paper is available);
- as soon as practicable after the incident, notes are made of the incident in the official notebook based on the field notes; and
- the field notes are placed on file.

Essential requirements

- All entries in the official notebook must be made in ink and be in chronological order.
- Every entry must state the time and date on which it was made.
- At the end of each entry a line must be drawn and the next entry must commence immediately below the line. (Do not leave spaces in the official note book to fill in later).
- Pages must not be torn out of any official notebook.
- If an alteration is necessary then the proper procedure is to draw a line through the original notes and insert the new notes, in such a manner as to leave the original entry in legible form.
- All entries in an official notebook should be made in the handwriting of the authorised person who the official notebook was issued to. If an authorised person makes entries in another authorised person's notebook, they must make it clear the reasons and who is making the entry in the notebook.

Use of official notebooks

An official notebook is issued to an authorised person for use for Departmental matters.

Official note books are to be used only for the purpose of recording notes about the person's official duties and must not be used to record notes or private matters.

An incident that may not seem like a compliance or investigation issue at the time may become an issue at a later date. Authorised persons should, whenever in doubt, record information in the official notebook.

For the purpose of accuracy of references and admissibility of the notes as evidence, notes should be made at the time the events being recorded are taking place, or as soon as possible afterwards so that the facts are still fresh in the memory of the person making the notes.

Where an alteration to an authorised person's official note book is likely to be significant, the person should bring the alteration to the notice of another authorised person or a manager and obtain that person's signature next to a statement in the official note book explaining fully what has been done.

Use of notes to refresh witness' memory

A witness giving evidence in court is usually allowed to refer to notes, or other records, for the purpose of refreshing their memory provided that:

- the facts or conversation cannot be accurately recalled without reference to the notes;
- either the authorised person made the notes, or read the notes of the partner at a time when the facts were still fresh in the memory of the authorised person.

The witness must testify to these facts and may be cross-examined regarding the manner, time and other circumstances relating to the making of the notes.

The usual procedure is for the witness to give as much evidence as possible from memory. When the authorised person cannot accurately remember the facts or conversation, the permission of the court will be sought for the authorised person to refer to the notes. The prosecutor will usually lead the authorised person through this process.

Notes may be used to refresh the memory at any time prior to a court hearing and a witness should have no hesitation in saying that notes have been referred to prior to the hearing to refresh the person's memory. If any of the persons interviewed during the course of the investigation are to be called as a witness, that person may also refer to the original statement if they have been given the opportunity to read the statement and sign it as a correct record whilst the facts were still fresh in their memory.

How to obtain an official notebook

Each regional office may have its own internal procedures for obtaining official notebooks. Check with your manager.

Identification of an official notebook

Authorised persons issued with official note books must immediately:

- enter their name inside the front cover;
- sign the cover page;
- record the name of the person who issued the official note book; and
- the location and date it was issued.

The authorised person being issued the official notebook must also sign the register identifying the number of the official notebook and the authorised person it was issued to.

When the official notebook is filled, it must be stored in a safe place for a period of at least three years.

Approved By



17 December 2009

Manager Strategy and Planning
Department of Environment and Resource
Management

Enquiries:
Strategy and Planning Team
Compliance and Investigations Branch
Ph. **3330 5560**

Procedural Guide

Compliance and Investigations

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17 December 2009

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Warning Notices

The purpose of this procedural guide is to provide guidance for authorised officers in determining those circumstances considered appropriate for issuing a warning notice. It also provides guidance in completing and issuing such notices.

What is a warning notice?

The Department of Environment and Resource Management (DERM) Enforcement Guidelines provide guidance for agency personnel involved in compliance and investigative duties as to how the issue of enforcement is to be approached.

The guidelines provide in part that “if an alternative to enforcement action will be more effective in achieving the objects of the Act being administered, then that alternative will be considered”.

DERM has a wide range of enforcement measures available for managing compliance with legislation administered by the agency. These enforcement measures include the option to issue verbal warnings and warning letters.

To facilitate and simplify the process of issuing warnings, a [warning notice](#) has been developed to enable relatively minor instances of non-compliance to be dealt with ‘on-the-spot’. The issue of a warning notice will be recorded, and where subsequent checks reveal a previous warning(s) has been issued to the same person/organisation for similar breaches, then further enforcement action may be taken.

Who can issue a warning notice?

Only those officers who are appointed authorised officers for the particular act being administered are permitted to issue warning notices.

When can a warning notice be issued?

Warning notices should be issued for minor instances of non-compliance, where a penalty infringement notice is not appropriate and where issuing a warning notice is likely to encourage the person to rectify the non-compliance.

Considerations to be made prior to issuing warning notices

Authorised officers detecting breaches/offences should carefully assess each case to determine the most appropriate course of action to be taken in the circumstances. As a means of assisting officers in this process, the DERM Enforcement Guidelines should be adopted as a guiding principle in determining those circumstances considered appropriate for the issue of a warning notice.

The issue of a warning notice should be confined to an alleged offence where:

- the offence/breach is a one-off situation;
- the offence/breach is considered minor or technical in nature;
- the operator is generally compliant;

- the operator has not previously been issued with a penalty infringement notice (PIN) or a warning for a similar offence;
- the harm or potential harm to the environment is considered minimal; and
- the issue of a warning notice is likely to be a deterrent.

Format of a warning notice

Warning notices are contained in books of 30, each notice being numbered with two copies.

The copies are dealt with as follows:

- Original – (DERM copy – remains on file at issuing office);
- Duplicate – (served on person named in the notice).

Completing the notice

When an authorised officer considers that circumstances are appropriate for the issue of a warning notice, the following points are to be observed when completing and issuing the notice:

- ensure the cardboard separator is placed immediately after the copy of the notice to be served on the person concerned;
- complete the notice with a ball-point pen, printing clearly and legibly in block letters;
- complete details relating to name, address, date of inspection/observation etc;
- specify location of inspection/observation;
- outline details of DERM concerns;
- identify legislation against which breach/offence has been committed;
- where appropriate, include date for any follow-up inspection considered necessary;
- complete issuing officer's details and details of the positional title and phone number to which inquiries relating to the issue of the notice should be directed;
- check for possible mistakes.

Following completion, the duplicate copy is to be delivered to the person named in the notice with an explanation as to the reasons the notice has been issued and what, if any, action is required of them. The advice given should be consistent with that appearing at the foot of the notice. Where any follow-up inspection is considered necessary, the person concerned is to be advised accordingly.

Making notes for evidence

After the notice has been served, the authorised officer should record details of any conversations concerning the incident and observations in their official notebook.

These details may be required if further enforcement action is taken with respect to the operator at a later date.

Data entry

Particulars included on warning notices are to be recorded in the compliance component of Ecotrack. This is an important step, and will make sure that the full compliance history for an operator is recorded so that future non-compliances can be dealt with appropriately. Following the recording of relevant information, the DERM (original) copy of the notice is to be filed at the issuing office.

Procedural guide

Compliance and Investigations

When and How to Issue a Caution

Essential Points

- A Caution is a warning from an investigator to an interviewee as to their right to silence and their right to the privilege against self-incrimination.
- The purpose of a caution is to ensure that the interview is fair and that any confessions or incriminating information supplied is supplied voluntarily.
- There is no need to give a general caution when interviewing a company.
- If using your powers under the *Environmental Protection Act 1994* ("EP Act") or the *Nature Conservation Act 1992* ("NC Act") to compel answers or give information always give the warning required by the respective Acts.
- Have a written copy of the caution to read from to ensure accuracy.

What is a Caution?

A caution is simply a warning to a real person about to be interviewed by an investigator as to their rights, specifically their right to silence and their right to the privilege against self-incrimination. Except if a statute specifically states otherwise a person does not have to participate in a record of interview, nor make any statement or supply any information that may implicate them in the commission of an offence.

The historical basis for the giving of the warning was the issuing of the Judges Rules. These were guidelines issued by the English judges for the benefit of the English Police. The Judges Rules have never been part of the law in Queensland however they have been referred to by Courts in deciding whether a confession has been obtained voluntarily and fairly.

When to Caution

You will need to use your judgement in every given case but the following are some guidelines and pointers to assist. You should consider:

- The privilege against self incrimination does not extend to companies so there is no need to give the general caution when interviewing a company, however be careful if you also think that the person being interviewed on behalf of the company may have committed offences personally. If an employee of a company who is not the focus of your investigation claims privilege against self-incrimination, you can probe as to why they feel the need to claim privilege. You can also tell the employee that they are not the focus of the investigation. You can also tell them that if their answers suggest that they should be the focus of the investigation, you will tell them and issue or reissue a caution to them. Under no circumstances can you give the employee an indemnity or tell them that they will not be prosecuted.
- The seriousness of the offence you are investigating. If it is an indictable offence such as wilfully and unlawfully committing material or serious environmental harm then it would be advisable to issue a caution.

- Have the Queensland Police Service been involved? If for whatever reason the Police have been involved in the investigation and you are interviewing the person it can be a good idea to issue a warning, in case it is assumed that the police presence has caused the person to participate rather than the exercise of his or her own free will.
- The person's level of education. If you believe that the person you are interviewing or about to interview does not understand that they do not have to speak to you unless they want to then you should issue a caution.
- The person's demeanor. A member of the public not used to dealing with investigators may be overawed by your presence, particularly if you are in a uniform, and not appreciate that they do not have to speak to you.

The important thing to remember is that a Court in assessing what evidence should be considered can rule out interviews on the grounds of unfairness or on the grounds that the statements in the interview were not made voluntarily. A caution can help to show that the person involved participated of their own free will and knew that they did not have to answer the questions asked of them.

Form of the Caution

If you decide to give a caution then the best idea is to give the same warning. Police are required to give. The caution is in the following terms:

" Before I ask you any questions I must tell you that you have the right to remain silent.
This means you do not have to say anything, answer any question or make any statement unless you wish to do so.
You are not at this point required by me or by the law to make a statement.
If this position changes I will clearly indicate it to you.
You may wish to make a statement to explain your involvement in the matters I am investigating or to provide information to demonstrate you or another's innocence.
However, no inference will be drawn from a failure to provide information during this interview.
If you do choose to say something or make a statement, it may later be used as evidence.
Do you understand?."

It is not a bad practice to give a written copy of the caution to the witness while you are reading it.

If a lawyer is present, you may address them this way:-

"Mr/Ms _____ could you please indicate who you are representing today. " (Answer)

"Mr/Ms _____ at the close of the interview I will allow you to place on the record any submissions you wish. Throughout the interview you will be permitted to advise your client and call brief adjournments to talk to your client in private. However, I direct that you not answer questions addressed to your client or otherwise obstruct me in the exercise of my duties. You are here today to look after the interests of this witness. Any submissions or objections not relating to this witness will be disregarded."

If multiple people are in the room, you should address them collectively:

"The courts have repeatedly stated that witnesses should be interviewed separately. I would prefer to interview you separately so that there is no confusion as to what each witness's evidence is and no suggestion that there has been any collaboration between you. Are you willing to be interviewed separately?"

Special Cases – Cautions to be given upon the use of Compulsory Powers

An authorised person under section 465 of the EP Act and a conservation officer under section 152 of the NC Act, may, if they suspect on reasonable grounds that an offence against the relevant act has occurred and that a person may be able to give information about the offence, require that person to answer a question (EP Act) or give information about the offence (NC Act).

Under each Act a warning must be given that it is an offence to fail to comply with the requirement without a reasonable excuse. Each Act goes on to provide that it is a reasonable excuse if complying might tend to incriminate the person.

The caution to give when making a requirement should be as follows:

“I now require you pursuant to section _____ of the _____ Act to give me information about [describe the offence you are investigating]. I must warn you that it is an offence under that Act to fail to comply with this requirement unless you have a reasonable excuse. The Act provides that it is a reasonable excuse for you to fail to give the required information if the giving of it may tend to incriminate you. Do you understand?”

Please refer to the procedural guide on “Obtaining Evidence that a Company has committed an Offence” for further details with respect to a company being able to decline to answer if it was required to answer under s 645 of the EP Act, on the grounds that it might tend to incriminate the company.

Final Tips

Have the relevant cautions written down so that you can be sure that you have delivered them accurately.

Should a person answer that they do not understand the caution, explain the caution to them using simpler terms, if they have a lawyer with them allow the lawyer to explain it.

Disclaimer:

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Environmental Protection Agency should satisfy themselves independently and by consulting their professional advisors before embarking on any proposed course of action.

Procedures for managing regulatory service complaints

This guideline provides an overview of the Operational Policy 'Requests for Regulatory Service and Complaints about the Service' to assist Environmental Operations Division (EO) officers in handling complaints about regulatory services provided by the Division. This guideline is to be read in conjunction with the Operational Policy.

Complaints about regulatory service

EO receives requests from individuals and community groups, to take action in respect of alleged breaches of the Acts it administers, for example in relation to complaints about excessive emissions from industrial activities. EO responds to such requests for regulatory intervention in accordance with the operational policy "[Requests for Regulatory Service and Complaints about the Service](#)".

Not everyone is satisfied with the response actions taken by EO, resulting in complaints about the nature of the regulatory action taken. This guideline outlines how such complaints need to be addressed, and should be read in conjunction with the [operational policy](#).

Procedure for receiving and resolving complaints

The operational policy "[Requests for Regulatory Service and Complaints about the Service](#)" sets out the procedure for effectively resolving regulatory service complaints within target timeframes. It does not apply to other complaints such as those concerning breaches of the EPA's code of conduct, or those concerning official misconduct.

Complainants must at all times be dealt with in a fair, transparent, responsive and respectful way. The steps involved are summarised as follows.

Step 1 – Receipt of the Complaint

A regulatory service complaint may be received in a number of ways, such as in person, by telephone or by letter. Complainants should be requested at all times to provide their name, residential address, and contact telephone number. Complainants should also provide details of the specific decision or action by EO that has led to the complaint, the grounds or reasons why they are dissatisfied, and any evidence or information they have concerning the matter or supporting their allegations.

EO will keep the complainant's personal details confidential, but will always advise complainants this may not be possible in all cases.

Wherever possible, assistance should always be provided wherever possible to persons wishing to make a regulatory service complaint, including an explanation of our complaint process. A simple information brochure is available to assist with this. Remember the 'Customer First' initiative and EOs commitment to excellence in customer service.

Procedure for regulatory service complaints

Step 2 – Categorisation of the Complaint

Regulatory service complaints are to be categorised according to the potential impact on the environment, and the level of seriousness and complexity involved. This categorisation will help identify complaints that can be addressed almost immediately by front-line managers, and those that may need further actions for their resolution. Complaints will either be:

- 1) **Insignificant** – minimal impact or risk to the environment. For instance, serial or repetitive complainants where history has shown little or no substance to the complaints, or complaints about minor or trivial matters such as the leaves blowing into a person's yard.
- 2) **Minor** – issue resolvable at the point of service. Has something simple been overlooked? Is the matter outside of the jurisdiction of the EPA? Can we provide some more information concerning our decision/action and explain applicable policies or legislation? These matters are resolvable at the point of service.
- 3) **Moderate** – low impact or risk to the environment. These issues are the ones that require a little more analysis or investigation. Many nuisance issues would fall within this category, such as where a complaint was made about odour from a landfill and EO officers were unable at the time to detect the odour on site visits, but the issue has continued. These matters may require further assessment or investigation.
- 4) **Major** – potential high impact on the environment. These issues are significant, such as allegations of dumping of waste where serious or material environmental harm may be involved and the complainant is unhappy with the level of service we have provided. For example the allegation may be that all avenues weren't investigated. These matters require investigation.
- 5) **Extreme** – high level of potential or actual impact on the environment. Serious complex issues that require high-level investigation. These are issues that involve potential or actual serious or material environmental harm, and the complainant is completely dissatisfied with our service or may allege that there was no service. These matters require investigation.

This step also involves recording the relevant details of the complaint in ECOTRACK. When the complaint was received, details of the complaint, the category of the complaint, applicable timeframes and the responsible officer should all be recorded in ECOTRACK. In later steps when the complaint is resolved, details of actions taken and the decision will also be recorded in the system. Even complaints which are resolved almost immediately, such as oral complaints or those not within the EPA's jurisdiction, should be recorded in ECOTRACK.

Step 3 – Acknowledgement of receipt of complaint

Regulatory service complaints are to be acknowledged within **5 days**. There are no restrictions on how this occurs i.e. it can occur formally by letter or informally by telephone. It is suggested that the acknowledgement reflects the way the complaint was communicated to the EPA and the seriousness of the complaint. Remember to record the details of this acknowledgement in ECOTRACK.

Step 4 – Front-line handling of complaints by Managers or Regional Directors

Initially, complaints are to be dealt with within **14 days**. If complaints are not able to be resolved within this timeframe, a progress report is to be made to the complainant within **14 days**. Managers will usually be the first point of contact, and wherever possible they should try to resolve the complaint in the first instance. Any complaints can be handled informally at this stage by providing appropriate advice concerning the action taken or decision made. This includes explaining carefully to the complainant the reasons for any decision or action

Procedure for regulatory service complaints

and providing any relevant policies or legislation that provides the basis for the decision or action. The response to the complaint (either orally or in writing) is also to include an explanation of the available complaint process as well as information concerning any other review rights the complainant may have (e.g. some decisions will have review or appeal rights under the relevant legislation).

Principles for the effective resolution of complaints are detailed in the operational policy. Action should be taken if appropriate and it is within the Manager's authority.

Managers may refer complaints to the Regional Director for resolution in the situations outlined in the operational policy. The Manager will ensure that the appropriate recording of details concerning the complaint, action taken, and its resolution are made in ECOTRACK in accordance with the operational policy. The Manager will also ensure that the outcomes of the complaint resolution are communicated to any relevant officers.

Where possible, contact should be made with the complainant around a week after the resolution of the complaint to verify that the matter is resolved for the complainant. This information should also be entered into ECOTRACK.

Step 5 – Internal Review

Where a complainant is dissatisfied with the way EO has handled their complaint, they can make a further written application for an internal review. Internal review is a reconsideration of the decision made or action taken including a review of all the information available relevant to the decision.

An application for internal review **MUST** be written and the complainant must provide further information such as any evidence supporting their allegations, and copies of relevant correspondence or other documents.

A progress report concerning the review will be given within **21 days** of the receipt of the complaint. The matter will be finalised within **35 days** of the receipt of the complaint.

The reviewer provides a written response to the complainant which explains the outcome and reasons for the outcome, including any supporting material such as relevant legislative provisions, as well as explaining the complaint process. Principles for the effective resolution of complaints are detailed in the operational policy. The reviewer will ensure that the appropriate recording of details concerning the complaint, action taken and its resolution are made in ECOTRACK in accordance with the operational policy. The reviewer will ensure that the outcomes of the review are communicated to the original decision maker.

Applications for internal review should be made to the Regional Director, where a Manager has dealt with the original regulatory service complaint. In cases where the regulatory service complaint had been referred to the Regional Director by the Manager, the application for internal review should be directed to the Executive Director, EO.

Where an internal review is completed by the Regional Director, if a complainant is still unsatisfied, they can make a written application for a further internal review by the Executive Director, EO. When the Executive Director completes an internal review, and the complainant still has unresolved concerns, the complainant will be referred to the Queensland Ombudsman.

Step 6 – Continuous Improvement

Managers, Regional Directors, or the Executive Director if relevant, will ensure that where relevant observations and outcomes from complaint resolution or internal reviews, provide opportunities for continuous improvement that appropriate changes to policies or procedures are made.

Disclaimer

While this document has been prepared with care, it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Environmental Protection Agency should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Application form

Environmental Protection Act

Program notice of relevant event

OFFICIAL USE ONLY

DATE RECEIVED

--	--	--

FILE REF

--

PROJECT REF

--

COMPLETE FORM

CORRECT AA

ENTERED BY [SIGNATURE]

--

DATE

--	--	--

A relevant event is an act or omission that has caused or threatened environmental harm in the carrying out of an activity by the person, and is lawful apart from the *Environmental Protection Act 1994*.

For example, you might provide details of the general activities that you were undertaking at the time, the act or omission and how it occurred, and any further action that was taken.

This form is to be used where a person wishes to provide a program notice under section 350 of the *Environmental Protection Act 1994* of an act or omission that has caused or threatened environmental harm.

Program notice details

1. Provider of program notice of relevant event

--

2. Responsible person

--

3. Current registration certificate or environmental authority number (if applicable)

--

4. When did the relevant event occur?

--

5. Description of the relevant event

--

6. Location of relevant event

NAME OR TYPE OF PLACE	
STREET ADDRESS	
LOT(S)	
PLAN(S)	
LOCAL GOVERNMENT	

For example, you might provide details of the proximity of the relevant event to sensitive places (e.g. parks or nearby waterways).

7. Description of the nature and extent of environmental harm caused or threatened as a direct or indirect result of the relevant event

8. What action has been taken to contain, clean up, rehabilitate and restore the environmental impact in relation to the relevant event?

Privacy statement

The Department of Environment and Resource Management (DERM) is committed to protecting the privacy, accuracy and security of your personal information in accordance with the *Information Privacy Act 2009*.

DERM is collecting your personal information in accordance with s. 350 of the EP Act in order to assess your program notice. The information will only be accessed by authorised employees within the department.

Your information will not be given to any other person or agency unless you have given us permission or we are authorised or required by law.

All information supplied on this form may be disclosed publically in accordance with the *Right to Information Act 2009* and *Evidence Act 1977*. For queries about privacy matters email: AdminReview@derm.qld.gov.au or telephone: (07) 3896 3705.

9. Declaration

Note: If you have not told the truth in this application you may be liable for prosecution under the relevant Acts or Regulations.

- I am aware that section 351 of the *Environmental Protection Act 1994* states:
 - “(1) If the relevant event stated in the program notice constitutes an offence against this Act (the “original offence”), the giving of the program notice, the program notice and any documents submitted with it are not admissible in evidence against the person in a prosecution for the original offence.
 - “(2) Subsection (1) does not prevent other evidence obtained because of the giving of the program notice, the program notice or any documents submitted with it being admitted in any legal proceeding against the person.”
- I will prepare and submit to the administering authority a transitional environmental program in accordance with section 333 of the *Environmental Protection Act 1994* for the relevant event.
- I do solemnly and sincerely declare that the information provided is true and correct to the best of my knowledge. I understand that it is an offence under section 480 of the EP Act to give to the administering authority or an authorised person a document containing information that I know is false, misleading or incomplete in a material particular.
- I understand that all information supplied on or with this application form may be disclosed publicly in accordance with the *Right to Information Act 2009* and the *Evidence Act 1977*.

APPLICANTS SIGNATURE	
APPLICANTS NAME	DATE

10. Provider checklist

- Notice completed and signed
- Supporting information attached (if applicable), including
 - Reports
 - Analysis and monitoring results

Please return your completed application to:

Permit and Licence Management
Implementation Support Unit
Department of Environment and Resource Management
GPO Box 2454
Brisbane Queensland 4001.

Enquiries: **1300 130 372**
Facsimile: (07) 3896 3342
Email: palm@derm.qld.gov.au

Risk Assessment (ERA and non-ERA industry / business activities)

This document provides guidance on completing a risk assessment of ERA and non-ERA (licensed and unlicensed) business or industry activities for inspection prioritisation or compliance reporting purposes and is to be used in conjunction with the [risk assessment tool](#)¹. This risk assessment guide is recommended for use in compliance projects identified under Annual Compliance Plans aimed at delivering upon the Agency Goal – Enable sustainable development and improvement of business and industry’s environmental performance.

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¹ The *Risk Assessment Tool* can be found in Ecosteps and is a tool that calculates the risk as per the steps in this procedural guide

Introduction

The release, be it licensed or otherwise, of contaminants into the environment has the potential to result in adverse human and/or ecological impacts. Risk assessment, in the context of industrial activity, is the process of systematically identifying credible hazards to human and ecological health and analysing the likelihood and severity of the potential consequences. Risk management involves a further and essential step of implementing action to manage the resulting level of risk.

Risk is defined using the following model:

$$\text{Site Risk} = \text{Hazard (Consequence)} \times \text{Exposure (Likelihood)}$$

Risk Assessment

Risk assessment is used extensively both in Australia and overseas as a factor in government approvals on the acceptability of new developments such as approvals for new Environmentally Relevant Activities (ERA's) or other business and industry activities. Risk assessment processes are also increasingly being used by governments to identify, prioritise and justify compliance activities and compliance and enforcement actions.

This procedural guide utilises risk assessment concepts such as, hazard, likelihood and consequence (see Appendix A) to assist Agency staff in setting site priority and inspection level. The steps outlined below guide you through the risk assessment process.

Risk Assessment Steps

To establish the level of risk an ERA or non-ERA business or industry facility or site poses, take the following steps:

1. Likelihood

Considering the type of activity occurring at a site, the characteristics of the identified risks, and the performance of the business operator, use *Table 1 - Likelihood Matrix* to determine the likelihood of environmental harm occurring. Refer to Table 1.1 to determine the client performance and then identify the Aggregate Environmental Score (AES). When assessing a site with multiple ERA's use the highest AES of all ERA's occurring at that site. When focussing on a specific ERA for the site, use the AES of that ERA.

Table 1 – Likelihood Matrix (based on client performance and client activity)

Client Performance	Client Activity Definitions ²				
	Non-ERA (known)	Non-ERA (unknown) OR AES (0-25)	AES (26-50)	AES (51-125)	AES (126-325)
Unknown	Possible	Possible	Likely	Almost certain	Almost Certain
Poor	Unlikely	Possible	Possible	Likely	Almost Certain
Moderate	Rare	Unlikely	Possible	Likely	Likely
Good	Rare	Rare	Unlikely	Possible	Likely
Very Good	Rare	Rare	Unlikely	Possible	Possible

² Aggregate Environmental Score (AES) are listed in Schedule 2 of the *Environmental Protection Regulation 2008* and in the *Risk Assessment Tool*

Table 1.1 – Likelihood – client performance descriptors

	Client Performance
Unknown	No inspections logged in Ecotrack = site performance unknown
Poor	Serious environment harm or major non-compliance; OR Material environment harm or repeated minor non-compliance For example, PIN, EPO, TEP, EE issued
Moderate	Evidence of environmental nuisance or minor non-compliance For example, Warning Notice/Letter issued
Good	Inspection conducted and site compliant
Very Good	Inspection conducted and site compliant Evidence of best practice

2. Consequence

Considering the types and quantities of emissions released from a site (NPI Risk Score), and the value of the surrounding environment type, use *Table 2 - Consequence Matrix* to determine the severity of the consequence occurring. Refer to Table 2.1 to determine the value of the predominant surrounding environment type and then identify the NPI Risk Score. When assessing Mobile and Temporary activities where locations are not known consider the most likely predominant surrounding environment type. Refer to Appendix C for assistance with Wetlands and Biodiversity Ecomaps layers. Client activity risk is based on NPI reporting data – whether a site releases emissions, whether emission rates/types are known, and the quantity and types of emissions released. Refer to Appendix B for NPI site Ecomaps layers.

Table 2 – Consequence Matrix (based on environment type and client activity)

Predominant Surrounding Land Use (Environment Type)	Client Activity Risk				
	Non-NPI site (no emissions or emissions known) Risk Score 1 ³	NPI Risk Score 2	NPI Risk Score 3	NPI Risk Score 4	Non – NPI site (emissions unknown) OR NPI Risk Score 5
Highly Significant Value	Severe	Severe	Major	Catastrophic	Catastrophic
Significant Value	Minor	Severe	Severe	Major	Catastrophic
Moderate Value	Insignificant	Minor	Severe	Major	Major
Low Value	Insignificant	Insignificant	Minor	Severe	Major
Very Low Value	Insignificant	Insignificant	Minor	Severe	Severe

³ Low risk compared to Non – NPI site (emissions unknown) OR NPI Risk Score 5 which is high risk

Table 2.1 – Consequence – environment type

	Predominant Surrounding Environment Type
Highly Significant Value	Site located within 100 metres of a wetland AND either within 100 metres of an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment
Significant Value	Site located within 100 metres of a wetland or within 100 metres of an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment
Moderate Value	Site located between 100 metres and 200 metres from a wetland system, wetland drainage, or a wetland spring OR between 100 metres and 200 metres from an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in Biodiversity Planning Assessment
Low Value	Site located between 200 metres and 500 metres from a wetland OR between 200 metres and 500 metres from an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment
Very Low Value	Site located greater than 500 metres from a wetland OR greater than 500 metres from an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment

3. Environmental Risk

Determine the level of risk by combining the results of Table 1 (likelihood) and Table 2 (consequence) by using *Table 3 - Environmental Risk Matrix*.

Table 3 – Environmental Risk Matrix (ERA and non-ERA industry / business activities)

		Consequence				
		Insignificant	Minor	Severe	Major	Catastrophic
Likelihood	Almost certain	3 / Moderate	3 / Moderate	4 / High	5 / Very High	5 / Very High
	Likely	2 / Low	3 / Moderate	3 / Moderate	4 / High	5 / Very High
	Possible	1 / Very Low	2 / Low	3 / Moderate	4 / High	4 / High
	Unlikely	1 / Very Low	1 / Very Low	2 / Low	3 / Moderate	4 / High
	Rare	1 / Very Low	1 / Very Low	2 / Low	3 / Moderate	3 / Moderate

4. Inspection

Determine the inspection type and frequency for the site using the result from Table 3 by using *Table 4 - Inspection Frequency*.

Table 4 – Inspection Frequency

The frequency of compliance inspections for premises is to be determined by the individual Region. The frequency and level of inspection required at a facility is based on the type of activity/activities undertaken on

Risk Assessment (ERA and non-ERA) industry / business activities

site; the types and quantities of emissions released from a site the proximity of the site to environmentally sensitive areas; and the proximity of the site to areas of social vulnerability.

The compliance inspections conducted by the Regions will take into account the level of environmental impact or risk that may be involved and the environmental outcomes that may be achieved.

Environmental Risk	Inspection Frequency (min)	Inspection Level
1 / Very Low	As issues arise	A
2 / Low	As issues arise	A or B
3 / Moderate	Biennially	B
4 / High	Annually	B or C
5 / Very High	Annually – Taskforce	C

Inspection Type

Inspections of differing degrees of detail are conducted, and will be either compliance inspection Level A; compliance inspection Level B; or compliance inspection Level C.

A / Basic Inspection

Level A Inspections are compliance inspections at the lowest level of detail for Agency interests. They tend to be targeted to a particular environmental issue, are inspections of low risk, non complex and non-regulated sites, or are planned inspections where little is known of the premises and an initial risk assessment of the site is necessary. Such inspections may comprise a quick visual check of a premises or a more detailed assessment of only a portion of the operations such as, for example, stormwater management. Level A Inspections can also be undertaken as follow-up inspections to establish compliance with enforcement actions (e.g. a Transitional Environmental Program or Environmental Protection Order) taken by the EPA at a given site. (Refer to [Preliminary Assessment Form / Level A Inspection Checklist](#) in Ecosteps).

B / Condition Inspection

Level B Inspections are the most common level of inspection undertaken at licensed premises. A licensed premise will usually have a statutory document issued by the EPA for the activity – a development approval. Compliance with any EPA issued statutory documentation is assessed as a minimum (usually an assessment of performance against approval conditions), however Level B Inspections may also include assessment of other documentation (such as a site based management plan) and the taking of samples. (Refer to [Compliance Audit Report](#) in Ecosteps).

C / Audit

Level C Inspection is the highest and most detailed level of compliance assessment that the EPA will undertake. They are expected to be pre-planned and scoped, involve a multi-disciplinary team for a specified period of time, and examine compliance with all aspects of issued statutory documents and the broader legislation.

Extensive documentary evidence of compliance is [REDACTED] determine or validate the presence or absence of environmental impacts. (Refer to [Compliance Audit Report](#), [Audit Plan](#) and [Compliance Program Audit Checklist](#) in Ecosteps).

Risk Assessment Examples

Example 1

A pre-inspection file review of annual returns and supporting information for a pesticide manufacturer indicates that the business has advised the EPA that soil and groundwater samples in the vicinity of its stormwater discharge are showing levels of Chlorpyrifos present above environmental threshold values. The business is located adjacent to an undisturbed freshwater stream. The presence of contamination suggests the business has inappropriate stormwater controls in place or an incident has recently occurred. There is both a risk that the business is in breach of its development approval conditions relating to stormwater controls (non-compliance risk) and a risk of environmental harm occurring (fish kill).

A further review of the file indicates that the business operator was operating in compliance at the time of the last site inspection (2 years earlier). However, until a more recent site inspection is undertaken, the operator's current performance remains unknown.

Referring to Table 1 and Table 1.1, determine the *likelihood* of a risk event occurring. The development approval indicates that the pesticide manufacturer has an approval for ERA 7(b) Chemical Manufacturing and therefore an AES of 114. The compliance performance of the business is "unknown" (Table 1.1), so Table 1 gives the likelihood of environmental harm occurring or the business operating in breach of environmental legislation as ALMOST CERTAIN.

An Ecomaps survey of the site and surrounding environment indicates that the site is within 100 metres of wetland drainage (but not within 100 metres of an area mapped as very high or high in the Aquatic Conservation Assessment or State or Regional Significance in the Biodiversity Planning Assessment). The site reports to the NPI and has an NPI Risk Score of 4.

Referring to Table 2 and Table 2.1, determine the *consequence* of a risk event occurring, or hazard having an impact. Table 2 gives the consequence of environmental harm occurring or the business operating in breach of environmental legislation as MAJOR.

Using the results from Table 1 (almost certain) and Table 2 (major) in Table 3 gives an overall risk for this industry/business site of 5/Very High. Level C audits should be conducted annually for this site (see Table 4).

Example 2

DERM has received a number of complaints from the community about odour originating from a landscape supplies and compost manufacturing business described as foul and similar to dynamic-lifter type fertilizer. The presence of odours suggests the business may be receiving or selling products that DERM is not aware of or undertaking composting activities inappropriately. There is both a risk that the business is in breach of its development approval conditions, including those relating to odour releases (non-compliance risk) and a risk of environmental nuisance occurring.

Referring to Table 1 and Table 1.1, determine the *likelihood* of a risk event occurring. The development approval indicates that the soil conditioner has an approval for ERA 53 and therefore an AES of 18. There appears to be an environmental nuisance at the site, so the operator's performance is "moderate" (Table 1.1). Table 1 gives the likelihood of an event occurring as UNLIKELY.

An Ecomaps survey of the site and surrounding environment indicates that the site is located within 100 metres of an area mapped as State Significance in the Biodiversity Planning Assessment (but not within 100 metres of a wetland or within 100 metres of an area mapped as very high or high in the Aquatic Conservation Assessment). The site reports to the NPI and has an NPI Risk Score of 2.

Risk Assessment (ERA and non-ERA) industry / business activities

Referring to Table 2 and Table 2.1, determine the *consequence* of a risk event occurring or hazard having an impact. Table 2 gives the consequence of environmental nuisance occurring or the business operating in breach of environmental legislation as SEVERE.

Using the results from Table 1 (unlikely) and Table 2 (severe) in Table 3, gives an overall risk for this industry/business site of 3/MODERATE. Level B site inspections should be conducted biennially for this site (see Table 4).

Appendix A

Risk Assessment Concepts

Hazard is the potential for mishap or harm. A hazard is not necessarily dangerous. Danger implies a reasonable likelihood of a mishap or harm actually happening. A hazard is simply the potential for that to happen; if sufficient precautions are taken to prevent the potential from being realised, then the hazard may be “safe”.

Risk is the chance of something happening that will have an impact upon objectives (for example, to prevent harm to the environment). It is measured in terms of consequences and likelihood.

Consequence is the outcome of an event or situation expressed qualitatively or quantitatively, being a loss, injury, and disadvantage or gains (e.g. a frequency of an overflow or release during a 1 in 10 year storm event).

Likelihood is a qualitative description of probability or frequency. Likelihood may be a probability (e.g. a 1% probability of an overflow or release of contaminated water during a storm event), or a frequency (e.g. a frequency of an overflow or release being a 1 in 10 year storm event).

Risk assessment as defined in AS/NZS 4360:2004⁴, is the overall process of risk identification, risk analysis and risk evaluation. Risk assessment is an integral component of the **Risk Management** process. Risk management can be applied at many levels in an organisation. It can be applied at a strategic level and at tactical and operational levels. It may be applied to specific projects, to assist with specific decisions or to manage specific recognised risk areas.

The main elements of the Risk Management process are the following:

- (a) Establish the context – Establish the external, internal and risk management context in which the risk management process will take place. Criteria against which risk will be evaluated should be established and the structure of the analysis defined.
- (b) **Identify risks** – Identify where, when, why and how hazard events could prevent, degrade, delay or enhance achievement of the objectives.
- (c) **Analyse risks** – Identify and evaluate existing controls. Determine consequences and likelihood and hence level of risk. This analysis should consider the range of potential consequences and how these could occur.
- (d) **Evaluate risks** – Compare estimated levels of risk against pre-established criteria and consider the balance between potential benefits and adverse outcomes. This enables decisions to be made about the extent and nature of treatments required and about priorities.
- (e) Treat risks – Develop and implement specific cost-effective strategies and action plans for increasing potential benefits and reducing potential impacts.
- (f) This element of the Risk Management process is addressed via DERM’s tools and strategies outlined in the Department’s Enforcement Guidelines.
- (g) Monitor and review – It is necessary to monitor the effectiveness of all steps of the risk management process. This is important for continuous improvement.

Risk Assessment

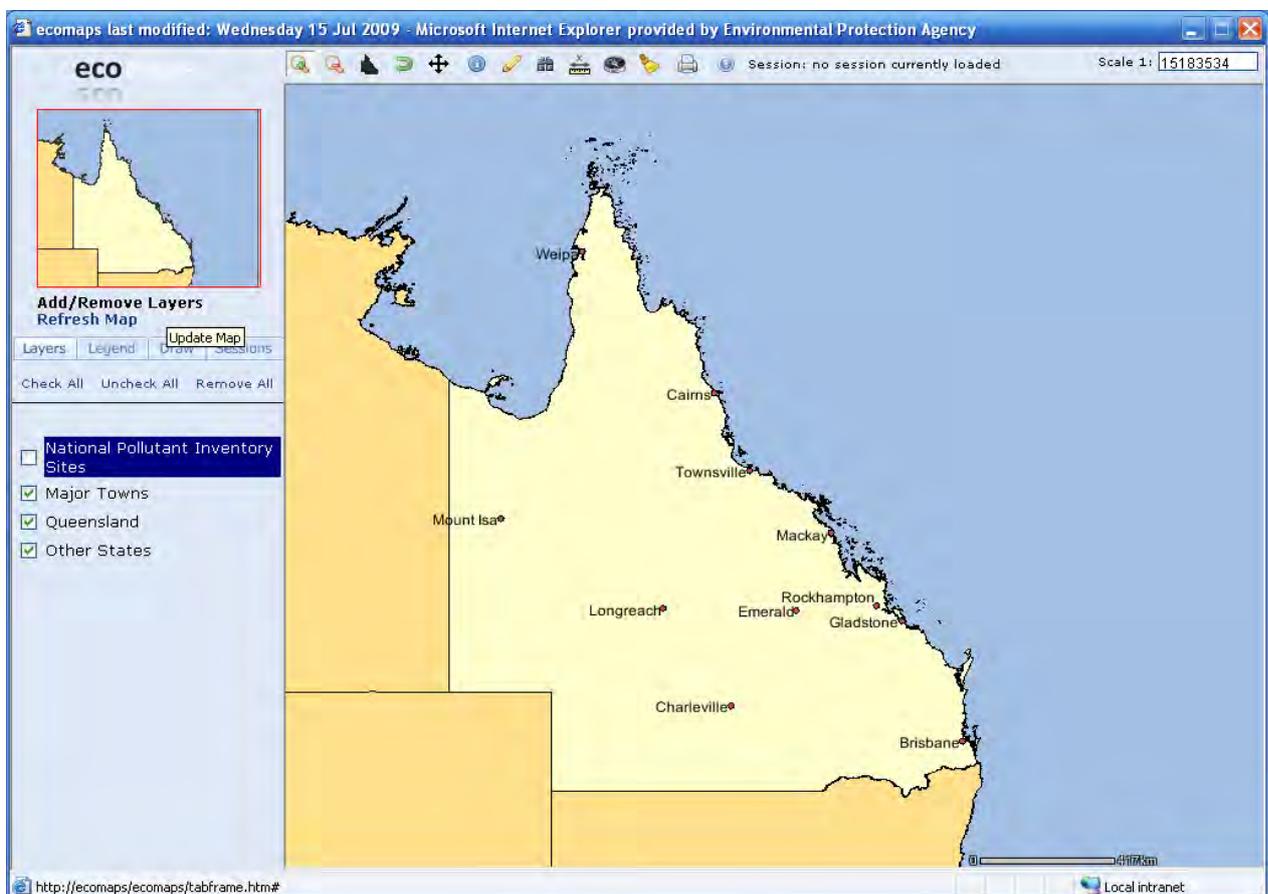
This element of the Risk Management process is addressed via DERM’s ongoing commitment to follow-up compliance inspections and enforcement action to address environmental risk associated with ERA and non-ERA industry and business activities. Risks and the effectiveness of treatment measures need to be monitored to ensure changing circumstances do not under or overstate the risk potential of a managed activity.

⁴ AS/NZS 4360:2004, Risk Management, Standards Australia

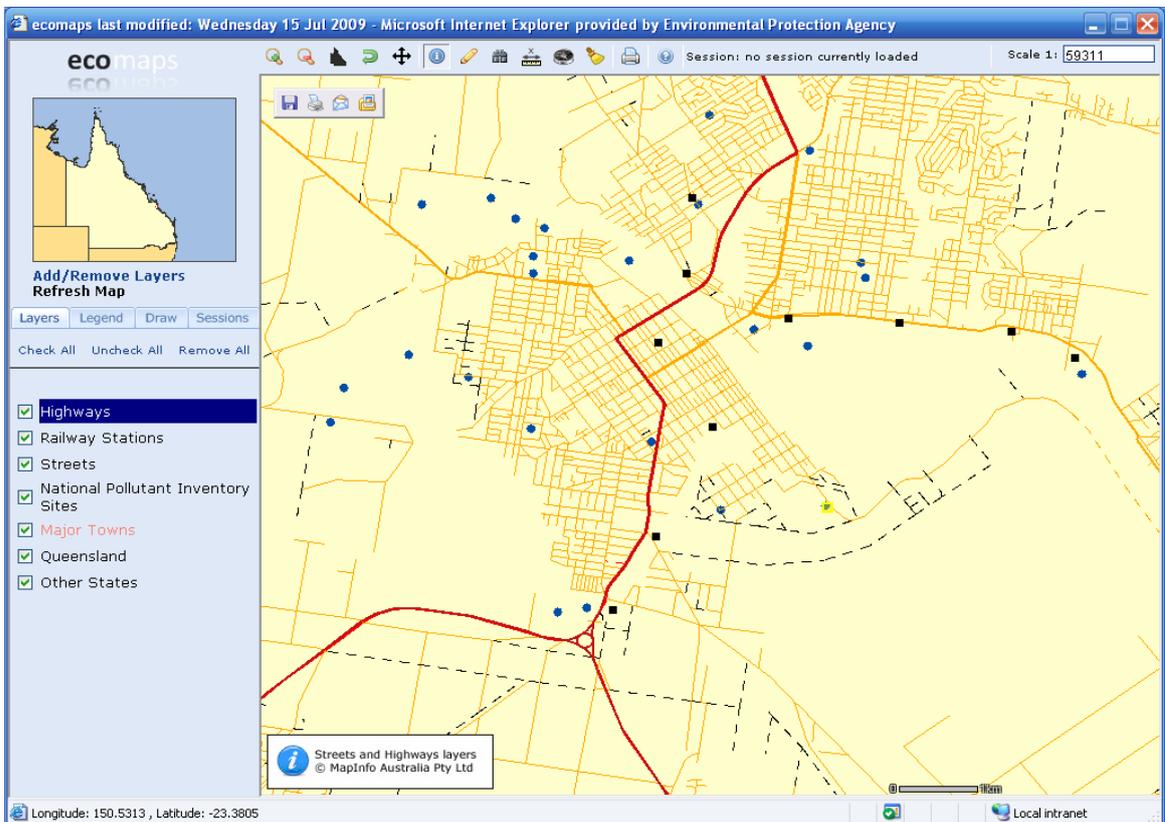
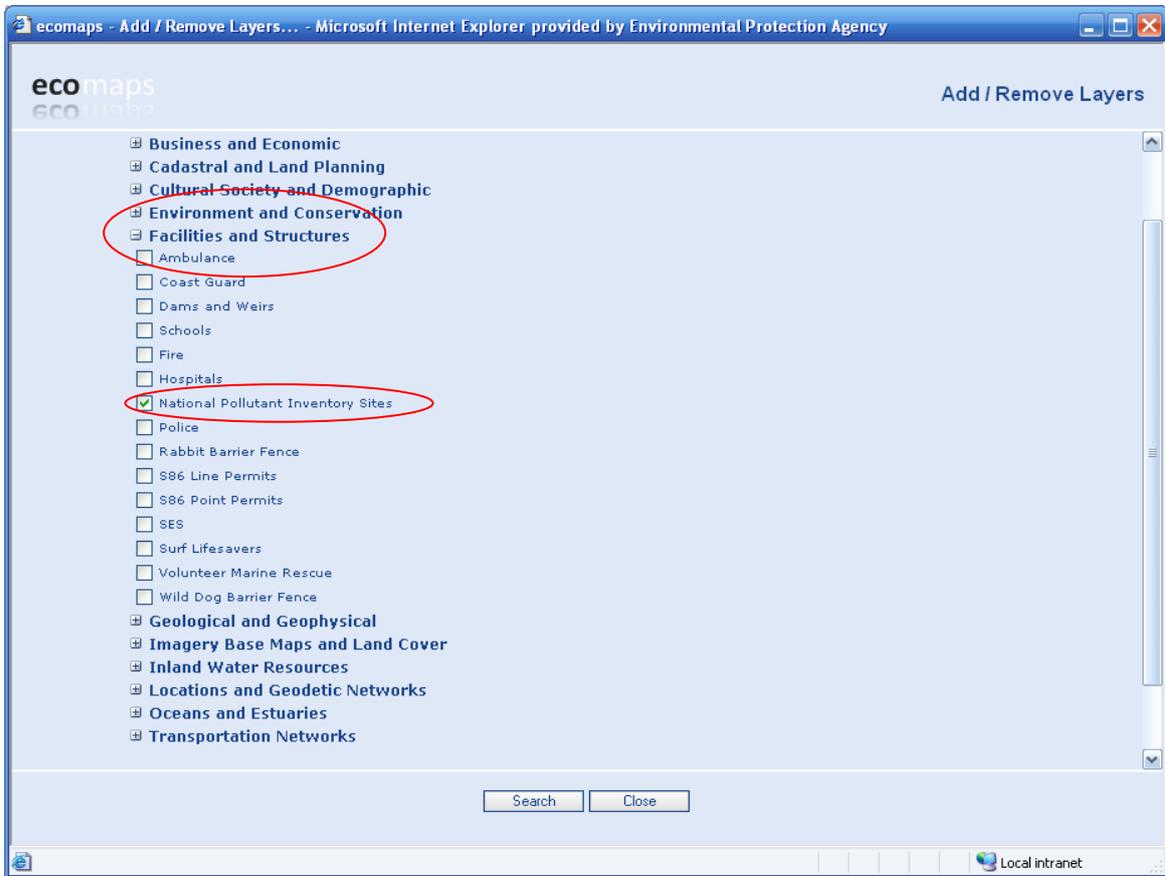
Appendix B

How to obtain NPI Scores

- Open [Ecomaps](#) (click on link)
- Select add/remove layers
- Select “Facilities and Structures” then tick “National pollutant inventory sites”
- Close add/remove layers window
- Ensure “National pollutant inventory sites” is ticked on left hand side and click on refresh maps
- Zoom into desired area. Select “locate” button in top menu then select “built environment” if searching by address or select “administrative” if searching by lot plan.
- Locations listed on NPI are highlighted BLUE
- Click on “Information” button in top menu and “Identify by” window will open
- Select “Point select” then click on desired location (blue dot)
- Query/selection result window will open listing site and NPI Risk Score



Risk Assessment (ERA and non-ERA) industry / business activities



Query/Selection Results - Microsoft Internet Explorer provided by Environmental Protection Agency

eco maps Info Results

Save Results Print Results Close Results

National Pollutant Inventory Sites

No.	Name	Address	ANZSIC Classification	Risk Score	Reports
1	DIGGERS PARK LANDFILL (CLOSED)-ROCKHAMPTON CITY COUNCIL	DIGGERS PARK NORMANBY ST ROCKHAMPTON QLD	Waste Disposal Services	4	25257
2	PELTOPHORUM STREET LANDFILL (CLOSED)-ROCKHAMPTON CITY COUNCIL	PELTOPHORUM ST NORTH ROCKHAMPTON QLD	Waste Disposal Services	4	25258

Queensland

No. Feature

1 Queensland Mainland

No Features Found in the following layer(s):

- Highways
- Railway Stations
- Streets
- Major Towns
- Other States

Appendix C

How to obtain Wetlands and Biodiversity Ecomaps layers

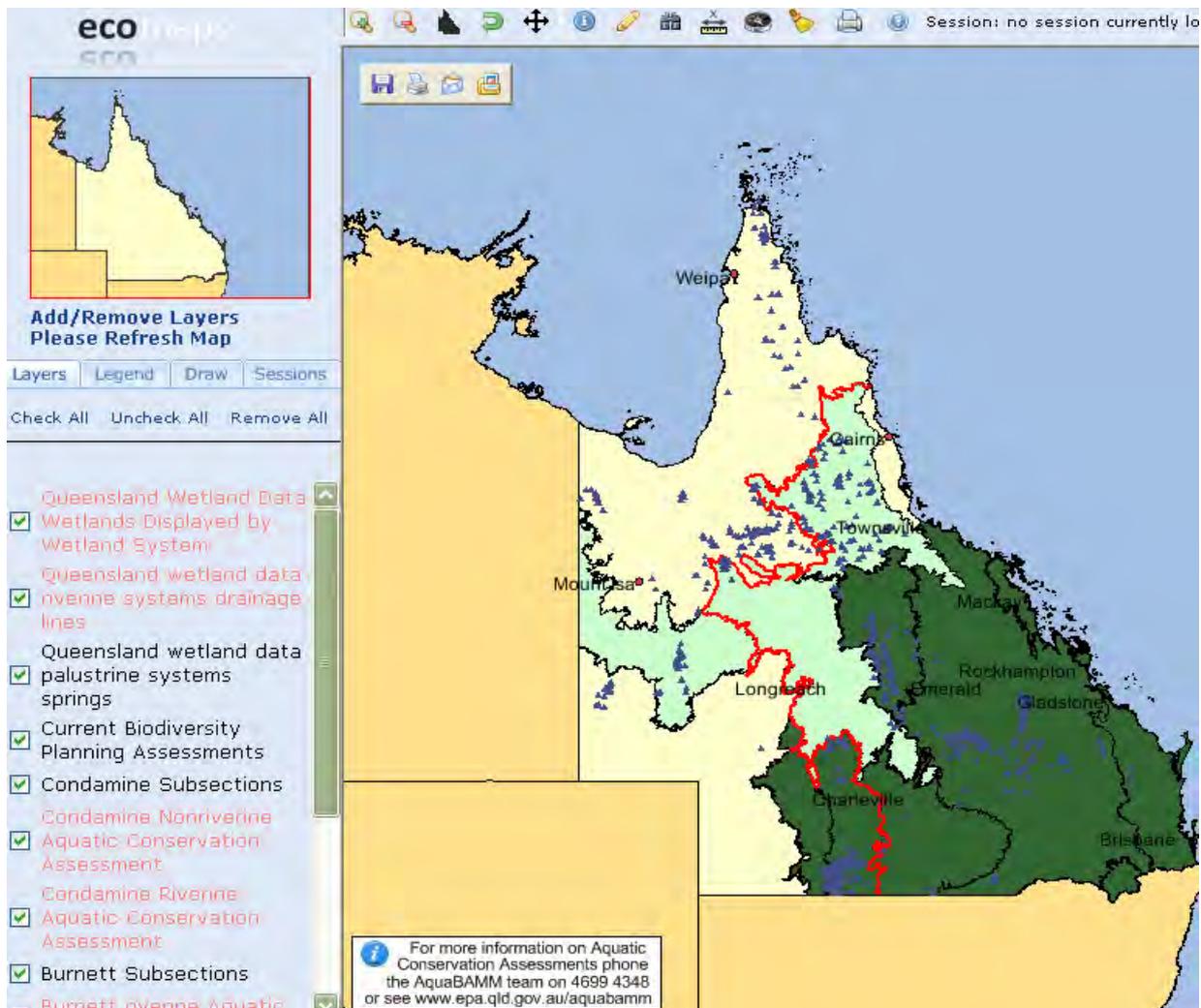
- Open [Ecomaps](#) (click on link) or select the GIS (green) button from the Permits screen in Ecotrack and it will take you to the exact location in Ecomaps
- Select add/remove layers
- Select **“Biologic & Ecologic”**
- Select **“Aquatic Conservation Assessments”** and tick relevant area (if in doubt tick them all)
- Select **“Biodiversity Planning Assessments”** and tick the relevant area (if in doubt tick them all)
- Select **“Wetland Programme”** then tick:
 - Queensland Wetland Data Wetland Displayed by Wetland System
 - Queensland Wetland Data riverine systems drainage line
 - Queensland Wetland Data palustrine system springs



- Close add/remove layers

Risk Assessment (ERA and non-ERA) industry / business activities

- Ensure relevant layers are ticked on the left hand side and refresh maps
- Select “legend” tab to identify the areas of State or Regional significance and very high or high in the Aquatic Conservation Assessment
- Zoom into desired area (this step is not required if you have accessed Ecomaps via Ecotrack). Select “locate” button in top menu then select “built environment” if searching by address or select “administrative” if searching by lot plan.
- Click on “information” button in top menu and “identify by” window will open
- Select “point select” then click on desired location (yellow/green dot)
- Query/selection result window will open listing wetlands information



Environmental nuisance complaint and/or pollution incident allegation

This form is to be completed by the complainant, (the person who is making the complaint about a nuisance, or reporting a pollution incident). Please provide as much details as possible. Any ensuing investigation will require your further assistance.

Complainant information

1 Complainant name and address

Full name(s)

Street & postal address

Telephone: Home
Work

Fax
E mail

2 Do you give permission for your details to be released to the alleged source if required?

- Yes No Only after consultation with an EPA officer.

Alleged source information

3 Name and address of the alleged source of nuisance/pollution (if known)

Individual's name and/or company/business name

Street address of the individual and/or company/business

Telephone

Fax

4 Type of premises where the nuisance or pollution originates from

- Residential Commercial/industrial public land (examples of public land include roads, waterways and parkland)

5 Have you contacted the person/company/business about the problem?

- Yes No

Environmental nuisance complaint and/or pollution incident allegation

6 Allegation type?

Nuisance:

- Noise Chemical/paint over spray
 Light Odour/fume/smoke
 Dust/particulate Other

Pollution:

- Waste dumping Water pollution
 Other

7 Details of allegations and/or description of the problem

(Including location if different to alleged source address in Question 3)

8 Details of the days and times that the nuisance/pollution incident has occurred?

For example, "Monday to Friday 6am to 5pm" or "every Sunday at 8am"

9 How long does the nuisance/pollution incident usually last for?

For example, "5 mins", "30 mins" or "24 hours a day"

10 To the best of your knowledge how long has the pollution/nuisance incident been occurring for?

History

Only complete questions 11 & 12 if the problem was identified as a nuisance allegation at question 6. If the problem relates to a pollution allegation go to question 13.

11 When is the nuisance most annoying to you and where does the nuisance affect you the most

Details (For example, the nuisance is affecting you inside your home when you are trying to sleep)

12 Will you be willing to keep a diary regarding the nuisance, if required?

- Yes No

13 Have you brought the nuisance/pollution incident to the attention of any of the following authorities?

- EPA Local council Police Another government agency

Please provide details of who you spoke to.

Environmental nuisance complaint and/or pollution incident allegation

14 Additional Notes

If there is any further information you would like to provide, please enter the information below or attach a separate signed statement

Declaration

Please read carefully through the certification before signing.

- I do solemnly and sincerely declare that the information provided is true and correct to the best of my knowledge and I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the *Oaths Act 1867*.
- I understand that all information supplied on or with this application form may be disclosed publicly in accordance with the *Freedom of Information Act 1992* and the *Evidence Act 1977*.
- I understand that environmental nuisance matters from 1/1/09 have been devolved to local councils, and as such that all information supplied can be disclosed to another agency, body or person under Information Privacy Principle 42.

Complainant's Signature

Date

Please return your completed application kit to:

<INSERT office name>

<INSERT office address>

<INSERT office address>

<INSERT office address>

Enquiries: <INSERT contact name>

Facsimile: <INSERT fax number>

Email: <INSERT email address>

Suggested PIN Letter Text (EP Act)

Copy and Paste to Departmental Letter Template as required

Suggested PIN Letter Text for infringement notices issued under the Environmental Protection Act 1994 excluding littering offences.

Dear Mr/Ms xxx,

Re: Penalty Infringement Notice

As you are aware, the Department of Environment and Resource Management (DERM) has been investigating an incident in which (*describe incident briefly, including date*).

(then describe investigation, as below. Delete all italicised and put in your facts:

During DERM's attendance at the site on xxx 2010 it was evident that the xxxx waste had been released to the bed and banks of waters. This release is a contravention of condition (C1) of xxxx Development Approval (IPDE/IPCExxx) that states:

Contaminants must not be directly or indirectly released from any approved place to any waters or the bed and banks of any waters except:

- (i) as permitted under any water schedule in this development approval;*
- (ii) as permitted under the stormwater schedule; or*
- (iii) to a sewer as permitted or otherwise agreed from time to time by the relevant Local Government*

I draw your attention to Section 435 of the Environmental Protection Act 1994 ("the Act") that states that it is an offence for a person to contravene a development condition of a development approval. A copy of this section is enclosed for your information.

A person who contravenes a condition of a development approval can be prosecuted by DERM in court in which case the maximum penalty the court can impose is \$166 500 for individuals and \$832 500 for corporations. Alternatively, DERM can exercise its discretion to issue an Infringement Notice for the offence that requires the payment of a set fine. The infringement notice penalty for contravention of a development condition of a development approval s \$2000.00. This figure is not representative of the penalty a court may impose.

On this occasion DERM has decided to issue xxxx an Infringement Notice for failing to comply with condition C1 of IPDE/IPCExxx on xxx 2010.

Should DERM obtain evidence indicating that the alleged offence is more serious than first thought, DERM may withdraw the Infringement Notice within 28 days and may consider taking further action under the Act's provisions. The infringement notice is attached.

If you have any questions regarding the content of this letter please phone xxxx on phone (07) xxxx-xxxx

Yours sincerely

<Insert Name>

<Insert Position>

Environmental Protection Act 1994

435 Offence to contravene development condition

(1) A person must not wilfully contravene a development condition of a development approval.

Maximum penalty—2000 penalty units or 2 years imprisonment.

(2) A person must not contravene a development condition of a development approval.

Maximum penalty—1665 penalty units.

(3) In a proceeding for an offence against subsection (1), if the court is not satisfied the defendant is guilty of the offence charged but is satisfied the defendant is guilty of an offence against subsection (2), the court may find the defendant guilty of the offence against subsection (2).

Environmental Protection Act

Transitional environmental program certificate of approval number

This certificate of approval is issued by the administering authority pursuant to <PICK FROM LIST> of the Environmental Protection Act 1994. A transitional environmental program is a specific program that, when approved, achieves compliance with the Environmental Protection Act 1994 for the matters dealt with by the program by reducing environmental harm, or detailing the transition to an environmental standard.

Under the provisions of the *Environmental Protection Act 1994*, this <PICK FROM LIST> is hereby granted to:

<INSERT recipient's name>

<INSERT street address>

<INSERT suburb, state and postal code>

approving the draft transitional environmental program; titled <INSERT title> for management of <INSERT details> at <INSERT location>.

The draft transitional environmental program, dated <INSERT date>, was received by this office on <INSERT date>.

The draft transitional environmental program is approved subject to the following conditions:

<INSERT conditions>

The transitional environmental program remains in force until <INSERT date>.

In any case where conditions are imposed upon a certificate of approval, you may apply to the administering authority for a review of the decision. You may also appeal against the decision to the Planning and Environment Court.

Information relating to a review of decisions or appeals under the *Environmental Protection Act 1994* is included with this notice. This information is intended as a guide only. You may have other legal rights and obligations.

Should you have any queries in relation to this Notice, <INSERT contact officer's name> of the Department of Environment and Resource Management on telephone <INSERT phone number> would be happy to assist you.

Signature

Date

<INSERT delegate's name>

<INSERT delegate's position>

Department of Environment and Resource Management

Enquiries:

<INSERT Permit and Licence Management or local office details>

Ph. <INSERT 1300 130 372 or local no.>

Fax. <INSERT (07) 3896 3342 or local no.>

Warning Letter—ERA Site

Compliance

Warning Letter for ERA sites in non-compliance

Enquiries #####
Telephone (07) #####
Your reference #####
Our reference #####

Date

Name
Council Name
Address
City State Postcode

Dear Sir/Madam

I refer to the inspection of premise name—located at premise address—on date, conducted by officers of the Environmental Protection Agency (EPA) in the company of Mr/Mrs ##### and/or yourself. The primary purpose of the inspection was to assess whether the activities conducted on site are in compliance with Development Approval (DA) conditions of approval Approval Number eg. IPDE##/IPCE##/SR##

The inspection was not a complete audit of your site and does not relieve you of your obligations to ensure compliance with approval Approval Number eg. IPDE##/IPCE##/SR##, and all other requirements of the *Environmental Protection Act 1994* (EP Act). You are reminded of section 319 of the EP Act—general environmental duty—which requires anyone who carries out an activity that causes or is likely to cause environmental harm to take all reasonable and practicable measures to prevent or minimise the harm..

As you may be aware, the inspection is part of the EPA's program, [undertaken in association with] ##### Council, to inspect industrial premises within the Estate name Industrial Estate.

During the inspection EPA officers observed the following environmental issues:

- i. e.g. contaminated stormwater was leaving the site via a drainage channel at the eastern side of the site
- ii. other issue

<<SELECT 1 OR BOTH OF THE FOLLOWING 2 PARAGRAPHS>>

<<For a breach of conditions>>

In light of these observations, it appears that at the time of the inspection, you were in breach of the following approval conditions:

- Condition No. and Condition
- Condition No. and Condition
- Condition No. and Condition

I recommend that you immediately take all reasonable and practicable measures to ensure compliance with the conditions of approval Approval Number eg. IPDE###/IPCE##/SR##. I draw your attention to Section 435 of the EP Act that states that it is an offence for the holder of a development approval to contravene a condition of the development approval.

The EPA has a responsibility to respond to any non-compliance with legislative requirements. In the event of non-compliance with the legislation and environmental performance standards, the EPA has the ability to use a number of enforcement tools including warning notices, statutory orders requiring certain actions to be taken, Penalty Infringement Notices and prosecution.

<<For a breach of other legislation administered by the EPA>>

During the inspection EPA officers observed that you were in breach of the following section(s) of the EP Act/Policy Name:

- Section Section Number and brief description

I recommend that you immediately take all reasonable and practicable measures to rectify the above issues and to ensure compliance with your general environmental duty.

The EPA is focussed on achieving environmental outcomes and looks forward to the prompt resolution of the matters raised above. EPA officers will return to your site on or after Date (2-3 weeks from date of letter) to ensure these matters have been properly addressed. Should the matters not be adequately addressed, other enforcement options may be considered.

If you wish to discuss this matter further please contact Officer Name on (07) #####.

Yours sincerely

Team Leaders Name
**Team Leader, District
Region, EPA**

Withdrawal of Infringement Notice

This infringement notice is submitted for withdrawal. Copy of this report together and copies of notice to be filed at your office for audit purposes.

Office

Date

Withdrawal of Infringement Notice No _____ is requested for the following reason:

- Error detected after issue. No further action desired.
- Issue of Infringement Notice not appropriate. Summons action to be commenced.
- Following Review.
- Statutory Declaration received.

This infringement notice is submitted for withdrawal. Copy attached.

Signature _____

Position

Date

Delegate Use Only

Infringement Notice No. _____ is withdrawn.

Copy of this report together with copies of notice to be filed at your office for audit purposes.

Delegate signature _____

Date ____ / ____ / ____

Procedural guide

Environmental Protection Act 1994 Environmental Protection Orders (EPOs)

Environmental Protection Orders (EPOs) are dealt with under Chapter 7 Part 5 of the Environmental Protection Act 1994 (EP Act). EPOs are a useful environmental management tool that can be issued to a person to secure compliance with a number of requirements including those contained in the general environmental duty, environmental authorities or development approvals, or an audit notice.

What is an EPO?

An EPO is an enforcement tool that can be used to secure compliance with the EP Act. It is a useful tool where a solution is clear and action can be undertaken by a person or an organisation. An EPO may:

- Impose a reasonable requirement upon a person to prevent or minimise environmental harm.
- Require the recipient to stop or not start a particular activity for a stated period or indefinitely.
- Require the recipient to undertake a specified activity only during stated times or subject to stated conditions or
- Require the recipient to take certain action within a specified period.

It is important that these impositions and requirements are made lawfully and fairly. Not only does this mean that the 'right' decision is likely to be made, it helps to increase public confidence in DERM and the government generally.

The decision to issue an EPO is an administrative decision

The following has been adapted from the Queensland Ombudsman's good decision making guide. Reference should also be made to that document as it is a valuable resource on making a good administrative decision. It can be downloaded from <<http://www.ombudsman.qld.gov.au>

The community expects public agencies to have policies and procedures to support and inform fair and consistent decision making at all levels within government. Good administrative decision making lies at the heart of this process. Administrative decision making can be broken down into three basic components: ¹

- *Facts* - gathering all necessary and relevant information
- *Law* - correctly identifying, interpreting and applying the relevant law to the facts
- *Discretion* - correctly identifying and considering relevant policy and considerations and reasonably exercising discretion

There are principles that apply to making a good administrative decision. It is recommended that you familiarise yourself with the Queensland Ombudsman's good decision making guide for further information. The guide also refers to four stages involved in good decision making. These are:

1. Preparing for the decision
2. Developing the decision
3. Making the decision

1

4. Communicating the decision.

It is important that throughout these four stages, **comprehensive and timely record-keeping** is maintained.

STAGE 1: Preparing for the decision (to issue an EPO)

This stage is critical, being the foundation of the decision making process. If this stage is not handled well, it is unlikely the ultimate decision will be sound.

What are the key issues?

The first step in any decision making process or investigation is to correctly identify the key issues. Here you need to first identify whether any of circumstances in which an EPO may be issued apply. These are outlined in section 358 of the EP Act and include:

- If a person does not comply with a requirement to conduct or commission an environmental evaluation (EE)
- If a person does not comply with a requirement to prepare a transitional environmental program (TEP)
- If an EE shows that unlawful environmental harm is being or is likely to be caused by an activity
- To secure compliance with:
 - the general environmental duty
 - an environmental protection policy (EPP)
 - a condition of an environmental authority (EA) or a development authority (DA)
 - a standard environmental condition of a code of environmental compliance for a chapter 4 activity
 - a condition of a site management plan
 - an audit notice
 - a surrender notice
 - a rehabilitation direction
 - a regulation *or*
 - an accredited environmental risk management plan

Identifying the key issues is important to the success of any decision to be made. The key issues in any decision include the relevant matters to be considered. You should only consider the relevant matters in making a decision. Irrelevant matters should be ignored.

Section 359 of the EP Act says that before deciding to issue an EPO, the administering authority (or his or her delegate) **must** consider the **standard criteria**. The definition of standard criteria is set out in the dictionary to the EP Act and means:

- The principles of ecologically sustainable development as set out in the national strategy for ecologically sustainable development 2 *and*

² The **Guiding Principles** are:

- decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations
- where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- the global dimension of environmental impacts of actions and policies should be recognised and considered

- Any applicable environmental protection policy *and*
- Any applicable Commonwealth, State or local government plans, standards, agreements or requirements *and*
- Any applicable environmental impact study, assessment or report *and*
- The character, resilience and values of the receiving environment *and*
- All submissions made by the applicant and submitters *and*
- The best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows:
 - an EA
 - a TEP
 - an EPO
 - a disposal permit
 - a DA *and*
- The financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument *and*
- The public interest *and*
- any applicable site management plan *and*
- Any relevant integrated environmental management system or proposed integrated environmental management system *and*
- Any other matter prescribed under a regulation.

Another key point to consider when issuing an EPO includes whether or not it is even appropriate to use an EPO. An EPO is used to require someone either to take or to not take a certain specified action in order to prevent or minimise environmental harm. EPOs are a good tool to use when it is known what action needs to be taken and if the action needs to be undertaken over a relatively short timeframe. EPOs should not be used where extensive work needs to be undertaken over a long period of time. A TEP is more appropriate where lengthy timeframes (i.e. years) are needed to achieve a solution to an environmental problem. If it is necessary to work out what is causing harm or what needs to be done to rectify the harm, an EE is a better tool to use. EPOs may only be used in order to prevent or minimise environmental harm. The [choosing the appropriate statutory tool to respond to regulatory non compliance](#) procedural guide can assist further in determining this

-
- the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised
 - the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised
 - cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms
 - decisions and actions should provide for broad community involvement on issues which affect them
 - decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations
 - where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation

These guiding principles and core objectives need to be considered as a package. No objective or principle should predominate over the others. A balanced approach is required that takes into account all these objectives and principles to pursue the goal of ESD.

Start and maintain a document trail

Public agencies have an obligation to undertake comprehensive record-keeping. This obligation is based on law and policy including:

- Sections 7, 13 and 26 of the *Public Records Act 2002*
- *Right to Information Act 2009*
- *Information Privacy Act 2009*
- *Information standard 40 'record keeping' (ISO40) – overarching record keeping policy for state and local government in Queensland*
- *The best practice public guide to record keeping - provides practical guidance for implementing the policy and principles in ISO40*
- *Information standard 31 'retention and disposal of public records' (ISO31) and the guidelines for the development and implementation of retention and disposal schedules*
- *General retention and disposal schedule for administrative records*

All information relevant to the decision to issue an EPO should be the subject of written records. Every form of contact should be recorded and maintained. These include emails, telephone memorandums, faxes, letters, notes of inspections and minutes of meetings

Read and understand the legislation

The main sections that are relevant to EPOs are 358 to 363 of the EP Act.

Check you have the legal authority to make the decision?

Legislation usually sets out who is authorised to make a decision. Section 358 of the EP Act says that the *administering authority* can issue an EPO. Sections 516 and 518 deals with who the *administering authority* (*chief executive*) can delegate his or her power to under the EP Act. The current EP Act delegation (in which the administering authority delegates the power to issue an EPO) is published on the DERM intranet at <http://insite2.dnr.qld.gov.au/derm/delegations/pdf/epa04.pdf>. It provides guidance as to the category of office or position that is able to issue an EPO (i.e. a team leader reporting to a regional manager, regional service delivery).

Should you be the decision maker?

It is important to consider whether you may have a conflict of interest in the decision to issue an EPO. A conflict of interest is where a decision maker's private interests interfere or appear to interfere with their duty to put the public interest first. Refer to the [code of conduct](#) and the [conflict of interest policy](#) published on the DERM intranet for further discussion.

STAGE 2: Developing the decision (to issue an EPO)

In developing the decision, you need to follow lawful and fair procedures, gather information relevant to the decisions and give people who may be affected by a proposed adverse decision natural justice.

Follow procedure

The EP Act imposes statutory requirements on a person responsible for the decision to issue an EPO. Some are mandatory (i.e. where the word *must* is used) and others are discretionary (i.e. where the word *may* is

used). Section 360 of the EP Act sets out the form and content that EPO that *must* follow. Section 360(1) says that the EPO:

- **Must** be in the form of a written notice (an [EPO template](#) is available on Ecosteps) *and*
- **Must** specify the person to whom it is issued (a *person* includes an individual and a corporation. Please note both companies and individuals can have business names. Please refer to the understanding legal entities procedural guide To confirm the existence of a company, a company search should be performed through CITEC. To help identify who runs a business, a business name search can be used. See www.abr.gov.au. The Australian Securities and Investments Commission can also be a useful site to visit in relation to searching for Australian businesses and companies <http://www.asic.gov.au/asic/asic.nsf>) *and*
- **Must** state the review or appeal details *and*
- **Must** be served on the recipient. Please refer to the understanding legal entities for further information about service. The procedural guide can be located on Ecosteps at <http://wwwhost.epa.qld.gov.au/steps/reflaunch.cfm?nw=true&ref=330>

Gather and record all relevant information

Information gathering should be directed to relevant factual matters to be proved and considered. When collecting information for making a decision, it is important to be aware of the status and the quality of the information being collected. You should ensure that you have gathered all reasonably/practicably available relevant evidence as this should be the basis for your findings of fact. Evidence is information that can be used to demonstrate the existence or non existence of a fact.

Types of evidence include oral, documentary, visual, physical and expert. Oral evidence is the verbal recollections of persons gathered by telephone, meeting and or interview. Documentary evidence is documents/records. Refer to sections 11, 12 and 13 of the *Right to Information Act 2009* and s 36 of the *Acts Interpretation Act 1954* for definitions of *document*. Visual evidence is gathered by site inspections. Physical evidence is any evidence gathered in the form of a physical object, thing or sample, intended to prove a fact in issue, based on its demonstrable physical characteristics. Expert evidence is opinion evidence given by an expert in a field of specialised field of knowledge.

Observe natural justice

Natural justice or procedural fairness means that a person who might be adversely affected by an administrative decision (the affected person) must be given a 'fair hearing' before the decision is made. However, there are generally considered to be three aspects of natural justice:

1. **The notice requirement** - the notice to the affected person must identify the critical issues and contain sufficient information for the person to be able to participate meaningfully in the decision-making process.
2. **The fair hearing rule** - means that the affected person is given a reasonable opportunity to 'speak or respond' and also that the decision-maker genuinely considers the affected person's submission in making the decision.
3. **The lack of bias rule** - means the person making the decision must act impartially in considering the matter. Bias is a lack of impartiality for any reason and may be in favour of or against the affected person. It may arise from the decision maker having some financial or other personal interest in the outcome of the decision (conflict of interest), or giving the impression that they have prejudged the issue to be decided (prejudgment).

Comment [a1]: Think this discussion needs to be improved on

Bias can be actual or apprehended. Apprehended (or the appearance of) bias is judged by whether a fair-minded observer properly informed as to the nature of the proceedings or process might reasonably apprehend that the decision-maker might not bring an impartial or unprejudiced mind to the resolution of the issue.

STEP 3: Make the decision

Find and record the facts

After evidence is gathered, you should evaluate the evidence, asking yourself three main questions.

1. **Is the evidence relevant?**

Relevant evidence is information that is logically or reasonably related to the issue in question. All relevant evidence must be considered, not just the evidence which supports the finding you may want to make.

2. **Is the evidence reliable?**

The reliability of evidence concerns the credibility or weighting. Some criteria to check in terms of ensuring the reliability of the information include:

- a) Is it hearsay? That is, is it simply second or third hand information, based on what someone else has been told is correct?
- b) Is there contradictory evidence? If there are two pieces of evidence that contradict each other, you will have to make a determination as to which is the most correct.

3. **Is the evidence sufficient to prove a fact?**

The question of whether evidence is sufficient to prove a fact must be assessed in accordance with a legal standard. The *civil standard of proof* (on the *balance of probabilities*) applies to administrative decisions. As mentioned above, EPOs can be issued in a number of circumstances.

If you are issuing an EPO to secure compliance with conditions of a DA for example, you must ensure that you have gathered and recorded specific evidence that demonstrates that on the *balance of probabilities*, the condition of the DA has been breached. This will be met if you can successfully establish that the claim you are making is *more probable than not*.

Ensure you record all findings of fact and the explanation and the explanation and reasoning for them. Clearly identify and explain the findings of fact that 'turn the decision' by recording the evidence you considered, the evidence you accepted or preferred and your reasoning. Where there are contradictions, you will need to indicate which findings have certain weight.

Apply the law to the facts

Comment [a2]: Is this needed?

It is helpful in applying the law to the facts, by gaining an understanding of the purposes or objects of the legislation you are working with. The object of the EP Act (defined in section 3) is environmental protection within the context of ecologically sustainable development. To achieve this object the Act provides a wide range of tools including EPOs.

Reasonably exercise discretion

Generally, if legislation states that a power *may* be exercised, after proper consideration of all the relevant issues and the particular circumstances of the case, it is up to the decision maker whether or not to exercise the discretion for the decision to be made. However, the decision to exercise or not to exercise the discretion must be lawful and reasonable in the circumstances. As discussed above, the EP Act imposes mandatory statutory

requirements on a person responsible for the decision to issue an EPO. However, section 360(1)(c), says that the EPO:

- **May** impose a reasonable requirement to prevent or minimise environmental harm.

Section 360(2) also says that without limiting subsection (1)(c), an environmental protection order **may**

- Require the recipient to not start, or stop, a stated activity indefinitely, for a stated period or until further notice from the administering authority *or*
- Require the recipient to carry out a stated activity only during stated times or subject to stated conditions *or*
- Require the recipient to take stated action within a stated period.

Section 360(1)(c) and section 360(2)(a)-(c) give the decision maker the ability to impose requirements on the recipient of the EPO. To ensure that the requirements you impose on an EPO are lawful and reasonable, please refer to the *writing effective and enforceable conditions* procedural guide located on Ecosteps at <http://wwwhost.env.qld.gov.au/steps/references/pg-ip-writing-effective-enforceable-conditions.pdf>. The requirements of an EPO must be unambiguous and fixed at the date the EPO is issued for them to be enforceable. The procedural guide also helps to ensure that the requirements and conditions are enforceable by asking the person drafting them to consider whether they are SMART (Specific, Measurable, Achievable, Relevant and Time Specific).

Requiring compliance with an Australian Standard for example, is likely to be too general to be enforceable. However, requiring the remediation of land in accordance with the Queensland Government *'Instructions for the Treatment and Management of Acid Sulfate Soils, 2001'* is appropriate. In considering what a 'reasonable requirement' is, allow sufficient time for compliance with the EPO, notwithstanding that there may have been extensive discussions leading up to the issue of the EPO. An extension can also be granted at a later date to allow more time for compliance with the EPO.

When requesting action to be/not to be taken at a *premise/place*, provide a description or definition of the *premises*. For example use wording such as 'this Environmental Protection Order is issued in respect of activities of XXXX Pty Ltd at premises/place on land described as comprising Lot X situated at X Street, Queensland (the 'said premises').

It is important that EPO requirements have a time period by which they have to be completed and that this is stipulated clearly and that the action required is clear. For example use the words '*by x date, ensure that...*' rather than '*take action to ensure*'. If the source of the contamination is unknown then avoid using the word 'investigate' instead say 'identify the source of the contamination' and provide the administering authority with a report on the investigation and subsequently require 'the contamination to be contained' (if applicable).

The EPO requirements must also be able to stand alone. For example if there are a number of requirements, a due date should be set for each and should not be contingent upon the other requirements (even if they can only be implemented in succession). If there is a list of requirements then they should all be due at the same time.

STAGE 4: Communicate the decision

It's important that people affected by government decisions understand the reasons for a decision. They must also be advised of any available right of internal or external review and appeal. If a correct decision is badly communicated, then it is likely compliance will be generated. Effective communication of decisions and reasons can assist in preventing or reducing complaints.

Give meaningful and accurate reasons

The purpose of giving reasons for a decision is to enable the person affected by the decision:

- To understand why the decision was made
- To decide whether to seek a review of or to appeal against, the decision and to identify the grounds for the review or appeal

Even though it is not a requirement of the EP Act (and if you haven't already) include an accompanying cover letter containing facts and circumstances by which the grounds for issuing the EPO can be established. This helps to promote fairness, transparency and accountability in decision-making. The recipient should also be made aware of the penalties for not complying with the EPO. As such the following information should be included when communicating the decision you have made in issuing an EPO.

What is the penalty for non-compliance with an EPO?

As with all statutory tools, it is important that once an EPO is issued, you follow up to make sure that the person to whom it is issued is complying with its requirements. If they are not complying, you should take appropriate follow up action (which could range from an informal warning, to issuing a penalty infringement notice or recommending that a matter be referred to the Investigations Team for investigation with a view to possible court action).

It is an offence under the EP Act, specifically section 361(1), to contravene an EPO. The section is split into three provisions, an indictable offence provision i.e. wilful contravention of an EPO, a summary offence provision i.e. contravention of an EPO and finally an overarching provision which provides the court with the discretion to reduce the offence from indictable to summary should they choose to do so.³

The maximum penalty a court may impose on an individual who wilfully contravenes an EPO is 2,000 penalty units (\$200,000) or 2 years imprisonment.⁴ The maximum penalty a court may impose on an individual who contravenes an EPO is 1,665 penalty units or \$166,500.⁵

The maximum penalty a court may impose on a corporation who wilfully contravenes an EPO is 11,660 penalty units or \$1,166,000.⁶

The maximum penalty a court may impose on a corporation who contravenes an EPO is 8,325 penalty units or \$832,500.⁷

³ Section 361(1)(2)(3) of the *Environmental Protection Act 1994 (Qld)*

⁴ Section 361(2) of the *Environmental Protection Act 1994 (Qld)*

⁵ Section 361(3) of the *Environmental Protection Act 1994 (Qld)*

⁶ Section 361(2) of the *Environmental Protection Act 1994 (Qld)*, section 181B(3) of the *Penalties and Sentencing Act 1992 (Qld)* and under section 57A of the *Corporations Act 2001 (Cth)* defines a Corporation to include a company, body corporate and or an unincorporated body that under the law of its place of origin, may sue or be sued, or may hold property in the name of its secretary or of an office holder of the body duly appointed for that purpose.

⁷ Section 361(3) of the *Environmental Protection Act 1994 (Qld)* and section 181B(3) of the *Penalties and Sentencing Act 1992 (Qld)* and under section 57A of the *Corporations Act 2001 (Cth)* defines a Corporation to include a company, body corporate and or an unincorporated

What is the penalty for non-compliance with disclosure requirement?

In circumstances where a recipient of an EPO enters into an agreement with a third party to dispose of the place or business, the recipient must give written notice to the buyer of the existence of the EPO before any such agreement is reached.⁸ The recipient who disposes of the place or business must within 10 business days give written notice of the disposal to the administering authority.⁹ The maximum penalty a court may impose on an individual for failing to disclose such information is 50 penalty units (\$5,000) or 250 penalty units (\$25,000) for a corporation.¹⁰

What is the penalty for failing to cease an activity?

Where the administering authority has stipulated within an EPO that a recipient must discontinue a specific activity, the recipient must give written notice to the administering authority within ten (10) days of this discontinuance.¹¹ The maximum penalty a court may impose on an individual for failing to provide written notice is 50 penalty units (\$5,000) or 250 penalty units (\$25,000) for a corporation.¹²

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body body that under the law of its place of origin, may sue or be sued, or may hold property in the name of its secretary or of an office holder of the body duly appointed for that purpose.

⁸ Section 362(2) of the *Environmental Protection Act 1994* (Qld)

⁹ Section 363(6) of the *Environmental Protection Act 1994* (Qld)

¹⁰ Section 363(6) of the *Environmental Protection Act 1994* (Qld) and section 181B(3) of the *Penalties and Sentencing Act 1992* (Qld)

¹¹ Section 363 of the *Environmental Protection Act 1994* (Qld)

¹² Section 363 of the *Environmental Protection Act 1994* (Qld) and section 181B(3) of the *Penalties and Sentencing Act 1992* (Qld) and under section 57A of the *Corporations Act 2001* (Cth) defines a Corporation to include a company, body corporate and or an unincorporated body body that under the law of its place of origin, may sue or be sued, or may hold property in the name of its secretary or of an office holder of the body duly appointed for that purpose.

Environmental Protection Order

Environmental Services

Environmental Protection Order

This Environmental Protection Order is issued by the administering authority pursuant to section 358 of the Environmental Protection Act 1994.

<INSERT recipient's name>
<INSERT street address>
<INSERT suburb, State and postal code>

Your reference: <INSERT>
Our reference: <INSERT>

TAKE NOTICE that under the provisions of the *Environmental Protection Act 1994*, an Environmental Protection Order is issued to you by the administering authority. The administering authority is the Chief Executive of the Department of Environment and Resource Management (referred to below as the Department of Environment and Resource Management).

The Environmental Protection Order is issued in respect to the activities of <INSERT RECIPIENTS NAME> at <INSERT PREMISES/PLACE> on land described as Lot <INSERT> on SP <INSERT> situated at <INSERT ADDRESS> (the "said premises").

A. Grounds

The Environmental Protection Order is issued on the following grounds:

- <INSERT THE APPLICABLE GROUNDS FOUND UNDER SECTION 358 OF THE EP ACT>>
- <UNDER EACH GROUND INSERT THE FACTS AND CIRCUMSTANCES WHICH FORM THE FACTUAL BASIS FOR THE GROUND (BE SURE TO INCLUDE WHERE RELEVANT THE STANDARD CRITERIA)>

B. Requirements

In accordance with this Environmental Protection Order, you are required to do the following:

- <INSERT THE REQUIREMENTS YOU BELIEVE ARE NECESSARY FOR THE PERSON TO BE COMPLIANT, MAKE SURE THE REQUIREMENTS ARE REASONABLE, UNAMBIGUOUS, HAVE A FIXED TIMEFRAME AND ARE DIRECTLY RELATED TO THE GROUNDS MENTIONED ABOVE>

C. Penalty

The maximum penalty for failure to comply with an Environmental Protection Order is \$200,000 or 2 years imprisonment for an individual or \$1,000,000 for a company.

And also **TAKE NOTICE** that:

1. The requirements of this Order take effect immediately upon service of the Order.
2. Failure to comply with this Environmental Protection Order is an offence under the *Environmental Protection Act 1994 (Qld)*.
3. This Order remains in force until further notice from the administering authority.
4. You may apply for a review of or appeal against the decision to issue the Environmental Protection Order within ten business days of the service of the order. Information regarding the reviews and appeals are attached to this order.

Obligations

Should you propose to dispose of the place or business to which this Environmental Protection Order relates, you must advise the buyer of the existence of this Environmental Protection Order (Section 362).

Within 10 business days after ceasing to carry out the activity to which this EPO relates, you must give written notice of the ceasing to carry out the activity to the Department of Environment and Resource Management (Section 363) at <Insert delegate's name and address>.

Signature

<INSERT delegate's name>
<INSERT delegate's position>
Department of Environment and Resource Management

Date

Enquiries:
< INSERT project manager>
< INSERT address>
Telephone: < INSERT phone number>
Facsimile: < INSERT fax number>

PROCEDURE FOR REVIEWS AND APPEALS

Section 521 Procedure for review

- (1) A dissatisfied person may apply for a review of an original decision.
- (2) The application must-
 - (a) be made in the approved form to the administering authority within-
 - (i) 10 business days after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the "review date"); or
 - (ii) the longer period the authority in special circumstances allows; and
 - (b) be supported by enough information to enable the authority to decide the application.
- (3) On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision-
 - (a) notice of the application (the "review notice"); and
 - (b) a copy of the application and supporting documents.
- (4) The review notice must inform the recipient that submission on the application may be made to the administering authority within 5 business days after the application is made to the authority.
- (5) If the administering authority is satisfied the applicant has complied with subsection (2) and (3), the authority must within 10 business days after receiving the application -
 - (a) review the original decision; and
 - (b) consider any submissions properly made by a recipient of the review notice; and
 - (c) make a decision (the "review decision") to-
 - (i) confirm or revoke the original decision; or
 - (ii) vary the original decision in a way the administering authority considers appropriate.
- (6) The application does not stay the original decision.
- (7) The application must not be dealt with by-
 - (a) the person who made the original decision; or
 - (b) a person in a less senior office than the person who made the original decision.
- (8) Within 10 business days after making the review decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.
- (9) The notice must-
 - (a) include the reasons for the review decision; and
 - (b) inform the person of their right of appeal against the decision.
- (10) If the administering authority does not comply with subsection (5) or (8) the authority is taken to have made a decision confirming the original decision.
- (11) Subsection (7) applies despite the Acts Interpretation Act 1954, section 272.
- (12) This section does not apply to an original decision made by-
 - (a) for a matter, the administration and enforcement of which has been devolved to a local government - the local government itself or the chief executive officer of the local government personally; or
 - (b) for another matter-the chief executive personally.

Section 522 Stay of operation of original decisions

- (1) If an application is made for review of an original decision, the applicant may immediately apply for a stay of the decision to-
 - (a) for an original decision mentioned in schedule 2, part 1 – the Land Court; or
 - (b) for an original decision mentioned in schedule 2, part 2 – the Court.

- (2) The Land Court or the Court may stay the decision to secure the effectiveness of the review and any later appeal to the Land Court or the Court.
- (3) A stay may be given on conditions the tribunal or the Court considers appropriate and has effect for the period stated by the Land Court or the Court.
- (4) The period of a stay must not extend past the time when the administering authority reviews the decision and any later period the Land Court or the Court allows the applicant to enable the applicant to appeal against the review decision.

Section 531 Who may appeal

- (1) A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1 applies, may appeal against the decision to the Court.
- (2) The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.
- (3) A dissatisfied person who is dissatisfied with an original decision to which section 521 does not apply may appeal against the decision to the Court.

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Procedural guide

Environmental Evaluations

Environmental Evaluations (Audits and Investigations)

Environmental evaluations (audits and investigations) are dealt with under Chapter 7 Part 2 (ss321-329) of the Environmental Protection Act 1994 (EP Act). This procedural guide outlines when and how environmental audits and investigations should be undertaken.

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What are environmental evaluations?

An environmental evaluation is an evaluation of an activity or event to decide the source, cause or extent of environmental harm being caused or likely to be caused by the activity or event, and the need for a transitional environmental program for the activity or event.

The administering authority can conduct or commission environmental evaluations (audits and investigations)

When can environmental evaluations be used?

- Establish whether the environmental evaluation should be an audit (s322 of the EP Act) or an investigation (s323 of the EP Act).
- An environmental evaluation must be required by written notice in a certain format (see template below and s324 of the EP Act). The notice **must** state the **facts and circumstances** forming the basis of the grounds for requiring the environmental evaluation.
- A decision must be made whether or not to accept the environmental report within 20 business days of receipt of it (s 326 of the EP Act).
- The report submitted will form the basis for consideration of the appropriate regulation or control of the activity or event and the action taken by the authority (s 326 of the EP Act).
- The administering authority can extend the time to decide whether or not to accept the report. A failure to make a decision within the required time constitutes a refusal to accept the report.

An environmental evaluation could be just one step in the compliance strategy and there may end up being a prosecution. Review and appeal rights apply against a decision to require an environmental evaluation.

An environmental audit is to be used if the administering authority is satisfied on reasonable grounds that:

- the holder of, or a person (individual or corporation) acting under, an environmental authority (EA) is or has been contravening a condition of the EA;
- a person is, or has been, contravening a condition of a development approval (DA); or
- a person is, or has been, contravening an environmental protection policy or a transitional environmental program (TEP).

An environmental investigation is to be used if the administering authority is satisfied on reasonable grounds that:

- An event has happened causing environmental harm while an activity is being carried out; or
- An activity or proposed activity is causing, or is likely to cause, environmental harm.

Consider:

- Whether the Department of Environment and Resource Management has evidence of a problem but it is difficult to identify the source, cause or extent of the problem.
- The person carrying out the activity or event bears the time and cost of undertaking the evaluation.
- Ensure the grounds for requiring an environmental evaluation are well documented.

Notice to require an environmental evaluation, another environmental evaluation and additional relevant information

- The Notice must state (section 324)
 - grounds upon which requirement is made;
 - facts and circumstances of those grounds;

Environmental Evaluations (Audits and Investigations)

- relevant matters for the environmental evaluation or the information required;
- a reasonable period after which the information/report is required; and
- the review or appeal information.
- When drafting the requirements of the environmental evaluation, consider the level and type of detail you need i.e. information to decide the appropriate regulation or control of the activity or event.
- Be comprehensive enough to ensure you cover all the relevant matters, but do not require information that is not relevant to the event or activity in question.
- The amount of information required and the time given to produce the information.
- Review and appeal rights apply against a decision to require an environmental evaluation.
- See templates of Notice to Conduct/Commission an Environmental Investigation and Another Evaluation attached and the attached example below.

Assessing environmental reports

The administering authority may

- Require the commission of another environmental evaluation if satisfied the report does not adequately address the relevant matter for the environmental evaluation to which the report relates.
- Require the recipient to give it information if satisfied that more information is required

Consider

- The relevant matters for the environmental evaluation – see the Notice to Conduct the Environmental Evaluation.
- Whether there been a statutory declaration completed by the recipient and the person who carried out the environmental evaluation?
- Does the report adequately address the relevant matters for the environmental evaluation?
- Does the report address the issues in such a way to enable a decision regarding the appropriate method to regulate or control future activities or events of a similar nature?
- Is there a need to require a further environmental evaluation?
- Is there a need to require additional relevant information?

Options after accepting the environmental report:

After accepting the environmental report the administering authority may (section 326 EP Act):

- Where relevant, amend conditions of the EA.
- Require preparation and submission of a TEP.
- Where relevant, change or cancel a condition of the DA.
- Issue an environmental protection order (EPO).
- Any other action that is considered appropriate.

Links to useful forms and templates

- [Template Notice to Conduct/Commissions an Environmental Investigation](#)
- [Template Notice to Conduct another Environmental Evaluation](#)
- [Statutory Declaration – s325 of the Environmental Protection Act 1994 - Recipient](#)

- [Statutory Declaration – s325 of the *Environmental Protection Act 1994* – Auditor/Investigator](#)

Extracts from the *Environmental Protection Act 1994*

Declarations to accompany report

325.

- (1) An environmental report submitted to the administering authority must be accompanied by a statutory declaration by the recipient and the person who carried out the environmental evaluation.
- (2) The recipient's declaration must be made—
 - (a) if the recipient is an individual—by the recipient; or
 - (b) if the recipient is a corporation—by an executive officer of the corporation.
- (3) The recipient's declaration must state that the recipient—
 - (a) has not knowingly given any false or misleading information to the person who carried out the environmental evaluation; and
 - (b) has given all relevant information to the person who carried out the environmental evaluation.
- (4) A declaration by the person who carried out the environmental evaluation must—
 - (a) state his or her qualifications and experience relevant to the evaluation; and
 - (b) state that he or she has not knowingly included any false, misleading or incomplete information in the report; and
 - (c) state that he or she has not knowingly failed to reveal any relevant information or document to the administering authority; and
 - (d) certify that—
 - (i) the report addresses the relevant matters for the evaluation and is factually correct; and
 - (ii) the opinions expressed in it are honestly and reasonably held.

Procedure for review

521.

- (1) A dissatisfied person may apply for a review of an original decision.
- (2) The application must-
 - (a) be made in the approved form to the administering authority within-
 - (i) 10 business days after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the "review date"); or
 - (ii) the longer period the authority in special circumstances allows; and
 - (b) be supported by enough information to enable the authority to decide the application.
- (3) On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision-
 - (a) notice of the application (the "review notice");
 - (b) a copy of the application and supporting documents.
- (4) The review notice must inform the recipient that submissions on the application may be made to the administering authority within 5 business days after the application is made to the authority.
- (5) If the administering authority is satisfied the applicant has complied with subsection (2) and (3), the authority must, within 10 business days after receiving the application-
 - (a) review the original decision; and
 - (b) consider any submissions properly made by a recipient of the review notice; and
 - (c) make a decision (the "review decision") to-
 - (i) confirm or revoke the original decision; or
 - (ii) vary the original decision in a way the administering authority considers appropriate.
- (6) The application does not stay the original decision.
- (7) The application must not be dealt with by-
 - (a) the person who made the original decision; or
 - (b) a person in a less senior office than the person who made the original decision.
- (8) Within 10 business days after making the review decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.
- (9) The notice must-
 - (a) include the reasons for the review decision; and

(b) inform the person of their right of appeal against the decision.

(10) If the administering authority does not comply with subsections (5) or (8), the authority is taken to have made a decision confirming the original decision.

(11) Subsection (7) applies despite the *Acts Interpretation Act 1954*, section 27A.

(12) This section does not apply to an original decision made by-

- (a) for a matter, the administration and enforcement of which has been devolved to a local government - the local government itself or the chief executive officer of the local government personally; or
- (b) for another matter-the chief executive personally.

Stay of operation of original decisions

522.

(1) If an application is made for review of an original decision, the applicant may immediately apply for a stay of the decision to-

- (a) for an original decision mentioned in schedule 1, part 1 - the tribunal; or
- (b) for an original decision mentioned in schedule 1, part 2 - the Court.

(2) The tribunal or the Court may stay the decision to secure the effectiveness of the review and any later appeal to the tribunal or the Court.

(3) A stay may be given on conditions the tribunal or the Court considers appropriate and has effect for the period stated by the tribunal or the Court.

(4) The period of a stay must not extend past the time when the administering authority reviews the decision and any later period the tribunal or the Court allows the applicant to enable the applicant to appeal against the review decision.

Who may appeal?

531.

(1) A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1 applies, may appeal against the decision to the Court.

(2) The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.

(3) A dissatisfied person who is dissatisfied with an original decision to which section 521 does not apply may appeal against the decision to the Court.

Disclaimer

While this document has been prepared with care it contains general information and does not profess to offer legal, profession or commercial advice. The Queensland Government accepts no liability for any external decision or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently and by consulting their professional advisors before embarking on any proposed course of action.

Approved By



Signature

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Date

Manager Strategy and Planning
Compliance and Investigations
Department of Environment and Resource
Management

Enquiries:
Compliance and Investigations
Ph. 3330 5566
Fax. 3330 5634

Procedural Guide

Compliance & Investigations

Direction Notices

Direction notices are dealt with under Chapter 7, Part 5A of the Environmental Protection Act 1994 (“EP Act”). A direction notice is a useful enforcement tool which can be issued to a person to secure compliance in circumstances which relate to environmental nuisance, noise and water contamination.

What is a direction notice:

A direction notice is a statutory enforcement tool made available to only those persons authorised under the EP Act. The purpose of a direction notice is to provide the person receiving it with an opportunity to remedy the situation before any further action is taken. Direction notices can be applied to offences relating to prescribed provisions which include environmental nuisance, noise standards and prescribed water contaminants (section 363A of the EP Act).

Who may issue a direction notice:

An authorised person under the EP Act may issue a direction notice. Before doing so, check whether your office has any business rules governing the issuing of direction notices. Local government has devolved responsibility to deal with environmental nuisance complaints and breaches of noise standards or the water contaminant provisions. DERM officers will only be required to respond where a government entity is involved or the local government has failed to respond.

Who is it appropriate to issue a direction notice to:

A direction notice should be issued to the person who is identified as being immediately responsible for the contravention of the specific prescribed provision. A “person” may be an individual, a number of individuals or a corporation.

The authorised person is required to serve the direction notice on a person via registered post or in person as this will provide DERM with confirmation that the notice has been received.

When should a direction notice be issued:

An authorised person may issue a direction notice where there has been a contravention of a prescribed provision; or a contravention that makes it likely that the contravention will continue or be repeated if

- the matter relating to the contravention can be remedied; and
- it is appropriate to give a person the opportunity to remedy the matter.

An authorised person must be able to establish with the use of credible evidence, the legal elements required before issuing a direction notice. Officers need to substantiate who is responsible for the site and its operations and whether there has been a contravention of a prescribed provision.

Contravention of a prescribed provision

There are three prescribed provisions environmental nuisance (section 440 EP Act), noise standards (section 440Q EP Act) and prescribed water contaminants (section 440ZG EP Act).

Where a contravention of these prescribed provisions has resulted in serious or material environmental harm, a direction notice is not available and other enforcement tools contained in the EP should be considered.

Environmental nuisance

Environmental nuisance is defined as an unreasonable interference or likely interference with an environmental value such as ecological health, public safety or public amenity (section 15 of the EP Act) caused by aerosols, fumes, light, noise, odour, particles or smoke (section 440 of the EP Act).

Schedule 1 of the EP Act lists the exclusions to offences pertaining to environmental nuisance. These exclusions include environmental nuisance:

1. caused by safety and transport noise;
2. caused by government activities and public infrastructure;
3. covered under;
 - a. a local law;
 - b. Police Powers and Responsibilities Act 2000, Chapter 19, Part 3;
 - c. Workplace Health and Safety Act 1995, section 9;
 - d. the Public Health Act 2005, section 11;
 - e. approval under the Integrated Planning Act 1997 that authorises EN;
 - f. fireworks display under the Explosives Act 1999;
 - g. Tobacco and Other Smoking Products Act 1998; or
 - h. Major Sports Facility Act 2001, section 30A.
4. caused by animal noise from a non-domestic animal; and
5. caused by a domestic cooking odour

In deciding whether to issue a direction notice for environmental nuisance an authorised person should do the following:

1. identify the source and level of nuisance;
2. identify the general emissions criteria contained in section 363C(3) of the EP Act; and
3. where the contravention of environmental nuisance has resulted from aerosols, fumes, light, odour and or particles of smoke, compare the source and level of the nuisance with the general emissions criteria (section 363C(3) of the EP Act); or
4. where the contravention of environmental nuisance has resulted from noise, compare the source and level with the noise emissions criteria (section 363C(4) of the EP Act);
5. if the level of nuisance is unreasonable, determine whether or not the source and level of nuisance can be remedied; and
6. whether it is appropriate to give the person an opportunity to remedy the situation.

Environmental noise standards

Noise is characterised to include vibrations of any frequency, whether emitted through air or another medium. It is the local government's responsibility to enact local law's which prohibit the making of certain noises or prescribing noise standards for their particular area (section 440O of the EP Act). In areas which do not contain prescribed noise standards there are default noise standards.

These are listed in sections 440R to 440ZC of the EP Act and have been specified for:

1. building work;
2. regulated devices;
3. pumps;
4. air conditioning equipment;
5. refrigeration equipment;
6. indoor venues;
7. open air vents;
8. amplifier devices;
9. power boats, sports and power boat engines;
10. blasting; and
11. shooting ranges.

If a local government prescribed standard exists then the local government of the area is responsible for enforcing that standard.

In deciding whether to issue a direction notice for a breach of noise standards an authorised person should do the following:

1. identify the source and level of noise;
2. identify the relevant prescribed standards and/or the standards for noise listed in section 440R to 440ZC of the EP Act;
3. compare the levels of noise found on or outside the site with the relevant levels prescribed under the EP Act;
4. if the levels exceed the prescribed level, determine whether or not the source and level can be remedied; and
5. decide whether it is appropriate to give the person an opportunity to remedy the situation.

Prescribed water contaminants

A prescribed water contaminant includes earth, defined as sand, soil, silt or mud (section 440ZD of the Act) or a contaminant listed under schedule 9 of the Environmental Protection Regulation 2008.

A person must not deposit a prescribed water contaminant into water, or into a roadside gutter or stormwater drain, or into a place where the contaminant could reasonably be expected to enter water, a roadside gutter or storm water drain (section 440ZG of the EP Act). In addition a person must not unlawfully release stormwater run-off into water, a roadside gutter or stormwater drainage if that release will result in the build up of earth in water, a roadside gutter or stormwater drain.

The term deposit includes drop, place, throw, release and expose (section 440ZE of the EP Act). A depositor of a contaminant includes the occupier of the premises or the person who is in control of the contaminant, who is aware the contaminant has been deposited.

In deciding whether to issue a direction notice to a depositor of a prescribed water contaminant an authorised person should do the following:

1. determine whether the contaminant found in the water is a prescribed contaminant;
2. identify the depositor of the contaminant;
3. determine whether or not the source and pollution can be remedied; and
4. decide whether it is appropriate to give the person an opportunity to remedy the situation.

Form and content of a direction notice:

A direction notice must state the following (section 363D of the EP Act):

1. the authorised person believes the person:
 - a. is contravening a prescribed provision;
 - b. has contravened a prescribed provision in circumstances that make it likely the contravention will continue or be repeated;
2. the particular prescribed provision the authorised person believes is being, or has been, contravened;
3. how it is believed the prescribed provision is being or has been contravened;
4. the time by which the person must remedy the contravention, the time allowed must be reasonable with regard to:
 - a. the action required to remedy the contravention;
 - b. the risk to human health or the natural environment, or risk of loss or damage to property, posed by the contravention; and
 - c. how long the person has been aware of the contravention, for example, because an authorised person has previously made an oral requirement that the contravention be remedied.
5. that it is an offence to fail to comply with the direction notice unless the person has a reasonable excuse;
6. the maximum penalty for failing to comply with the direction notice; and
7. review of appeal details.

The direction notice may also state the reasonable steps the authorised person considers necessary to remedy the contravention, or avoid further contravention, of the prescribed provision.

Please click [here](#) to access a direction notice for you to complete.

The notice should be sent by registered post to the registered office of the business or for an individual to the last known address of that individual. If a company's registered office is different to its business premises, it might also be appropriate to send a copy to the business premises.

If it is not practicable to issue a written notice then a requirement to remedy the contravention may be made orally however; it should be confirmed by a direction notice as soon as possible.

Offence and Penalties

It is an offence under section 363E of the EP Act not to comply with a direction notice without a reasonable excuse. The maximum penalty for non-compliance is 300 penalty units for an individual or five times the maximum for a corporation.

Defences:

A person must comply with the notice unless there is a reasonable excuse for not complying with it.

Example of when to issue a direction notice:**Scenario:****Facts:**

DERM receives a noise complaint from a property owner adjacent to a site owned by a government entity. Noise testing is conducted on the site and on properties adjacent to the site to determine the cause and level of noise. The cause is a generator and the level of noise has been calculated.

DERM Response:

- DERM has jurisdiction to investigate the government owned entity.
- DERM should identify any relevant prescribed noise standards or default noise standards.
- If the level of noise is above the relevant standards, the site is in breach of a prescribed provision.
- DERM must then determine whether to issue a direction notice taking into consideration the following:
 - whether or not the breach can be remedied; and
 - whether it is appropriate to provide the person with an opportunity to remedy the situation.

Environmental Services

Direction Notice

This statutory notice is issued by an authorised person pursuant to section 363D of the Environmental Protection Act 1994, to advise you of a decision that requires you to remedy a contravention of a prescribed provision.

<INSERT recipient's name>
<INSERT street address>
<INSERT suburb, State and postal code>

Your reference: <INSERT>

Our reference: <INSERT>

TAKE NOTICE that under the provisions of the *Environmental Protection Act 1994* a Direction Notice is issued to you by <INSERT authorised person's name>, an authorised person under the *Environmental Protection Act 1994*.

The Direction Notice is issued to <<Name of person/entity>> in respect of the activities at <<State premises/place>> on land described as <<select ONE ONLY>> Lot ## on RP ##### situated at address OR description of locality e.g. causeway of Xyz Highway over Abc Creek to remedy a contravention of a prescribed provision.

A. Grounds

The Direction Notice is issued on the following grounds:

<<SELECT ONE OF THE FOLLOWING TWO GROUNDS AND DELETE THE OTHER>>

- <<State name of person/entity>> is contravening a prescribed provision being <<select ONE ONLY>> section 440 / 440Q / 440ZG of the *Environmental Protection Act 1994*; or
- <<State name of person/entity>> has contravened a prescribed provision being <<select ONE ONLY>> section 440 / 440Q / 440ZG of the *Environmental Protection Act 1994* in circumstances that make it likely that the contravention will continue or be repeated.
- The facts and circumstances forming the basis of these grounds are:

Briefly describe how the prescribed provision is being, or has been, contravened.

If contravention of section 440 (environmental nuisance), including consideration of the general emission criteria (as stated in section 363C(3)) and having regard to those criteria consider whether it would be appropriate to issue a Direction Notice or first try and resolve the matter in another way. If the contravention of section 440Q (contravening a noise standard) state which Default Noise Standard applies.

If the nuisance relates to noise, and there are no Default Noise Standards for that noise, the offence is contravention of section 440; or if there is a Default Noise Standard for that noise and the person is complying with the Default Noise Standard, but the administering authority believes that environmental nuisance is still being caused, consider the general emission criteria (as stated in section 363C(3)), the noise emission criteria (as stated in section 363C(4)) and having regard to those criteria whether it would be appropriate to issue the Direction Notice first or resolve the matter in another way.>>

B. Requirements

Pursuant to this Direction Notice you are required to perform the following actions by the time indicated for each action:

- (1) <<State action and time>>;
- (2)

C. Penalty

The maximum penalty for failure to comply with a Direction Notice is \$30,000 for an individual or \$150,000 for a company.

AND also **TAKE NOTICE** that:

- 1. The requirements of this Notice take effect immediately upon service of the Notice.
- 2. Failure to comply with this Direction Notice, without reasonable excuse, is an offence under the *Environmental Protection Act 1994*.
- 3. You may apply for a review of or appeal against the decision to issue the Direction Notice within ten (10) business days of the service of the Notice. Information regarding the reviews and appeal are attached to this Notice.

Signature

<INSERT authorised person's name>
<INSERT authorised person's position>
Authorised person under the
Environmental Protection Act 1994

Enter date here

Date

Enquiries:
Department of Environment and Resource
Management
Ph. <INSERT contact phone number>
Fax. <INSERT contact fax number>

EXTRACTS FROM THE ACT REGARDING REVIEWS AND APPEALS

- 521**
- (1) A dissatisfied person may apply for a review of an original decision.
 - (2) The application must-
 - (a) be made in the approved form to the administering authority within-
 - (i) 10 business days after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the "**review date**"); or
 - (ii) the longer period the authority in special circumstances allows; and
 - (b) be supported by enough information to enable the authority to decide the application.
 - (3) On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision-
 - (a) notice of the application (the "**review notice**"); and
 - (b) a copy of the application and supporting documents.
 - (4) The review notice must inform the recipient that submission on the application may be made to the administering authority within 5 business days after the application is made to the authority.
 - (5) If the administering authority is satisfied the applicant has complied with subsection (2) and (3), the authority must within 10 business days after receiving the application -
 - (a) review the original decision; and
 - (b) consider any submissions properly made by a recipient of the review notice; and
 - (c) make a decision (the "**review decision**") to-
 - (i) confirm or revoke the original decision; or
 - (ii) vary the original decision in a way the administering authority considers appropriate.
 - (6) The application does not stay the original decision.
 - (7) The application must not be dealt with by-
 - (a) the person who made the original decision; or
 - (b) a person in a less senior office than the person who made the original decision.
 - (8) Within 10 business days after making the review decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.
 - (9) The notice must-
 - (a) include the reasons for the review decision; and
 - (b) inform the person of their right of appeal against the decision.
 - (10) If the administering authority does not comply with subsection (5) or (8) the authority is taken to have made a decision confirming the original decision.
 - (11) Subsection (7) applies despite the *Acts Interpretation Act 1954, section 27A*.
 - (12) This section does not apply to an original decision made by-
 - (a) for a matter, the administration and enforcement of which has been devolved to a local government - the local government itself or the chief executive officer of the local government personally; or
 - (b) for another matter-the chief executive personally.
 - (13) **Also, this section does not apply to an original decision to issue a clean-up notice.**

Who may appeal

- 531**
- (1) A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1 applies, may appeal against the decision to the Court.
 - (2) The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.

- (3) A dissatisfied person who is dissatisfied with an original decision to which section 521 does not apply may appeal against the decision to the Court.

Clean-up Notice

The purpose of this procedural guide is to provide officers with an overview of the clean-up notice provisions found under chapter 7, part 5B of the Environmental Protection Act.

What is a clean-up notice:

A clean-up notice is an enforcement tool contained under chapter 7, part 5B of the *Environmental Protection Act 1994* ("EP Act"). It is issued by the administering authority in response to a contamination incident which has resulted in material or serious environmental harm. A clean-up notice may require a person to take any of the following stated action:

- Prevent or minimise the contamination.
- Rehabilitate or restore the environment because of the incident, including by taking steps to mitigate or remedy the effects of the incident.
- Assess the nature and extent of the environmental harm, or the risk of further environmental harm, from the incident, including by inspecting, sampling, recording, measuring, calculating, testing or analysing.
- Keep the administering authority informed about the incident or the actions taken under the notice, including by giving to the administering authority stated reports, plans, drawings or other documents.

Who can issue a clean-up notice:

A delegate of the administering authority can issue a clean-up notice. Ensure that the person issuing the notice has the delegation to do so by checking the delegations on the DERM's Intranet.

Who can be issued with a clean-up notice:

The administering authority may issue a clean-up notice to a prescribed person for a contamination incident. A prescribed person is defined in section 363G of the EP Act to include any of the following:

1. a person, causing or permitting, or who caused or permitted the incident to occur;
2. a person who at the time of the incident, is or was,
 - a. the occupier of a place at or from which the incident is happening or happened; or
 - b. the owner, or person in control, of a contaminant involved in the incident;
3. if a clean-up notice is issued to a corporation (the first corporation) in relation to the incident and if it fails to comply with the notice,
 - a. a parent corporation of the first corporation; and
 - b. an executive officer of the first corporation.

An “occupier of the place” is defined in schedule 4 of the EP Act to mean the person apparently in charge of the place. “Place” is defined to include premises, another place on land or a vehicle.

A “parent corporation of another corporation” is defined as a corporation of which the other corporation is a subsidiary under the Corporations Act.

When a clean-up notice can be issued:

The administering authority may issue a written clean-up notice to a person whom the administering authority believes to be a prescribed person for a contamination incident. A contamination incident is *an incident involving contamination of the environment, that the administering authority is satisfied has caused or is likely to cause serious or material environmental harm* (section 363F of the EP Act).

In order for a clean up notice to be issued there needs to be contamination of the environment causing:

- serious environmental harm or;
- material environmental harm.

What is contamination of the environment:

A contamination of the environment is defined as *the release (whether by act or omission) of a contaminant into the environment* (section 10 of the EP Act). A contaminant is defined broadly to include a *gas, liquid, solid, odour, organism (whether alive or dead) including a virus, energy, including noise, heat, radioactivity, electromagnetic radiation or a combination of contaminants* (section 11 of the EP Act).

What is material environmental harm:

Material environmental harm is defined in section 16 of the EP Act as *environmental harm, other than environmental nuisance that is:*

1. *not trivial or negligible in nature, extent or context; or*
2. *that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount (\$5000), but less than the maximum amount (\$50,000); or*
3. *that results in costs of more than the threshold amount but less (\$5000) that the maximum (\$50,000) amount being incurred in taking appropriate action to*
 - a. *prevent or minimise harm; and*
 - b. *rehabilitate or restore environment to its condition before the harm.*

To determine whether a contamination incident is trivial or negligible in nature, officers are required to consider the context of the contamination incident and its associated long term effects on the environment. For example if a dam containing hazardous waste was to overflow into its surrounding area, the characterisation of the harm would depend upon the nature of the surrounding area, the amount of waste that overflowed and the prevention/rehabilitation measures available. If the prevention/rehabilitation costs amount to a figure between \$5,000 and \$50,000 then the incident can be classed as causing material environmental harm.

What is serious environmental harm:

Serious environmental harm is defined in section 17 of the EP Act as *environmental harm, other than environmental nuisance,*

1. *that is irreversible, of a high impact or widespread; or*

2. *caused to an area of high conservation value or special significance; or*
3. *that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount (\$50,000); or*
4. *that results in costs of more than the threshold amount (\$50,000) being incurred in taking appropriate action to,*
 - a. *prevent or minimise harm, and*
 - b. *rehabilitate or restore the environment to its condition before harm.*

To determine whether a contamination incident should be classed as irreversible, of a high impact or widespread, officers should consider the context of the contamination incident and its associated long term effect on the environment. For example if a transportation vehicle releases a toxic contaminant, such as hazardous wastewater and the contaminant then flows into a watercourse the characterisation of such harm would depend upon the amount of hazardous wastewater released, the nature of the watercourse and the prevention/rehabilitation measures available. If the cost of prevention/rehabilitation amounts to more than \$50,000 then the incident can be classified as causing serious environmental harm.

Form and content of a clean-up notice:

The clean-up notice must state the following:

1. the name of the recipient, (if there is more than one recipient, each recipient must receive a notice);
2. a description of the contamination incident;
3. the place at or from which the administering authority is satisfied the incident is happening or has happened;
4. the actions the recipient must take;
5. for each action, the time by which it must be taken, (the time in which the recipient is required to complete an action must be reasonable given the circumstances, the specific action required to be taken and the risk of harm or further harm from the incident);
6. that it is an offence for the recipient not to comply with the notice unless the recipient has a reasonable excuse;
7. the maximum penalty for the offence;
8. that, if the recipient does not comply with the notice, an authorised person may take any of the action stated in the notice and the administering authority may recover from the recipient the costs incurred in taking the actions;
9. the name, address and contact details of the administering authority; and
10. the review or appeal details.

The notice may also include any other information the administering authority considers appropriate.

Please click [here](#) to access a clean-up notice for you to complete.

The notice should be sent by registered post to the registered office of the business or for an individual to the last known address of that individual. If a company's registered office is different to its business premises, it might also be appropriate to send a copy to the business premises.

Offence and penalty:

It is an offence under section 363I EP Act not to comply with a clean-up notice without a reasonable excuse. The maximum penalty for non compliance is 2000 penalty units or 10,000 penalty units for a corporation.

Defences:

The recipient of a clean-up notice must comply with the notice, unless the recipient has a reasonable excuse. It is a reasonable excuse not to comply with a notice if it requires information that might incriminate the person to whom it was issued (section 363I EP Act).

It is also a defence if the recipient can show that:

1. the recipient is not the prescribed person for the contamination incident;
2. the relevant contamination incident was caused by a natural disaster;
3. the relevant contamination incident was caused by a terrorist act or some other type of sabotage by a person other than the recipient;
4. the recipient had taken all measures it would be reasonable for the recipient to have taken to prevent the incident, having regard to all the circumstances including the inherent nature of the risk and the nature of the recipient's connection with the incident;
5. if the recipient is the parent corporation, that it took all reasonable steps to ensure the first corporation complied with the notice served on the first corporation; or
6. if the recipient is an executive officer of the first corporation,
 - a. that the person took all reasonable steps to ensure the first corporation complied with the notice served on the first corporation; or
 - b. the person was not in a position to influence the conduct of the first corporation in relation to its compliance with the notice on the first corporation.

Examples of when to issue a clean-up notice:**Scenario:**

A transport company by the name of T Transport is carrying a variety of hydrocarbons manufactured by a petrol company named P Industries. T Transport's vehicle is involved in an accident. The hydrocarbons stored in the vehicle then leak out into a stormwater drain and surrounding land. The Department receives a phone call informing it of the incident. Officers investigate and find that the hydrocarbons are contained in crude oil which was being transported by T Transport. In addition local government plans indicate that the stormwater drain is a main drain which is responsible for distributing water into an ecologically sensitive river.

In the next few hours, the Department obtains quotes with respect to preventative and rehabilitation measures which can be taken. The quotes are around \$35,000.00.

Compliance response:

- Officers should investigate the matter and gather relevant evidence
- In deciding whether to issue a clean-up notice DERM should confirm that crude oil containing hydrocarbons fits within the definition of a contaminant under section 11 EP Act and characterise the harm.

- In this case the harm would constitute material environmental harm as the cost of preventative and rehabilitation measures is above the threshold amount but less than the maximum amount under section 16 EP Act.
- DERM should identify the prescribed person, in this case P Industries or T Transport, and issue them with a clean-up notice. It may be better to issue P Industries with the notice as they may have the requisite level of experience and funding to undertake the clean-up.

Disclaimer

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently and by consulting their own professional advisors before embarking on any proposed course of action.

Approved By:

[Redacted Signature]

17/12/09

Manager Strategy and Planning
Department of Environment and Resource
Management

Enquiries:
Strategy and Planning Team
Compliance and Investigations Branch
Ph: **3330 5560**

Compliance Program Scheduled Notice

Compliance and Support

Suggested Text – Compliance Program Scheduled Inspection Notice

The purpose of this procedural guide is to provide officers with a suggested body of text with respect to a Compliance Program Scheduled Inspection Notice. Officers are required to copy and paste the below text and insert the text into the current Departmental provided letter template. In addition, officers are required to insert relevant details into the suggested body of text, where necessary. If officers using this template require further assistance, please contact the Compliance and Investigations Branch.

RE: Compliance Inspection to be conducted for <INSERT activity> at <INSERT premises>

Officers of the Department of Environment and Resource Management are conducting compliance inspections as part of the compliance inspection program. The compliance inspection program is a pro-active system for measuring environmental compliance during the operational stage of an environmentally relevant activity.

DERM officers will be visiting your site on <insert date – suggested 14 days notice for large or remote sites> to conduct a compliance inspection in regards to your <insert either License/Development Approval> issued under the <insert either *Environmental Protection Act 1994/Integrated Planning Act 1997*>.

Please arrange to have the appropriate company personnel on site for this inspection, and have all environmental records and documents available for inspection. DERM officers will enter the premises at a reasonable time and complete the inspection as promptly as possible. Because of the scale of the activity the environmental inspection will take <insert timeframe>.

Should you require any further information regarding this matter, or if you foresee any difficulties meeting the requirements of this notice, please contact DERM officer <insert name of officer> on <insert phone number>.

Assessment Report

Environmental Protection Act 1994

Assessment of a transitional environmental program (TEP)

This document will assist users in critically evaluating the content of a draft TEP and make a decision to either to approve (with or without conditions) or refuse the draft TEP.

Identifying details	
Compliance activity number	
Ecotrack number	
Permit number	
File number	
Applicant name	
Registered office or place of business	
Date draft TEP received.	<i>Note: The department has 20 business days in which to make a decision in relation to the draft TEP.</i>

Note:

1. Assessment reports recommending a decision be made are to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading.
3. The report is to be endorsed by the investigating officer, supervisory review and the delegated decision maker.

1. Brief history of the matter.

Please briefly outline any historical information relevant to this decision.

<Provide historical information relating to the matter.>

2. Criteria and considerations in assessing the content of a draft TEP.

Will the draft TEP, if approved, achieve compliance with the *Environmental Protection Act 1994* (the Act) by reducing environmental harm or detailing the transition to an environmental standard?

Yes.

No.

<If the answer is yes, provide a brief summary><If the answer is no, then provide details of concerns/issues.>

Does the draft TEP clearly set out the objectives that will be achieved and maintained under the program?

- Yes.
 No.

<If the answer is yes, provide a brief summary><If the answer is no, then provide details of concerns/issues.>

Does the draft TEP clearly set out the proposed actions to achieve the stated objectives, including the date by which each action will be completed?

- Yes.
 No.

<Consider whether there is sufficient information provided in relation to each proposed action to allow the department to be able to clearly determine whether or not it has been carried out. Is each action specific about what will be done and is performance of the action able to be measured? Does each action have a due date for completion?>

Does the draft TEP take into account best practice environmental management for the activity?

- Yes.
 No.

Note: Refer to s21 of the Act for more information about best practice environmental management.

<If the answer is yes, provide a brief synopsis of how the draft program address this><If the answer is no, then list how the draft TEP does not address this.>

Have all of the risks of environmental harm associated with the activity been appropriately identified and addressed by the proposed actions?

- Yes.
 No.

Note: The draft TEP should contain sufficient detail on how each risk will be prevented or minimised including what specific interim measures are to be implemented and how these will be measured.

<If the answer is yes, provide details in relation to each risk identified><If the answer is no, provide details of how these matters have not been addressed in relation to each risk>

If the draft TEP has been prepared to transition an activity to comply with a condition of a development approval or environmental authority, is each condition that has been breached addressed by the proposed actions?

- Yes.
 No.
 Not applicable.

Note: There should be sufficient information provided in the draft TEP to show how the activity does not comply at present and detail how compliance with the condition will be achieved by the end of the program.

<If the answer is yes, provide summary on how this will be achieved for each condition> <If the answer is no, list which conditions have not been addressed>

If the draft TEP has been prepared to transition an activity to meet an environmental standard, has each standard been appropriately identified and addressed by the proposed actions?

- Yes.
 No.
 Not applicable.

<If the answer is yes, provide summary on how this will be achieved> <If the answer is no, list which standards have not been addressed>

If the draft TEP is prepared because of a requirement of a condition of a development approval or environmental authority, has the program been checked for inconsistencies with other conditions of the approval or authority?

- Yes.
 No.
 Not applicable.

<If the answer is yes, provide summary on how this will be achieved> <If the answer is no, list which standards have not been addressed>

Is end date of the TEP clearly stated?

- Yes.
 No.

Note: The date on which the TEP will expire should be clearly stated. Consideration should also be given to the viability of the timeframe proposed to achieve the objectives of the program.

<If the TEP was submitted in response to a written notice from the department, does the term in the TEP meet the requirements as set out in the notice?>

Have appropriate performance indicators at intervals of not more than 6 months been included in the draft TEP?

- Yes.
 No.

Note: The performance indicators must be clearly defined and measurable and set out the date on which each indicator will be assessed.

Does the draft TEP provide for sufficient monitoring and reporting on compliance with the program?

- Yes.
 No.

Note: Specific details on the frequency and level of the monitoring and reporting must be provided e.g. what information should be given to the department and when.

Is the proposed monitoring sufficient to allow the company and DERM to assess progress with the TEP, and to assess compliance with the requirements of the TEP?

- Yes.
 No.

Is the draft TEP acceptable in terms of any relevant regulatory requirements?

Yes.

No.

Note: Regulatory requirements are set out in ss46-64 of the Environmental Protection Regulation 2008 and may also be contained in environmental protection policies.

If the answer is yes, provide brief details on which regulatory requirements were considered and why the draft TEP is acceptable how this will be achieved.

If the answer is no, provide brief details of which regulatory requirements were considered and why the draft TEP is not acceptable.

<Answer>

Is the draft TEP acceptable in terms of the standard criteria?

Yes.

No.

For each of the standard criteria, provide brief details of your assessment of the draft TEP. If a criterion is not applicable, write 'N/A'.

Standard criteria	Detailed comments
Ecologically sustainable development	
Environmental protection polices (EPPs)	
Plans, standards or agreements	
Environmental impact study, assessment or report	
Receiving environment	
Submissions made by the applicant and submitters	
Best practice environmental management	
Financial implications	
Public interest	
Site management plan	
Environmental management systems (IEMS)	

Has all additional information given in relation to the draft TEP been considered?

Yes.

No.

Not applicable.

If the answer is yes, provide brief notes on the information contained within the additional documents e.g. do they recommend further investigations or propose specific works that have been incorporated into the draft TEP.

If the answer is no, list reasons why.

<Answer>.

If applicable, have any views expressed at a conference held in relation to the draft program been considered?

Yes.

No.

Not applicable.

< If the answer is yes, provide brief notes on the information provided.>

Are you satisfied that the draft TEP meets all of the requirements of the Act and should be approved?

If the answer to all of the above questions was “Yes” or “Not applicable”, the draft TEP may be approved. If the answer to any question about was “No”, the draft TEP may not be approved.

Yes - Proceed to section 3.

No - Proceed to section 4.

3. If you are satisfied with the draft TEP.

Prior to making a recommendation to issue a certificate of approval it is important to bear in mind that the Act stipulates that the draft TEP be a program that achieves compliance with the Act for the matters dealt within it.

If the draft TEP does **NOT** meet the requirements of the Act it must be refused. Whilst the Act does make provision for the approval to be subject to conditions, the conditions should address relatively minor issues only. Conditions on a certificate of approval must not be used to rectify significant issues with a draft TEP.

A certificate of approval must be issued within 8 business days of making the decision to approve the TEP. If the approval is subject to conditions, an information notice about the decision to impose conditions must also be provided.

Certificate of approval checklist.

- Does the certificate of approval identify the documents forming the approved TEP, including any amendments under s339(1)(a)?
- Does the certificate of approval specify any conditions imposed?
- Does the certificate of approval state the date the approval ends?
- If conditions have been added, has an information notice been drafted?

4. If administrating authority is not satisfied with the draft TEP.

If a decision is made to refuse the draft TEP, an information notice must be given to the person or public authority that submitted the program. The information notice should include:

- the reasons for the decision.
- any available rights of internal and external review.

5. Provide for natural justice.

If you are making a decision that is not the decision requested by the person or company submitting the TEP (for example, to refuse to approve the draft TEP), summarise below any submissions put forward by the person or company in favour of the draft TEP and your response to those submissions.

<List any submissions made.>

<State the reasons why you accept or reject the submissions.>

Are the decision maker and recommending officer free from bias or the perception of bias?

Yes.

No.

<If the answer is no, the person should not be involved in recommending or making a decision about the draft TEP.>

6. Recommendation.

The recommending officer is required to make a recommendation in relation to the draft TEP.

Recommendation:.

<For example, "I recommend that the draft TEP be approved OR I recommend that the draft TEP be approved with the amendments agreed in the letter to the company dated dd/mm/yyyy OR I recommend that the draft TEP be refused".>

7. Endorsement

Recommending officer	Supervisory review
Print name:	Print name:
Date:	Date:

Delegated decision maker	Approve / Reject recommendation (circle one)
Reasons for decision.	
Print name:	
Date:	

Procedural Guide

Environmental Protection Act 1994

Program notices

The purpose of this guide is to provide officers with guidance on what to do if a program notice under s350 of the Environmental Protection Act 1994 is received by the Department of Environment and Resource Management.

What is a program notice?

A program notice is a notice given by a person (or company) to the Department of Environment and Resource Management (the department) about:

- an act or omission
- that has caused or threatened environmental harm
- in the course of carrying out an activity by the person
- that is lawful apart from the *Environmental Protection Act 1994* (the Act).

This means that for a person to be able to submit a program notice, they must have done something or failed to do something that has caused or threatened environmental harm. If there is no environmental harm or threat of environmental harm, a person cannot submit a program notice. The activity must also be lawful (apart from anything that the Act makes unlawful). This means that a program notice cannot be submitted for an activity that needs to be authorised by other legislation but is not actually authorised.

What must a program notice contain?

A program notice must be in the approved form and contain all of the following:

- full details of the act or omission that has caused or threatened environmental harm
- a declaration that the person intends to prepare and submit a transitional environmental program (TEP).

What is the effect of a program notice?

If a person submits a program notice, it has the following effects:

- The program notice itself and any documents submitted with the program notice, are not admissible in evidence against the person submitting the program notice in a prosecution for any offence revealed by the program notice. **However, the program notice does not stop other evidence from being gathered and then used against the person.**
- The person cannot be prosecuted for any offence revealed by the program notice until one of the following events happen:

- The person receives an approval from the department for a TEP that addresses the matters set out in the program notice (if the person receives an approval, they are then authorised to do or not do the actions set out in the TEP even if those actions would otherwise breach the Act).
- The person receives from the department a notice of refusal to approve a TEP that addresses the matters set out in the program notice.
- The person fails to submit to the department a draft TEP by the date specified by the department.

In summary, the program notice gives a person protection while they are developing a TEP. If the department approves the TEP, then the person has the normal protection given by a TEP. If, however, the person does not submit a draft TEP or submits a draft TEP that is refused by the department, the department may still prosecute the person for the original incident. It is also important to note that the department may take other compliance or enforcement action against the person (such as issuing an environmental protection order (EPO) or a penalty infringement notice (PIN)) even if a program notice is submitted. The information in the program notice can be used to support an EPO, PIN, or other statutory tool.

The department is able to apply to the Planning and Environment Court for an order setting aside the person's immunity from prosecution. The court may set aside the immunity in certain circumstances – if the offence revealed by the program notice was wilful and done with the intention of relying on the immunity from the program notice; or the nature and extent of the environmental harm caused or threatened by a continuation of the offence is so great that the immunity should be withdrawn. The department must make its application to the court within 20 business days of receiving the program notice.

What actions should be taken when a program notice is received?

Inform manager

Inform your manager that the program notice has been received and provided with a copy of the notice and any accompanying documents. Do this immediately after receiving the program notice, to allow the department as much time as possible to consider whether to make an application to the court to set aside the immunity from prosecution.

If the manager believes that the program notice should be set aside for either of the two reasons set out in the previous section, the manager should contact the regional manager as soon as possible so that the Litigation Branch can be briefed.

It is the regional manager's responsibility to decide whether to forward the program notice to the Litigation Branch for advice on commencing an application to set aside the immunity. The regional manager should also inform the Director of Compliance and Investigations of the matter.

Ecotrack

Details of the program notice must be entered into Ecotrack.

Does it meet the legal requirements?

Check whether the program notice meets the requirements of the Act. Does the program notice state an act or omission done by the person? An event that happens to a person or site is not by itself enough for a program notice.

For example, heavy rain that caused a pond to overtop is not an act or omission by the person. However, failing to adequately manage stormwater leading to overtopping of a pond is an omission by the person and would meet the legal requirements for a program notice. If the program notice doesn't state an act or omission, write to the person informing them that the program notice does not meet the requirements of the Act and is not effective. Contact the Compliance and Investigations Unit (Compliance Support) or Litigation Branch if assistance is required.

The program notice must also be about the environmental harm that has been caused or threatened. If the program notice does not reveal that environmental harm has been caused or is threatened by the act or omission, write to the person informing them that the program notice does not meet the requirements of the Act and is not effective.

For example, treating sewage from more equivalent persons than allowed by a development approval, if the sewage treatment plant has the capacity to treat the excess sewage, is not an act that is causing or threatening environmental harm and is not able to be the subject of a program notice. However, a breach of discharge limits that leads to an increase in contaminants in a watercourse is an act that causes or threatens environmental harm and does meet the requirements for a program notice. Again, contact Compliance and Investigations Unit (Compliance Support) or Litigation Branch if you need assistance.

Acknowledge the notice and request a TEP

Once a TEP is received, the department has 10 business days to give a written notice to the person submitting it. The notice from the department must do two things:

- acknowledge receipt of the program notice
- state the day by which a draft TEP dealing with the matters contained in the program notice must be submitted to the department. That day must be no more than three months after the department receives the program notice. In other words, the person submitting the program notice has a maximum of three months within which to submit the draft TEP.

When choosing the day by which the draft TEP must be submitted, consider how complex the matter raised in the program notice is, how urgent it is for a draft TEP to be submitted and what is a reasonable time for the person to prepare the draft TEP.

A [template acknowledgement notice](#) is available on Ecosteps.

What happens when the draft TEP is submitted?

When the person submits the draft TEP refer to the procedural guide, [Assessment of transitional environmental programs](#) and the assessment report, [Assessment of a transitional environmental program](#) available on Ecosteps for guidance on assessing the draft TEP.

Procedural guide

Environmental Protection Act 1994

Assessment of transitional environmental programs (TEPs)

This document is designed to assist users to critically evaluate the content of a draft transitional environmental program and assess whether or not the proposed objectives and actions meet the legislative requirements. It should be used in conjunction with the document Assessment report for assessing a transitional environmental program.

What must be included in the content of a draft transitional environmental program (TEP)? (s331)

A draft TEP must:

- state the objectives to be achieved and maintained under the program for an activity
- state how the objectives are to be achieved, and a timetable to achieve the objectives, taking into account:
 - the best practice environmental management for the activity
 - the risks of environmental harm being caused by the activity
- state the appropriate performance indicators at intervals of not more than 6 months
- make provision for monitoring and reporting compliance with the program.

Fees

The draft TEP must be accompanied by the required fee. The fee is set by the operational policy titled, *Transitional environmental program (TEP) fees*, available on Ecosteps.

Application date (s552)

Many actions about draft TEPs must be made within a certain number of days from the application date. The application date is either:

- 10 business days after the day the application for approval of the TEP draft is received by the Department of Environment and Resource Management (the department), or
- if the department requests additional information about the draft TEP within 8 business days of receiving the application for approval, the day that the department says to the applicant in a written notice is the new application date. That new application date must be no earlier than 2 business days after the applicant receives the written notice.

What is the timeframe for consideration of a draft TEP? (s337)

The department must decide whether to approve the draft TEP within 20 business days after the application date. There is one exception to this. If public notice is required under s335 of the *Environmental Protection Act 1994* (the Act) the department must decide whether to approve the draft TEP within 20 business days of the day stated in the public notice as the day by which submissions may be made to the department. More information about public notice is set out below.

If the department fails to decide whether to approve or refuse a draft TEP within the time required, the failure is taken to be a decision by the department to refuse to approve the draft TEP (s343).

What criteria must be taken into consideration? (s338)

When deciding whether or not to approve the draft TEP or deciding to impose conditions (if any) on the approval, the department must comply with any relevant regulatory requirement.

Subject to the above, the department must also consider:

- the standard criteria
- additional information given in relation to the draft program
- the views expressed at a conference held in relation to the draft program.

If the draft program is prepared because of a requirement of a development condition of a development approval, the department may approve the draft program only if it is not inconsistent with other conditions of the approval.

More information about these matters is set out below.

Is public notice required? (s335)

Public notice is required where the person or public authority submits for approval (in either compulsory or voluntary circumstances) a draft TEP that will be carried out for longer than 3 years. Within 2 business days after the application date, the person or public authority must give public notice of the submission by:

- advertisement published in a newspaper circulating generally in the area in which the activity to which the draft program relates is, or is proposed to be, carried out
- if the program relates to premises, a notice must also be placed on the premises and served on the occupiers of all adjoining premises.

The notice must be in the approved form, invite submissions (see s335(3)(b)) on the draft TEP and state the day (at least 10 business days after the advertisement and service of notice) nominated by the department as the day by which submissions may be made to it.

When may the department call a conference? (s336)

The department may invite the person or public authority that has submitted a draft TEP and another person who has made a submission under s335 about the program, to a conference to help it in deciding whether or not to approve the program. See s336 for details of notice and other requirements regarding conferences.

Other consultation and considerations

Depending on the content of the draft TEP, officers may need to consult with other business units or departments in order to ensure that the risks from and effects of, the draft TEP have been fully understood. For example, if the draft TEP involves releases to water, Queensland Health and/or Office of the Water Supply Regulator should be consulted. Releases to air may also require consultation with Queensland Health.

Officers should consider whether a formal risk assessment should be undertaken to ensure that any risks from approving the draft TEP are identified and adequately managed. If there is likely to be significant community interest in the draft TEP, officers should also consider whether the views of the community and other stakeholders should be taken into account.

How do I successfully assess a draft TEP?

Officers must complete an assessment report to document the decision and depending on the outcome issue a certificate of approval and/or written information notice detailing conditions or an information notice detailing refusal of the draft TEP.

Step 1 - Complete the assessment report

Officers are required to complete an assessment report which sets out relevant information about the draft TEP and documents the decision making process used in determining to either approve or refuse the draft TEP (with or without conditions).

The assessment report is not intended to replicate the departmental file. Rather it is designed to capture all critical aspects that have led to the department's decision. Accordingly, officers are encouraged to limit the information included to relevant points only. A template assessment report is available on Ecosteps <http://wwwhost.epa.qld.gov.au/steps/reflaunch.cfm?nw=true&ref=467>.

The following sections relate to the corresponding sections of the assessment report.

1. Brief history of the matter

Please briefly outline any historical information relevant to the decision. This information should be presented in succinct chronological dot points and should include why a draft TEP is now being considered i.e. as a result of a program notice, voluntary submission or in response to a notice requesting the submission of a TEP.

2. Criteria and considerations in assessing the content of a draft TEP (s338)

A significant amount of care should go into checking and considering the full potential effects of the draft TEP because by approving the draft TEP the officer is authorising everything permitted by the TEP.

Therefore the assessment criteria plays an instrumental part of the decision making process. Firstly, to establish the critical objectives the TEP must achieve and if the content of the draft TEP actually addresses how these achievements will be completed.

Secondly, from the point of view of compliance and enforceability, to establish whether the draft TEP passes the SMART test (i.e. it must be specific, measureable, achievable, relevant and time specific to the objective stated). This is an imperative consideration given that the department may have to establish beyond a reasonable doubt that the TEP has not been complied with, in order to take action against the holder for failure

to comply with the TEP. For this reason, the contents of the draft TEP must be clearly drafted, unambiguous and easily auditable.

Achieving compliance with the Act by reducing environmental harm or detailing the transition to an environmental standard

The draft TEP must either bring the applicant into compliance with the Act or detail how the applicant will transition to an environmental standard. If it is not clear from the information provided by the applicant that at the end of the period of the TEP the applicant will be in compliance with the Act or will have successfully transitioned to an environmental standard, the draft TEP must not be approved.

This section must demonstrate how the activity is currently in non-compliance with the Act (e.g. non-compliance with permit conditions resulting in the need to upgrade plant or equipment to achieve permit requirements) or how the activity is currently not achieving a particular environmental standard and why it is desirable to achieve this standard (e.g. a sewage treatment plant currently treats to class 'C' quality and is required to achieve class 'A').

An 'environmental standard' includes, but is not limited to new requirements under the *Environmental Protection Regulation 2008* or environmental protection policies following amendments.

Objectives to be achieved and maintained under the TEP

The draft TEP must clearly set out the objectives of the TEP (i.e. what is it aiming to achieve?). Examples of objectives might be - to bring the operator into compliance with conditions G12 and H5 of development approval 1234; or, to prevent or minimise environmental harm caused by the migration of landfill gas. The objectives should be as specific and clear as possible so that, if approved, the department can assess whether the objectives have been met.

Clearly set out the proposed actions

The draft TEP must set out the actions that the applicant will carry out in order to achieve the objectives of the TEP. It is important that the actions are as definite, specific and clear as possible. If they are vague or uncertain, it will be difficult for the department to assess whether the applicant is doing what they have said that they will do and may prevent the department from taking enforcement actions. Each action must have a due date in day-month-year or dd/mm/yyyy format, by which it will be completed and must comply with the SMART principle (specific, measurable, achievable, relevant and time specific). For more information on SMART, refer to the guide *Writing effective and enforceable conditions* on Ecosteps. Included in the actions should be progress reporting dates and final reporting dates in day-month-year or dd/mm/yyyy format.

Best practice environmental management

In stating how the draft TEP will achieve its objectives, it must take into account best practice environmental management (BPEM). BPEM is defined in s21 of the Act and officers should refer to the Act for more detail on what BPEM is.

Risks of environmental harm

The draft TEP must take into account the risks of environmental harm being caused by the activity being carried out by the applicant. The draft TEP and any supporting documents must show that the risks have been considered and what treatment or mitigation of the risks is proposed.

Transition to comply with condition

If the objective of the draft TEP is to bring the applicant into compliance with one or more conditions of a development approval or environmental authority, the draft TEP must set out actions to address each condition that is stated in the objective.

Transition to environmental standard

If the objective of the draft TEP is to transition to meet an environmental standard, the draft TEP must identify each standard and the actions that are proposed to ensure that those standards are met.

TEP required because of a condition of a development approval or environmental authority

If the draft TEP has been prepared because of a requirement of a condition of a development approval or environmental authority, it must be consistent with the conditions of the approval or authority.

End date

The draft TEP must state the date on which it will come to an end. By that date, the applicant must be in compliance with the Act for the matters covered by the TEP. Note that if the TEP is proposed to last for more than 3 years, public consultation is required (see above).

Performance indicators

The draft TEP must set out appropriate performance indicators at intervals of not more than 6 months. The performance indicators must show how the applicant is progressing in achieving the objectives of the TEP. The indicators must also be capable of being measured and be specific enough for the department to be able to assess with certainty whether they have been met or not. The indicators must set out the date by which each one will be met.

Monitoring and reporting

The draft TEP must provide for sufficient monitoring and reporting. It must provide for the applicant to monitor progress with carrying out the actions in the TEP and with achieving its objectives and for any necessary environmental monitoring. It must also provide for reporting by the applicant to the department on progress with the TEP, including any failure to carry out actions by their due dates. Reporting by the applicant must also include provision to the department and interpretation of any environmental monitoring requirements and a final report demonstrating compliance with the Act or successful transition to the nominated environmental standard and outline the achievement of all actions and objectives in the TEP.

Regulatory requirements

Sections 46-64 of the *Environmental Protection Regulation 2008* set out matters that must be considered in certain specified circumstances. Officers must consider any matters that are relevant to the draft TEP (e.g. there are certain matters specified where release of water to land is contemplated). If consideration of the matters leads to the conclusion that the actions proposed in the TEP are not appropriate, then the TEP should be refused or the applicant should be asked to amend the draft TEP.

Standard criteria

Officers must consider the standard criteria set out in the Act when considering the draft TEP. If consideration of the criteria leads to the conclusion that the actions proposed in the TEP are not appropriate, then the TEP should be refused or the applicant should be asked to amend the draft TEP. Some guidance on the standard criteria is set out below:

- **The principles of ecologically sustainable development (as set out in the *National strategy for ecologically sustainable development*)**

Consider the following questions:

- Has the decision effectively integrated long and short term economic, environmental, social, and equity considerations?
- Has due regard been given to the precautionary principle? (i.e. where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation)
- Does the decision have due regard to the global dimensions of environmental impacts and policies?
- Does the decision assist in the development of a strong growing and diversified economy, which can enhance the capacity for environmental protection?
- Has the need to maintain and enhance international competitiveness in an environmentally sound manner been considered when making the decision?
- Have cost effectiveness and flexibility been considered?
- Does the decision/action allow for broad community involvement on issues that affect them?
- **Any applicable environmental protection policies (EPPs)**
 - Is the draft TEP consistent with the EPPs on water, air, noise and waste (where relevant)?
- **Any applicable Commonwealth, State or local government plans, standards or agreements**
 - Consider documents such as State and regional coastal plan, National Health and Medical Research Council (NHMRC) and Australian and New Zealand Environment and Conservation Council (ANZECC).
- **Any applicable environmental impact study, assessment or report**
 - Consider any findings or recommendations that are relevant to the draft TEP.
- **The character, resilience and values of the receiving environment**
 - Does the draft TEP have regard to the environmental values of the receiving environment?
 - What is the impact on the values of the actions contained in the draft TEP?

- **All submissions made by the applicant and submitters**
 - Consider any submissions made by the applicant and anyone who makes a properly made submission about the draft TEP.
- **Best practice environmental management**
 - See above.
- **The financial implications of the requirements**
 - Explore the financial implications for the client in complying with conditions of the TEP. Are they reasonable in the particular circumstances?
- **The public interest**
 - Is it in the interests of the community that the draft TEP be approved?
- **The site management plan**
 - If there is a site management plan for contaminated land (approved under chapter 7, part 8 of the Act), is the draft TEP consistent with the site management plan? If not, is the inconsistency necessary for addressing the matters in the draft TEP? How will any inconsistency be reconciled? Consult with the Contaminated Land Unit as early as possible when there are any contaminated land issues.
- **Any relevant integrated environmental management systems (IEMS) or proposed IEMS**
 - Is the draft TEP consistent with the IEMS? If not, is the inconsistency necessary for addressing the matters in the draft TEP? How will any inconsistency be reconciled?

Other additional information

Has any supporting information provided by the applicant been considered? Considering the draft TEP and any supporting information, is it clear that the draft TEP achieve compliance with the Act?

Views expressed at a conference

If a conference has been held as part of a public notice process, the views expressed at that conference must be considered and the reasons for having regard to or not having regard to, those views must be recorded.

Satisfaction that the draft TEP meets the requirements of the Act

Having considered all of the above matters, officers completing the assessment report must decide whether they are satisfied with the draft TEP. If any of the issues in the assessment report were answered 'no', officers should proceed to section 4. Otherwise they should proceed to section 3.

3. If you are satisfied with the draft TEP

If the answer to all of the questions on the assessment report was 'yes' (or 'not applicable'), you may recommend that the draft TEP be approved. If the delegate approves the draft TEP the department must, within 8 days after making a decision to approve the draft TEP, give to the person or public authority that submitted the program a certificate of approval about the decision.

What should the certificate of approval contain?

The certificate should:

- identify the documents forming the approved TEP, including any amendments under s339(1)(a)
- state any conditions imposed
- state the day the approval ends.

Key considerations regarding conditions

The Act does make provision for the approval to be subject to conditions the administering authority considers appropriate and remains in force for the period specified in the certificate (s339(3)). However, the enforceability of conditions placed on TEPs is unclear. As a result conditions should not be imposed except for minor matters. Conditions must not be used to alter the terms of the TEP itself. Instead, if the TEP is not satisfactory, it must be refused or amendments sought from the applicant. Conditions in the certificate of approval should not be used as a quasi-development approval, or to alter or amend the TEP to meet the requirements of the Act.

If the draft TEP is approved with conditions an information notice must be given to the person or public authority that submitted the program.

4. If you are not satisfied with the draft TEP

If you have answered 'no' to one or more of the questions in the assessment report, you should either recommend a refusal of the draft TEP, or seek more information or amendments to the draft TEP from the applicant. If you seek more information within 8 business days of the department receiving the draft TEP, you may specify a new application date which will give you more time to assess the draft TEP (see above for more information).

If you receive more information and/or amendments to the TEP, you should repeat the assessment report process taking into account the new information or amendments. This may lead to the draft TEP being acceptable.

What action is required? (s340)

If the draft TEP is refused an information notice must be given to the person or public authority that submitted the program. As a matter of good practice the notice should include:

- the reasons for the decision
- any available rights of internal and external review or appeal.

5. Provide for natural justice:

The department must ensure that decisions are made in a fair and consistent manner. This includes ensuring that the affected individual is provided with 'natural justice' (that they are given an opportunity to make their case for why the decision should go in their favour) and that people involved in making the decision are free from bias or the perception of bias.

Any submissions made by the applicant that have not already been considered earlier in the assessment report process must be documented in section 5 of the assessment report.

6. Recommendation

The recommending officer is required to make a recommendation as to whether or not the draft TEP should be approved, with or without conditions, or refused.

7. Endorsement

An officer with the appropriate delegation must consider the contents of the assessment report and the recommendation and make a decision about whether to approve (with or without conditions) or refuse the draft TEP. The department's list of delegations can be found on the department's intranet at <http://insite2.dnr.qld.gov.au/derm/delegations/>.

What is the effect of compliance with the approved TEP? (s346)

An approved TEP protects the holder or a person acting under the approval, from enforcement action for non-compliance with the relevant:

- regulation
- condition of an environmental authority (EA)
- condition of an development approval (DA)
- condition of an environmental protection policy (EPP)
- standard environmental condition of a code of environmental compliance for a chapter 4 activity
- accredited environmental risk management plan (ERMP) under the Great barrier Reef protection measures.

What follow up is required?

It is an offence for the holder of an approved TEP to contravene the program. Officers should diarise all performance indicator requirements listed in the program or conditions and monitored for compliance.

Officers are encouraged to use tools such as reminders in Microsoft Outlook to ensure the matter is followed up in a timely manner.

What penalties exist for non-compliance with a TEP? (s432)

The holder of an approval of a TEP, or a person acting under a TEP, must not wilfully contravene the program. 'Contravening the program' includes failing to comply with milestones and failing to undertake actions required by the TEP.

Maximum penalty is 1665 penalty units or 2 years imprisonment.

The holder of an approval of a TEP, or a person acting under a TEP, must not contravene the program.

Maximum penalty is 835 penalty units.

Check list for successfully assessing a draft TEP

Officers are encouraged to ensure the following criteria have been considered:

- The appropriate and delegated decision maker has been identified. The department's list of delegations can be found at <http://insite2.dnr.qld.gov.au/derm/delegations/>.
- The appropriate person or commercial entity to be issued the certificate of approval, information notice of refusal or conditions is known. Assistance can be sought at: <http://wwwhost.epa.qld.gov.au/steps/reflaunch.cfm?nw=true&ref=330>
- The decision makers are free from a potential conflict of interest or bias in considering this matter.
- Copies of all the information sourced during the investigation have been documented, labelled and stored.
- Any reasons why information has been deemed to be irrelevant and has been excluded from the decision making process has been recorded.
- The principles of natural justice have been observed and the affected person has been provided with the opportunity to respond to the information that the department has sourced.
- Any major arguments raised by the affected person have been documented and addressed.
- Hard and soft copies of any information gathered to date have been labelled and stored.
- Any time frames set for the decision making process have been identified and complied with in accordance with legislation or best practice guidelines.
- A diary or other tool has been used to ensure appropriate follow up of this matter.

Procedural Guide

Compliance and Investigations

Covert Recording

This document sets out the circumstances in which authorised persons conducting investigative activities can covertly record conversations. This document is separate to the EPA's Human Resource Management policy No. 18 Covert Recording of Conversations.

Purpose

The purpose of this document is to:

- Set out the circumstances in which authorised persons may covertly record a conversation; and
- Where covert recording is permissible, to provide an approval process.

Definitions

'*Covert recording*' is when one or more parties to a conversation are unaware a recording is taking place.

'*Overt recording*' is when **all parties to a conversation are fully aware** a recording is taking place

'*Recording device*' means any instrument, apparatus, equipment or device capable of being used to overhear record, monitor or listen to a private conversation when it is taking place. Examples include tape recorders, mobile phones, digital cameras, video recorders and telephone adaptations that enable recording of conversations.

Background

- Authorised persons regularly investigate breaches of EPA administered legislation. Investigations may lead to criminal and/or civil litigation.
- Audio and video recording provide an effective means to avoid allegations of harassment and to negate any concerns involving threat, promise or inducement.
- Covert recording is an essential and legitimate investigative tool.

Legal position

The *Invasion of Privacy Act 1971* allows the covert recording of conversations by persons who are a party to the conversation. However the Act contains restrictions regarding the use of such a recording.

Permission is not required from the parties involved if the conversation is intended for use as evidence in court or if the conversation is deemed to be in the public interest by the courts. There are severe criminal penalties for persons who breach this exception.

Use of Overt Recording

Authorised persons may overtly record a conversation to which they are a party. It is the responsibility of the authorised person to ensure all parties to the conversation are fully aware the conversation is being recorded, and such awareness should be evident from the recording itself.

Please ensure you receive verbal confirmation on the recording to indicate as evidence the parties to the conversation are fully aware.

Use of Covert Recording

At no time can an authorised person record a conversation to which they are not a party.

Authorised persons **may**, with the necessary approval, covertly record a conversation to which they are a party in the following circumstances:

1. Where the authorised person is investigating whether parties are complying with EPA administered legislation; or
2. The recording of the conversation will assist, or is likely to, assist in the gathering of evidence regarding an alleged contravention of the legislation administered by the EPA; or
3. Where it is important that there is an accurate record of conversations for evidentiary reasons; or
4. Where the authorised person reasonably believes the disclosure of a recording activity may adversely affect the authorised person in the execution of their duties.

If an authorised person covertly records a conversation, the fact of the covert recording must be noted in the authorised person's official notebook as soon as practicable.

Covert Recording approval process

EPA Division	Authorised person to grant approval	Method
QPW Authorised officers under the legislation administered by QPW, such as "conservation officers" under the <i>Nature Conservation Act 1992</i>	Executive Director, QPW	Regional staff must seek ¹ support through their Regional Manager. Regional Manager to seek support from Director (Terrestrial) or Director (Marine). Director to seek approval by Executive Director via email. Executive Director may approve via email.
Environmental Services Authorised officers under the legislation administered by Environmental Services such as the <i>Environmental Protection Act 1994</i>	Executive Director, Environmental Services	Regional staff must seek support through their Regional Manager. Regional Manager to seek support from Director Regional Services. Director Regional Services to seek approval by Executive Director via email. Executive Director may approve via email.

¹ This may be verbal, email or by phone confirmation (if urgent)

State-Wide Investigations Team	Director (Compliance and Investigations) or Executive Director, Environmental Services	<p>Investigator to seek support from Manager (Investigations).</p> <p>Manager (Investigations) to seek approval by Director (C&I) or Executive Director either at time of approval of investigation plan or via email.</p> <p>Director (C&I) and Executive Director may approve via email.</p> <p>Where Director (C&I) is the approving officer, a copy of the approval must be provided to the Executive Director.</p>

Communication of information obtained covertly

If a recording is sought to be communicated or otherwise used then advice must be sought from the Legal Services Unit, except if the recording is to be used as evidence in litigation.

Approved By

Signed

19/9/2008

Executive Director
Environmental Services

Enquiries:
Compliance Strategy, Planning and Support
Ph. 07 3225 1310
Fax. (07) 3225 1316

Compliance and Investigations

Proposed Compliance Action Report

This form is to be completed in order to request proposed action for regulatory non-compliance. Approval will refer the matter to the investigations team for action. Guidance for inserting the required information is provided in italics; please delete these prior to producing a final documents for signature. Please contact the Investigations Team for further advice.

Date Report Prepared:

Name and contact details of officer preparing this report:

Relevant sections of the legislation:

1) Name and full details of the person/entity that is the subject of this report:

- *Provide the person/entity's full name, address, DOB and any other details known. It is to include any know DERM licences that are held and the nature/location of any activity undertaken by the person/entity.*
- *Provide any history of previous non-compliance*

2) Details of the incident or information received; including how the matter came to notice:

- *Dot point incident/information in chronological order, including full name and details of any alleged offender/s. Briefly outline what offences have allegedly occurred and evidence there is to support the allegations. Do not attach copious documents or photographs as these can be obtained at a later date.*
- *Dot point the relevant sections of the Act and how this PCAR relates to each one.*

3) The case for the proposed compliance action:

- *Dot point what action you propose and why this action is necessary.*

4) Comments on alternative approaches to the proposed compliance action:

- *Dot point whether there are any other alternate approaches to the action proposed and clearly indicate why the alternate/s are not applicable in this case.*

5) Anticipated resource implications:

- *Dot point what resources you believe may be necessary to carry out the proposed action.*

Proposed Compliance Action Report

.....
(Signature of person making report)
Name:
Designation:
Section/Unit/Division:

.....
(Date)

Recommendation of the (Relevant Manager)

.....
(Name)

.....
(Date)

Recommendation of the (Relevant Director)

.....
(Name)

.....
(Date)

Recommendation of the Manager, Investigations

.....
(Name)

.....
(Date)

Recommendation of the Director, Compliance & Investigations

.....
(Name)

.....
(Date)

Procedural guide

Environmental Protection Act 1994 Transitional environmental program (TEP)

Part 1 – Notice requiring a draft TEP

This document is designed to assist Environmental Services officers to issue a notice requiring a draft TEP under the provisions of Chapter 7, Part 3 of the Environmental Protection Act 1994.

What is a TEP?

Section 330 of the *Environmental Protection Act 1994* (the Act) provides that a transitional environmental program (TEP) is a specific program which, when complied with, facilitates compliance with the Act for the activity to which the TEP relates by doing one or more of the following—

- reducing environmental harm caused by the activity
- detailing the transition of the activity to an environmental standard
- detailing the transition of the activity to comply with:
 - a condition (including a standard environmental condition) of an environmental authority or code of environmental compliance or
 - a development condition.

The legislative provisions in respect to TEPs can be found in Chapter 7, Parts 3 and 4 (ss330-357) of the Act.

Who can enter into a TEP?

A person or public authority may enter into a TEP voluntarily or may be required to submit a draft TEP by the Department.

When can a TEP be used?

TEPs are intended to be used where a significant change or changes are needed to be made by a person to achieve compliance. One of the reasons for this is that a person has some protection from prosecution for actions conducted under the TEP for the duration of the TEP.

(a) Requirement to submit a draft TEP

There are certain circumstances when the Department may require a person or public authority to prepare and submit for approval a draft TEP. These circumstances are set out in Section 332 of the Act.

(b) Voluntary TEP

Section 333 of the Act provides that a person or public authority may also, at any time, submit a draft TEP to the Department for an activity the person or public authority is carrying out or proposes to carry out.

(c) Program notices

A person intending to prepare and submit a voluntary TEP may give the Department a program notice under s350 of the Act. For further information in regard to program notices, see: [Procedural Guide - Program notices TEP](#)

(d) Fee for consideration of draft TEP

A person or public authority that submits a draft TEP to the Department for consideration and approval must pay the Department the fee prescribed by regulation. See: [Operational policy - Transitional Environmental Program \(TEP\) fees](#)

An invoice for the fees incurred should be issued to the person or public authority that has submitted the draft TEP for approval at the time when the notice stating the Department's decision is issued.

How do I successfully issue a notice requiring a draft TEP?

Officers must complete an assessment report to document the decision to issue a notice requiring a draft TEP, as well as completing the notice.

Step 1 - Complete the Assessment Report

Before completing the notice requiring a draft TEP, officers must complete an assessment report. The assessment report sets out the facts and circumstances relating to the matter and documents the decision-making process of the Department in determining whether or not to issue the notice.

The following sections of the procedural guide are a guide to completing the assessment report. The numbering and headings of the sections in the procedural guide correlate with those in the assessment report for ease of reference.

The assessment report is not intended to replicate the Departmental file. Rather it should capture all critical aspects considered by the Department in making a decision. Accordingly, officers should include relevant points only. A template assessment report may be found on the Compliance Support Materials page on the Departmental intranet.

1. Brief history of the matter

Briefly outline any historical information relevant to the decision. This information should be presented in succinct chronological dot points and include how the Department became aware of the issues that led the Department to consider issuing a notice requiring a draft TEP.

For example:

- *Previous compliance inspections have identified risks with stormwater controls and management on the site (CA123 – Ecotrack – May 2008) (CA456 – Ecotrack – May 2009).*
- *The operator made significant investments in stormwater management infrastructure in 2002, however the business has grown substantially since this period with no changes to stormwater management.*
- *Discussions with the operator during a compliance inspection on 10 May 2010 indicated an acceptance of the need to investigate and pursue further stormwater management improvements and included a discussion of the potential submission of a draft TEP.*

- *The Department wrote to the operator on 1 June 2010 to advise of the outcomes of the May compliance inspection.*
- *The Department received an Annual Return Form from the operator attaching stormwater release monitoring results demonstrating non-compliance with development approval conditions C11 and C12.*
- *The Department issued a notice requiring a draft TEP to another timber preservation/treatment operator in the region for non-compliance with development approval conditions associated with stormwater management issues.*

2. Grounds for issuing a notice requiring a draft TEP

The legislation provides in Section 332 that the Department may require the submission of a draft TEP—

- as a condition of an environmental authority or
- as a development condition of a development approval.

The Department may also require the preparation and submission of a draft TEP if satisfied that—

- an activity carried out, or proposed to be carried out by the person or authority is causing, or may cause unlawful environmental harm or
- it is not practicable for the person or public authority to comply with an environmental protection policy or regulation on its commencement or
- a condition of an environmental authority held by the person or public authority is, or has been, contravened or
- a standard environmental condition of a code of environmental compliance for a chapter 4 activity is, or has been, contravened by the person or public authority or
- a development condition of a development approval is, or has been, contravened and the person or public authority is:
 - an owner of the land for which the approval is granted or
 - another person in whom the benefit of the approval vests.

In this section, an officer must identify the relevant grounds upon which the decision to issue the notice requiring a draft TEP is based. For example:

A timber preservation/treatment operator is required under development approval conditions to ensure that stormwater released from the site meets specific limits. A compliance inspection was undertaken on the site that identified some issues with stormwater controls and management. Following the inspection, a letter was sent by the Department to the operator advising of the outcomes of the inspection and reminding the operator of its responsibilities. The operator submitted monitoring results indicating that on occasion, stormwater was released from the site in breach of the release limits.

A notice requiring a draft TEP was issued to the operator based on the following grounds:

1. *that an activity carried out, or proposed to be carried out, by the person is causing, or may cause, environmental harm and/or*
2. *that a development condition of a development approval is, or has been, contravened and the person is an owner of the land for which the approval is granted.*

3. Expand upon the grounds

The purpose of this section is to clearly identify the elements, or what the Department must 'prove' before deciding to use a notice requiring a draft TEP, and should be used to expand upon the grounds which have previously been identified. This can include identifying the specific offence or breach under investigation or any statutory requirements listed in the legislation which must be met by the Department prior to issuing the notice.

In instances where one action has resulted in multiple breaches, each breach should be listed independently. For example, a site inspection could potentially detect a number of breached conditions associated with a single development approval. In this situation each breach would need to be proven on its own merits and should be listed separately.

Each ground (including breaches or requirements) should be allocated a separate number.

4. Detail the matters considered

The purpose of the table in the assessment report is to link the elements of the breach to the evidence gathered and the conclusions formed. This is achieved by identifying:

- the elements of any specific breach or allegation
- the evidence which has been considered for each element and
- the conclusion that has been reached by the officer after considering the information sourced.

When documenting the evidence, officers should limit the information to relevant points only. This can include (but is not limited to):

- notes recorded in an officer's official notebook
- samples collected for analysis and any subsequent lab reports
- photographs and copies of documents and
- any observed actions and direct testimony received from individuals.

The last column in the table requires officers to detail the relevant facts and circumstances. Officers are encouraged to consider the accuracy and relevance of available evidence, historical details, professional expertise and the weight attributed to any direct testimony provided.

After considering the details, evidence, facts and circumstances, officers are required to set out how the TEP would deal with the issues.

5. Provide for Natural Justice

Prior to the Department making a decision which may adversely impact on an individual or group it must:

- **Notify** - Notify the individual that the Department is considering issuing a notice requiring a draft TEP
- **Respond** - Provide the individual with an opportunity to respond to the allegation and
- **Consider** - Consider any representations made by the affected person before finalising the decision.

The seriousness of the matter will dictate the process by which natural justice is provided and is likely to vary from case to case. Accordingly, officers should use their discretion in determining how to best ensure natural justice is afforded and the amount of time provided to the affected person to respond. In some circumstances it may be appropriate for an officer to discuss the above information with the affected person during a site

inspection or a telephone interview and to take contemporaneous notes. In more serious circumstances a written notification which includes a specific closing date for submissions should be used.

Regardless of the manner in which natural justice is afforded, any information provided by the affected person is to be documented. The summary of information should include how natural justice was provided as well as any responses given by the affected person. For example:

Following each of the compliance inspections, the Department wrote to the site operator advising of the outcomes of the inspections and the risks identified with stormwater management on the site:

- CA123 – May 2008
- CA456 – May 2009
- CA780 – May 2010

On-site discussions with the operator during the May 2010 compliance inspection indicated an acceptance of the need to investigate and pursue further stormwater management improvements and included commitments to consider drafting a voluntary TEP.

Since the May 2010 compliance inspection the Department has had further discussions with the operator, raising the implications of the exceedances of the release limits observed in the stormwater quality monitoring results for the last 12 months. The operator was also informed that the Department's intention was to issue a notice requiring a draft TEP and given a period of five business days to submit any further information for consideration by the Department. The operator did not submit any formal submissions to the Department but has advised by telephone of an intention to engage a suitably qualified consultant to assist with drafting a plan of action for site upgrades.

6. Proposed requirements of the TEP

Officers are required to include the following things (amongst other things as set out in s332(4)) in the notice requiring a draft TEP—

- the matters to be addressed by the program and
- the period over which the program is to be carried out and
- the day (at least a reasonable period after the notice is given) by which the program must be prepared and submitted to the Department.

In instances where it is recommended that requirements are imposed upon the affected person, officers are required to develop proposed requirements for consideration by the delegate. As affected persons are able to seek a review of the Department's decision to impose one or more conditions/requirements, it is necessary for officers to provide justification for their inclusion.

Requirements must be specific, measureable, achievable, relevant to the activity and time-specific. For further information, refer to the [Procedural Guide - Writing effective and enforceable conditions](#). For example:

Proposed requirement	Justification
<i>The draft TEP must include a stormwater management plan in order to cease all unlawful releases of stormwater from the site on or before 30 November 2011 and be submitted to DERM by 1 July 2011.</i>	<i>The development of a stormwater management plan is considered to be best practice and is a requirement which is currently being met at other ABC Pty Ltd development sites in Queensland. Compliance inspections conducted in May 2008, 2009</i>

The stormwater management plan must include the following—

1. *An assessment of the existing site infrastructure, including but not limited to:

 - (a) *a determination of the effectiveness of existing stormwater infrastructure in controlling stormwater runoff and capturing contaminants to prevent or minimise the release of contaminants to waters and*
 - (b) *a determination of the effectiveness of existing containment facilities associated with the storage, transport and production of materials in minimising the release of contaminants to the stormwater system and*
 - (c) *a determination of the effectiveness of current management practices and procedures regarding the minimisation of stormwater contamination.**
2. *An identification of measures to improve stormwater management on site, which must:

 - (a) *assess the adequacy of existing pollution control measures and*
 - (b) *identify opportunities to reduce areas of surface contamination and minimise contact of stormwater with contaminants and*
 - (c) *identify opportunities to separate the clean and contaminated stormwater catchments and*
 - (d) *identify opportunities for harvesting clean stormwater for beneficial reuse and*
 - (e) *identify the infrastructure (including its appropriate structural design) required to effectively manage stormwater in each of the stormwater catchments.**
3. *A program of activities to construct measures to improve stormwater management on the site, including but not limited to:

 - (a) *a program of activities informed by 1 and 2 above and*
 - (b) *stormwater quality monitoring to inform the effectiveness of (a) above.**
4. *The operator is required to propose a reasonable timetable for consideration of approval by the*

and 2010 have identified a number of exceedances of release limits of stormwater, with an increase in the last 12 months.

The Department has consulted with the operator on a number of occasions and discussed the implications of the exceedances. However, such consultation has not resulted in any action by the operator in relation to reducing unlawful stormwater releases.

The Department estimates that it will take at least 12 months for the operator to upgrade the site to a standard that results in compliance with stormwater release limits.

After considering all of the issues and the estimated time-frame for the operator to achieve compliance, the Department considers that requiring the operator to provide a draft TEP is the most appropriate and effective course of action.

As ABC Pty Ltd is currently operating in a regional area, the Department has allowed ABC Pty Ltd 9 weeks (5 weeks more than for an urban area) to develop the plan.

<i>administering authority for the above actions to be completed.</i>	
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7. Recommendation

The responsible officer is required to make a recommendation in relation to the alleged breach. For example:

<i>It is the opinion of the Department that ABC Pty Ltd failed to comply with development conditions D11 and D12 of development approval IPDE123456 by allowing stormwater to leave 24 Jones Road and enter Murphy Creek. After considering all factors the Department has determined that requiring a draft TEP would be the most effective way of achieving the operator's compliance with the development conditions. It is recommended that a notice requiring a draft TEP be issued.</i>

Administrative decisions are made based upon the balance of probabilities. This means that the decision-maker must be able to determine whether, based upon the information available, it was more likely than not that the event occurred.

Officers are encouraged to consider alternative actions/tools, the Department's enforcement guidelines, details of any consultations including site visit details and discussions with the ERA contact officer (if applicable) prior to making a recommendation. The reasonableness of proposed timeframes for the completion and submission of the draft TEP for consideration and approval, and the period over which the TEP is to be carried out, should be taken into account. For example, if the location is geographically isolated, or there is an impending wet season, the Department may consider allowing additional time for the recipient of the notice to prepare the draft TEP.

6. Approval

The assessment report is to be approved by an appropriately delegated officer. The Department's list of delegations can be found at: <http://insite2.dnr.qld.gov.au/derm/delegations/>

Step 2 - Complete the notice requiring a TEP

The notice requiring a draft TEP must meet a number of legislative requirements in order to be legally binding. A requirement to prepare and submit a draft TEP must be made by written notice which must state—

- the grounds on which the requirement is made and
- the matters to be addressed by the TEP and
- the period over which the TEP is to be carried out and
- the day (at least a reasonable period after the notice is given) by which the TEP must be prepared and submitted to the Department and
- the review or appeal details.

A template notice requiring a draft TEP is included in the TEP material.

The notice and the assessment report must be signed by the decision-maker.

Service of a notice requiring a draft TEP

Service means delivery to the party who will be responsible for actioning the notice. Officers are encouraged to use their discretion as to the most appropriate form of service, having regard to the recipient in question.

Methods of service are provided for in ss39 and 39A of the *Acts Interpretation Act 1954* (AI Act).

A notice requiring a draft TEP may be served:

- on a person:
 - by delivering it to the person personally or
 - by leaving it at, or by sending it by post, facsimile or similar facility (e.g. email) to the person's last known place of residence or business or
- on a body corporate - by leaving it at, or sending it by post, facsimile or similar facility (e.g. email) to the head office, a registered office or a principal office of the body corporate.

The date, time and method of service should be documented by contemporaneous notes, a file note, any receipts arising from the postage or any facsimile confirmations and email 'read' receipts.

What follow-up is required?

It is important that the matter is appropriately followed up to make sure that the person to whom the notice requiring a draft TEP is issued complies within the required time-frame. Follow-up is to be scheduled by the relevant officer and confirmed with the business area manager. The business area manager is responsible for ensuring follow-up is undertaken within the agreed time frame.

Once a notice has been issued, dates for the submission of the draft TEP and the review and appeal periods should be diarised and monitored. If the draft TEP is not submitted by the due date, follow-up should be carried out by way of a site visit or telephone call. The recipient should be reminded that the time-frame has expired and that non-compliance with the notice could lead to prosecution.

The recipient of the notice requiring a draft TEP may contact the Department during the period of the notice and establish legitimate reasons for non-compliance with the relevant time frame. In this instance the Department may consider granting an extension of time. However, it must be remembered that the affected person should communicate any issues with time-frames prior to their expiration. For further information regarding amendments to an issued notice requiring a draft TEP, please see the paragraph below headed 'Amendments to an issued notice requiring a draft TEP'.

What are my record-keeping responsibilities?

Officers are required to record all allegations of non-compliance in the EcoTrack system. This includes creating a complaint report, uploading copies of any relevant documents, updating the description field with commentary on actions and recording any decisions made on the enforcement measures screen (this includes a decision to take no further action). Hard copies of any relevant documents should be placed on the paper file. The Department is required to make and record an informed decision about all allegations of non-compliance.

Amendments to an issued notice requiring a draft TEP

If minor changes to the notice requiring a draft TEP or an extension of time to respond are required, the recipient of the notice should be notified in writing.

If significant changes are required, officers should, in order to avoid confusion, repeal (revoke) the original notice, and issue a fresh one on the same grounds with the necessary changes.

The repeal and issue of a fresh notice requiring a draft TEP should be carried out in the same way, and subject to the same conditions as the issuing of the original notice. Accordingly, a new assessment report should be completed and endorsed by the appropriate delegate.

It is preferable if the decision to issue a fresh notice is made by the original decision-maker. If this is not possible the decision should be made by a person with the appropriate delegation who holds a position equal to or higher than that of the original decision-maker.

Officers should also update and record the changes or the decision to repeal and re-issue the notice in EcoTrack or CIRaM and place hard copies of any documents on the paper file.

Review of decisions and appeals

The provisions regarding review of decisions and appeals may be found in Chapter 11, Part 3 of the Act.

The Act specifies that a person who is dissatisfied by a decision made by the Department in respect to a notice requiring a draft TEP may apply for a review of an original decision by submitting an application on the approved form to the Department—

- within 10 business days after the day on which the person received notice of the original decision or the Department is taken to have made the decision, or
- if there are special circumstances, whatever longer period the Department allows.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#)

A person who has made an application for review of an original decision may immediately apply to the Planning and Environment Court for a stay of the decision.

If the person is dissatisfied with the review decision, the person may appeal against that decision to the Planning and Environment Court by filing written notice of appeal with the registrar of the Court within 22 business days after the day the person receives notice of the decision or the decision is taken to have been made, unless the Court extends the period for filing the notice of appeal.

The court may grant a stay of a decision appealed against until such time the appeal is decided. An appeal against a decision does not affect the operation or the carrying out of a decision unless the decision is stayed.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

Non-Compliance with a notice requiring a draft TEP

Officers must respond and may take further action in relation to non-compliance with a notice requiring a draft TEP. The following issues should be considered—

- **Providing extra time** – If extra time to comply has been granted, officers should document the details of the extra time allowed and the reasons for giving the extension of time. Confirmation of these details should be provided in writing to the recipient of the notice.
- **Other tools** – It may be that using another compliance tool would be more likely to achieve compliance. For example, issuing an Environmental Protection Order (EPO) in relation to the non-compliance may be a more appropriate way to achieve compliance due to the far higher penalty for breaching the EPO.
- **Prosecution** – If no other action is likely to be effective, officers should consider prosecuting a non-compliant recipient of a notice requiring a TEP for both failure to comply with the notice as well as for the environmental harm being caused.

What penalties exist for non-compliance with a notice requiring a draft TEP?

A person must comply with a notice requiring a draft TEP, unless the person has a reasonable excuse (s332(5)).

Maximum penalty for non-compliance with a notice requiring a TEP—

For an individual – 100 penalty units or \$10,000.00.

For a corporation – 500 penalty units or \$50,000.00.

Procedural guide

Environmental Protection Act 1994 Transitional environmental program (TEP)

Part 2 - Considering and making a decision about a draft TEP

This document is designed to assist users to critically evaluate the content of a draft TEP and assess whether or not the proposed objectives and actions meet the legislative requirements.

Consideration of a draft TEP submitted by a person or public authority

If a person submits a draft TEP to the Department of Environment and Resource Management (the Department), the Department is required to consider the draft TEP and make a decision whether to approve or refuse the draft TEP, or to approve it with conditions.

Section 337 of the *Environmental Protection Act 1994* (the Act) provides that the Department must make its decision within 20 business days after—

- if a public notice is required under s335—the day stated in the notice as the day by which public submissions may be made to the Department or
- otherwise—the application date.

The terms *application date* and *person* are defined below.

Application date (s552)

The *application date* is important because many actions in relation to a draft TEP must be made within a certain number of days from the application date. Subsection 552(2) of the Act states that the application date relating to a draft TEP is 10 business days after the day it has been submitted to the Department.

However, if the Department requires additional information about the draft TEP within 8 business days after the day it has been submitted, the application date is the day the Department states in a written notice to the applicant as being the application date (s552(3)). This day must not be earlier than two business days after the person has received the written notice (s552(6)).

If, within 8 business days after a person submits a draft TEP, the Department advises the person who made the submission that the TEP (or proposed amended TEP) does not contain or provide for a matter mentioned in s331 (content of a program), and the person is required by the Department to amend the submission so that the TEP (or proposed amended TEP) is compliant with s331 and to resubmit the submission to the Department, the application date is the day that is 10 business days after the day the amended TEP is submitted to the Department.

Or, if the Department requires additional information about the amended TEP within 8 business days after the day the amended TEP is submitted to the Department, the application date is the day the Department states in a written notice to the applicant as being the application date (s552(5)). This day must not be earlier than 2 business days after the person has received the written notice (s552(6)).

Person

The term *person* includes an individual, public authority or corporation.

Fee for consideration of a draft TEP (s334)

A person that submits a draft TEP to the Department for consideration and approval must pay to the Department the fee prescribed by regulation. See: [Operational policy - Transitional Environmental Program \(TEP\) fees](#)

An invoice for the fees incurred should be issued to the person that has submitted the draft TEP for approval at the time when the notice stating the Department's decision is issued.

What must be included in the content of a draft TEP? (s331)

Section 331 of the Act requires that a draft TEP must, for the activity to which it relates—

- (a) state the objectives to be achieved and maintained under the TEP for the activity and
- (b) state the particular actions required to achieve the objectives, and the day by which each action must be carried out, taking into account:
 - (i) the best practice environmental management for the activity and
 - (ii) the risks of environmental harm being caused by the activity and
- (c) state how any environmental harm that may be caused by the activity will be prevented or minimised, including any interim measures that are to be implemented and
- (d) if the activity is to transition to an environmental standard, state:
 - (i) details of the standard and
 - (ii) how the activity is to transition to the standard before the TEP ends and
- (e) if the activity is to transition to comply with a condition of an environmental authority or code of environmental compliance, or a development condition, state:
 - (i) details of the condition and how the activity does not comply with it and
 - (ii) how compliance with the condition will be achieved before the TEP ends and
- (f) state the period over which the TEP is to be carried out and
- (g) state appropriate performance indicators at intervals of not more than six months and
- (h) provide for monitoring and reporting on compliance with the program.

Is public notice required? (s335)

Public notice is required where the person submits a draft TEP for approval that states the TEP is to be carried out over a period of longer than three years. Within 2 business days after the application date, the person must give public notice of the submission by:

- an advertisement published in a newspaper circulating generally in the area in which the activity to which the draft program relates is, or is proposed to be, carried out and
- if the program relates to premises, a notice must also be placed on the premises and served on the occupiers of all adjoining premises

TEP Part 2 – Considering and making a decision about a draft TEP

- invite submissions on the draft TEP (s335(3)(b)) and state the day (at least 10 business days after the advertisement and service of notice) nominated by the Department as the day by which submissions may be made to the Department.

The notice must meet the requirements of the Act,

In what circumstances may the Department call a Conference? (s336)

The Department may invite the person that has submitted a draft TEP, and another person that has made a submission under section 335 about the TEP, to a conference to help it decide whether or not to approve the draft TEP. See section 336 of the Act for details of notice and other requirements regarding conferences.

Other consultation and considerations

Depending on the content of the draft TEP, officers may need to consult with other business units or Departments in order to ensure that the risks from, and effects of, the draft TEP have been fully understood. For example, if the draft TEP involves releases of water, Queensland Health and/or the Office of the Water Supply Regulator should be consulted. Releases to air may also require consultation with Queensland Health.

Officers should consider whether a formal risk assessment should be undertaken to ensure that any risks from approving the draft TEP are identified and adequately managed.

Consideration of draft TEPs (s337)

The Department must decide whether to approve a draft TEP submitted to it within 20 business days after the application date. Or, if a public notice is required under s335, the Department must make a decision 20 business days after the day stated in the notice as the day by which submissions may be made to the Department. If public notice of the submission of the draft TEP is required to be given, the Department must be satisfied that public notice has been properly given before making a decision (s337(2)).

If the Department fails to decide whether to approve or refuse a TEP within the time it is required to make a decision, the failure is taken to be a decision by the Department to refuse to approve the program at the end of the time (s343).

What must be taken into consideration? (s338)

When deciding whether or not to approve the draft TEP or the conditions (if any) of the approval, the Department—

- must comply with any relevant regulatory requirement and
- subject to the above, must also consider the following:
 - the standard criteria
 - additional information given in relation to the draft TEP and
 - the views expressed at a conference held in relation to the draft TEP.

If the draft TEP is prepared because of a requirement of a development condition of a development approval, the Department may approve the draft TEP only if it is not inconsistent with other conditions of the approval.

Decision about draft TEP (s339)

Section 339 of the Act provides that the Department may—

- approve a draft TEP as submitted or
- approve a draft TEP as amended at the request, or with the agreement, of the Department or
- refuse to approve a draft TEP.

If the Department approves the draft TEP it may impose—

- any conditions the Department must impose under a regulatory requirement and
- any other conditions considered appropriate by the Department.

If the draft TEP is approved, the approval remains in force for the period stated in the notice of the approval given pursuant to s340 of the Act.

How does an officer successfully consider and make a decision about a draft TEP?

Officers must complete an assessment report to document the decision whether to accept the draft TEP (with or without conditions), to require amendments to the draft TEP or to reject the draft TEP. If the draft TEP is accepted (with or without conditions) or rejected, a notice of decision must be issued under s340 of the Act.

Step 1 - Complete the assessment report

Before issuing a notice of decision under s340 of the Act, officers are required to complete an assessment report which sets out the facts and circumstances relating to the matter and documents the decision-making process used in determining whether to approve or refuse the draft TEP (with or without conditions).

The assessment report lists all the matters that must be considered by officers during the decision-making process. This includes the criteria by which the TEP must be assessed, the matters that must be addressed by the draft TEP and the matters that officers must consider when making a decision about the draft TEP. Each matter has checkboxes beside it, as well as text fields for officers to provide further information if necessary. The text fields contain explanatory notes indicating the types of information that is to be provided. Officers should check the relevant checkboxes to indicate that the particular matter has either been adequately addressed or is not applicable to that particular draft TEP. If a matter is applicable, but has not been adequately addressed, the checkbox should not be checked, and details as to how the particular matter has not been adequately addressed should be inserted in the text field provided.

The following sections of the procedural guide are a guide to completing the assessment report. The numbering and headings of the sections in the procedural guide correlate with those in the assessment report for ease of reference. Officers should refer to the procedural guide for information while completing the assessment report.

The assessment report is not intended to replicate the Departmental file. Rather, it is designed to capture all critical aspects that have led to the Department's decision. Accordingly, officers should limit the information included to relevant points only.

A template assessment report may be accessed at the Compliance Support Materials site on the DERM intranet.

1. Brief history of the matter

Briefly outline any historical information relevant to this decision. This information should be presented in succinct, chronological dot points and should include the reasons why a draft TEP is now being considered, for example, as a result of a program notice, voluntary submission or in response to a notice requesting the submission of a TEP.

2. Matters that must be considered when making a decision about the draft TEP (s338)

A significant amount of care should go into checking and considering the potential effects of the draft TEP, because by approving the draft TEP, the officer is authorising everything it permits.

Accordingly, the assessment criteria are an instrumental part of the decision-making process. Firstly, they establish the critical objectives that the draft TEP must achieve and how the content of the draft TEP will deliver on these objectives. Secondly, from the view of compliance and enforceability, and to establish that the draft TEP passes the *SMART* test, the requirements must be specific, measurable, achievable, relevant and time-specific. These are vital considerations given that in future, the Department may have to establish beyond a reasonable doubt that the TEP has not been complied with in order to take action against the person for failure to comply with the TEP. For this reason, the contents of the draft TEP must be clearly drafted, unambiguous and easily auditable.

More information about drafting SMART requirements and conditions may be found in the [Procedural guide - Writing effective and enforceable conditions](#)

Achieving compliance with the Act (s330)

A TEP should, for the activity to which it is concerned, achieve compliance with the Act by doing one or more of the following things—

- reducing environmental harm caused by the activity
- detailing the transition of the activity to an environmental standard
- detailing the transition of the activity to comply with:
 - a condition, including a standard environmental condition, of an environmental authority or code of environmental compliance or
 - a development condition.

The term *environmental standard* is defined as being:

- an environmental standard (however called) set out, or otherwise provided for, in a regulation under the Act or
- an outcome or objective that is directed at protecting or enhancing environmental values set out in an environmental protection policy.

A *standard environmental condition* for an environmental authority or code of environmental compliance means a standard environmental condition approved by the Minister pursuant to s549 of the Act.

A *development condition* of a development approval means a condition of the approval imposed by, or because of a requirement of, the Department if it is the assessment manager or concurrence agency for the application for the approval.

The draft TEP must set out how the activity is currently in non-compliance with the Act and how the person proposes to make the activity compliant. If it is not clear from the information provided in the draft TEP that by

TEP Part 2 – Considering and making a decision about a draft TEP

doing one or more of these things compliance with the Act will be achieved by the end of the operative period of the TEP, the draft TEP must not be approved.

Content of the TEP (s331)

A TEP, for the activity to which it relates, must include the following—

(a) Objectives to be achieved and maintained under the TEP

A draft TEP must clearly set out what it is trying to achieve. For example:

EXAMPLE 1

To bring the operator into compliance with conditions G12 and H5 of development approval 123456

EXAMPLE 2

To prevent or minimise environmental harm caused by the migration of landfill gas.

The objectives should be as specific and clear as possible so that, if the draft TEP is approved, the Department can assess whether the objectives have been met.

(b) State the particular actions

The draft TEP must set out the actions that the person will carry out in order to achieve the objectives. It is important that the actions are as definite, specific and as clear as possible. If they are vague or uncertain, it will be difficult for the Department to assess whether the person is doing what they have said they will do, which may prevent the Department from taking enforcement action in future. Each action must have a due date by which it will be completed, and must comply with the SMART principles.

Progress reporting dates and final reporting dates should be included in the actions.

In stating the particular actions required to achieve the objectives, the draft TEP must take into account best practice environmental management. Officers should refer to s21 of the Act for a definition of *best practice environmental management*.

(c) Prevention and minimisation of environmental harm

The risks of environmental harm being caused by the activity should also be taken into account. The draft TEP must state how any environmental harm that may be caused by the activity will be prevented or minimised, including any interim measures that are to be implemented.

(d) Transition to an environmental standard

If the objective of the draft TEP is to transition to meet an environmental standard, the draft TEP must provide details of the standard and set out how the activity is to transition to the standard before the operative period of the TEP comes to an end. Please see 'Achieving compliance with the Act' above for a definition of *environmental standard*.

(e) Transition to comply with a condition of an environmental authority or code of environmental compliance, or a development condition

If the objective of the draft TEP is for an activity to transition to comply with a condition of an environmental authority or code of environmental compliance, or a development condition, the draft TEP must set out each condition and detail how the activity does not comply with the condition. The draft TEP must also state how compliance with the condition will be achieved before the end of the operative period of the TEP.

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(f) Period over which the TEP is to be carried out

To be approved, the draft TEP must state the period over which the TEP is to be carried out. If the person has submitted for approval a draft TEP that states it will be carried out over a period longer than three years, the person must give public notice of the submission within 2 business days after the application date in accordance with s335 of the Act.

(g) Performance indicators

The draft TEP must state appropriate performance indicators at intervals of not more than 6 months. The performance indicators must show how the applicant is progressing in achieving the objectives of the TEP. The indicators must also be capable of being measured and be specific enough to enable the Department to assess with certainty whether or not they have been met. The date on which each performance indicator will be met must be set out in the TEP.

(h) Monitoring and reporting

The draft TEP must provide for sufficient monitoring and reporting on compliance with the program. It should provide for the person to monitor and report on—

- the carrying out of the actions
- whether or not the objectives are being achieved
- whether or not the required time-frames are being met and
- any environmental and scientific testing.

The draft TEP should also allow for the person to provide—

- reports on progress with the TEP, including any failure to carry out prescribed actions by the stipulated dates
- reports on any environmental monitoring requirements (including interpretation) and
- a final report to the Department demonstrating that compliance with the Act has been achieved.

Regulatory requirements (s338(1)(a))

Sections 46-64 of the *Environmental Protection Regulation 2008* specify the matters that must be considered when the Department is making environmental management decisions. An *environmental management decision* is a decision under the Act for which the Department is required to comply with regulatory requirements. All matters relevant to the draft TEP must be considered when making a decision about it, for example, if there are certain matters specified where release of water to land is contemplated.

Standard criteria (s338(1)(b)(i))

As stated above, the Department **must** consider the standard criteria, set out below, before deciding whether or not to approve the draft TEP—

- **The principles of ecologically sustainable development as set out in the ‘National Strategy for Ecologically Sustainable Development (ESD)’**

Consider the following guiding principles:

- Has the decision effectively integrated long- and short-term economic, environmental, social, and equity considerations?

TEP Part 2 – Considering and making a decision about a draft TEP

- Has due regard been given to the precautionary principle? In other words, where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- Does the decision have due regard to the global dimensions of environmental impacts and policies?
- Does the decision assist in the development of a strong, growing and diversified economy, which can enhance the capacity for environmental protection?
- Has the need to maintain and enhance international competitiveness in an environmentally sound manner been considered when making the decision?
- Have cost effectiveness and flexible policy instruments (for example, improved valuation, pricing and incentive mechanisms) been adopted?
- Does the decision/action allow for broad community involvement on issues that affect them?
- **Any applicable Environmental Protection Policies (EPPs)**
 - Is the draft TEP consistent with the EPPs on water, air, noise and waste (where relevant)?
- **Any applicable Commonwealth, State or local government plans, standards, agreements or requirements**
 - Consider guidelines such as the State and Regional Coastal Plan, National Health and Medical Research Council (NHMRC) and the Australian and New Zealand Environment and Conservation Council (ANZECC) Guidelines.
- **Any applicable environmental impact study, assessment or report**
 - Consider any findings or recommendations that are relevant to the draft TEP.
- **The character, resilience and values of the receiving environment**
 - Does the draft TEP have regard to the environmental values of the receiving environment?
 - What is the impact on the values of the actions contained in the draft TEP?
- **All submissions made by the applicant and submitters**
 - Consider any submissions made by the applicant and anyone who properly makes a submission about the draft TEP.
- **Best practice environmental management for the activity to which the draft TEP relates**
 - Analyse how approving the draft TEP with or without conditions will ensure that best practice environmental management is achieved.
- **The financial implications of the requirements**
 - Explore the financial implications for the client in complying with conditions of the TEP. Are they reasonable in the particular circumstances?
- **The public interest**
 - Is it in the interest of the community that the draft TEP be approved?
- **Any applicable site management plan**
 - If there is a site management plan for contaminated land (approved under Chapter 7, Part 8 of the Act), and is the draft TEP consistent with the site management plan? If not, is the inconsistency necessary for addressing the matters in the draft TEP? How will any inconsistency be reconciled?

TEP Part 2 – Considering and making a decision about a draft TEP

Consult with the Contaminated Land Unit as early as possible when there are any contaminated land issues.

- **Any relevant integrated environmental management system or proposed integrated environmental management system (IEMS)**
 - Is the draft TEP consistent with the IEMS? If not, is the inconsistency necessary for addressing the matters in the draft TEP? How will any inconsistency be reconciled?
- **Any other matter prescribed by a regulation**
 - See 'regulatory requirements' above.

Additional information (s338(1)(b)(ii))

The Department must consider any additional information given in relation to the draft TEP. Has all supporting information provided by the applicant been considered? Having considered the draft TEP and any supporting information, is it clear that the draft TEP achieves compliance with the Act?

Views expressed at a conference (s338(1)(b)(iii))

If a conference has been held as part of a public notice process, the views expressed at that conference in relation to the draft TEP must be considered and the reasons for having regard to, or not having regard to, those views must be recorded.

Consistency with development conditions of a development approval (s338(2))

If the draft TEP is prepared because of a development condition of a development approval, the Department must not approve the draft TEP unless it is consistent with other conditions of the development approval.

Public notice of submission of draft TEP (s337(2)) and substantial compliance with the Act (s342)

If public notice is required, before approving the draft TEP, ensure that the person or public authority submitting the draft TEP has properly given public notice and complied with the requirements of s335 of the Act.

The Department must be satisfied that the public notice has been properly given before making a decision (s337 of the Act). If the Department is not satisfied that public notice has been properly given, it may consider and decide whether to approve the draft program if it is satisfied there has been substantial compliance with the public notice requirements of the Act (s342).

See 'Is public notice required?' above for further information regarding public notice.

Satisfaction that the draft TEP meets the requirements of the Act

Having considered all of the above matters, officers completing the assessment report must decide whether they are satisfied the draft TEP adequately addresses all of the relevant matters. If any of the issues in the assessment report were answered 'no', officers should proceed to section 4. Otherwise, proceed to section 3.

3. Request for further information and/or amendments to the draft TEP

In some cases the draft TEP may substantially address the required matters, but cannot be approved because some matters have not been adequately addressed. In this situation, the Department may request that further information be provided or that particular amendments be made to the draft TEP. It is important to recognise that if there are major problems with the draft TEP, or a large number of matters that have not been addressed by the draft TEP, officers should recommend to the Delegate that it not be approved and a notice of decision should be sent to the person or public authority that submitted the draft TEP advising of this decision.

TEP Part 2 – Considering and making a decision about a draft TEP

However, if it is likely that the draft TEP would be approved if further information is provided or some changes are made, it is preferable for the Department to write to the person submitting the draft TEP and request the further information and/or amendments, rather than approve the TEP subject to conditions, owing to the fact that conditions may be difficult to enforce. See 'Key considerations regarding conditions' below for further information.

Officers should consult with their supervisor when considering whether to request further information or amendments to the draft TEP, and in formulating the amendments required to be made (if any). A request for amendments to a draft TEP should be made in writing. If, after the draft TEP is amended, it is approved, the amended TEP will form part of the approved TEP.

It is highly recommended that a request for amendments be made within 8 business days after the draft TEP is submitted to the Department, as this means that the application date will then be 10 business days after the date that the amended TEP is submitted to the Department. Consequently, the Department will have additional time to consider the amended TEP and make a decision whether or not to approve it.

Time-frames

For information regarding a change in time-frames if further information is sought or the Department requests amendments to the draft TEP, see the section 'Application date' above.

Minor amendments and/or further information

If only very minor amendments are necessary, officers should consider suspending the decision-making process, so as to provide the opportunity to the person submitting the draft TEP to make the requested amendments. If the requested amendments are made, the assessment report can then be completed to reflect the amendments. Then, if all relevant matters have been adequately addressed, officers may recommend that the Delegate approve the draft TEP.

More significant amendments

If the amendments required are more significant or complicated, officers should list the requested amendments in the assessment report and recommend that the Delegate approve a request for the required amendments. Then, if the amendments are provided by the person submitting the draft TEP, officers must complete a fresh assessment report and provide a new recommendation to the Delegate.

4. Approval of the draft TEP

The assessment report lists all the matters that must be considered by officers during the decision-making process, with checkboxes beside each matter. At least one checkbox must be checked beside each matter before a decision can be made to approve the draft TEP.

Key considerations regarding conditions

The Act does make provision for an approval of a draft TEP to be subject to conditions the Department considers appropriate. However, the enforceability of conditions placed on a TEP is unclear. Accordingly, conditions should not be imposed except for minor matters. Conditions must not be used to alter the terms of the TEP itself. If the TEP is not satisfactory, it must be refused or amendments sought from the applicant. Conditions in the notice of decision should not be used as a quasi-development approval, or to alter or amend the TEP to meet the requirements of the Act.

TEP Part 2 – Considering and making a decision about a draft TEP

Financial assurance conditions (ss364-367)

Under s364 of the Act, the Department may, by condition of an approval of a TEP, require the holder of the approval to give the Department financial assurance as security for—

- compliance with any conditions of the TEP and
- costs or expenses, or likely costs or expenses, that the Department incurs, or might reasonably incur, in taking action to:
 - prevent or minimise environmental harm or rehabilitate or restore the environment, in relation to the carrying out of an activity under a TEP approval or
 - secure compliance with the TEP, or any conditions of the TEP, for which financial assurance has been given.

However, under s364(2) the Department may impose a condition requiring a financial assurance to be given only if it is satisfied that the condition is justified, having regard to—

- the degree of risk of environmental harm being caused, or that might reasonably be expected to be caused, by the activity carried out, or to be carried out, under the program and
- the likelihood of action being required to rehabilitate or restore and protect the environment because of environmental harm being caused by the activity and
- the environmental record of the holder.

Section 365 of the Act provides that before approving a draft TEP subject to the condition that financial assurance be given, the Department must give the person who submitted the draft TEP a written notice that must –

- state the grounds for the condition and
- state the form and extent of the financial assurance and
- invite the person to make representations to the Department to show why the approval of the draft TEP should not be subject to the condition and
- state the period (at least 22 business days after the notice is given to the person) within which the representations may be made and
- the representations must be made in writing (s365(3)).

Within 20 business days after the end of the period stated in the notice (s365(4)), the Department must—

- consider the representations properly made by the person and
- if the Department gives the approval subject to the condition that the holder of the approval give financial assurance—the Department must give written notice to the person giving reasons for imposing the condition.

5. Refusal to approve a draft TEP

The draft TEP cannot be approved unless a checkbox has been checked next to each matter listed on the assessment report, either to confirm the matter has been adequately addressed, or to indicate that the matter is not applicable to the draft TEP. If a checkbox has not been checked next to a matter, officers are to provide details in the text field provided.

TEP Part 2 – Considering and making a decision about a draft TEP

If any of the required matters are not addressed in the draft TEP, officers should either recommend a refusal of the draft TEP, or seek further information or amendments to the draft TEP from the person that submitted it. (See 'Request for further information and/or amendments to the draft TEP' above). If the deficiencies in the draft TEP are too serious to be addressed by further information and amendments, the Department should refuse to approve the draft TEP.

6. Provide for natural justice

The Department must ensure that decisions are made in a fair and consistent manner. This includes ensuring that the affected individual is provided with 'natural justice' (that they are given an opportunity to make their case for why the decision should go in their favour) and that people involved in making the decision are free from bias or the perception of bias.

Any submissions made by the applicant that have not already been considered earlier in the assessment report process must be documented in section 5 of the assessment report.

7. Recommendation

Officers are required to make a recommendation as to whether or not the draft TEP should be approved (with or without conditions) or refused.

8. Approval

An officer with the appropriate delegation must consider the contents of the assessment report and the recommendation and make a decision about whether to approve (with or without conditions) or refuse the draft TEP. The Department's list of delegations can be found on the Department's intranet at <http://insite2.dnr.qld.gov.au/derm/delegations/>.

Step 2 – Complete the notice of decision

Section 240 of the Act provides that within 8 business days of making a decision under s339, the Department must give the person or public authority that submitted the draft TEP a written notice of the decision (the notice of decision).

If the delegate approves the draft TEP, the notice of decision must—

- identify the documents forming the approved TEP, including any amendments under s339(1)(a)(ii) and
- state any conditions imposed on the approval by the Department and
- state the day the approval ends.

If the draft TEP is approved, the approval remains in force for the period stated in the notice of decision (s339(3)).

Content of approved program (s341)

An approved TEP consists of the following—

- the draft program submitted under section 332 or 333, as amended at the request, or with the agreement of the Department

TEP Part 2 – Considering and making a decision about a draft TEP

- any conditions imposed on the program by the Department.

Information notice

If the Department refuses to approve the draft TEP, or approves it with conditions, the notice of decision given to the person or public authority that submitted the program must be an information notice (s340(3)).

An *information notice* means a written notice stating—

- the decision and
- the reasons for the decision and
- the review and appeal details.

Officers must issue an invoice for the fees for consideration of the draft TEP to the person or public authority that has submitted the draft TEP for approval at the time when the notice stating the Department's decision is issued. See: [Operational policy - Transitional Environmental Program \(TEP\) fees](#)

What is the effect of compliance with the approved TEP? (s346)

An approved TEP protects the holder, or a person acting under the approval, from enforcement action for non-compliance with the relevant—

- regulation or
- environment protection policy (EPP) or
- environmental authority (EA) held by the holder or
- development condition of a development approval (DA) or
- standard environmental condition of a code of environmental compliance for a chapter 4 activity or
- accredited environmental risk management plan (ERMP) under the Great Barrier Reef protection measures.

What follow-up is required?

It is an offence for the holder of an approved TEP to contravene the program. Officers should diarise all performance indicator requirements listed in the program or conditions and ensure they are monitored for compliance.

Officers are encouraged to use tools such as reminders in Microsoft outlook to ensure the matter is followed up in a timely manner.

Review of decisions and appeals

The provisions regarding review of decisions and appeals may be found in Chapter 11, Part 3 of the Act.

The Act specifies that a person who is dissatisfied by a decision made by the Department about a draft TEP, may apply for a review of an original decision by submitting an application on the approved form to the Department—

- within 10 business days after the day on which the person received notice of the original decision or the Department is taken to have made the decision, or

TEP Part 2 – Considering and making a decision about a draft TEP

- if there are special circumstances, whatever longer period the Department allows.

An approved form for the review of an original decision may be found at [Application form - Review of Original Decision](#)

A person who has made an application for review of an original decision may immediately apply to the Planning and Environment Court for a stay of the decision.

If the person is dissatisfied with the review decision, the person may appeal against that decision to the Planning and Environment Court by filing written notice of appeal with the registrar of the Court within 22 business days after the day the person receives notice of the decision or the decision is taken to have been made, unless the Court extends the period for filing the notice of appeal.

The court may grant a stay of a decision appealed against until such time the appeal is decided. An appeal against a decision does not affect the operation or the carrying-out of a decision unless the decision is stayed.

Further information about review of decisions and appeals may be found in the [Information sheet - Internal review \(DERM\) and appeal to the Planning and Environment Court](#)

What penalties exist for a contravention of a requirement of a TEP (s432)?

The holder of an approval of a TEP, or a person acting under a TEP, must not wilfully contravene a requirement of the program.

Maximum penalty—1665 penalty units (\$166,500.00) or 2 years imprisonment.

The holder of an approval of a TEP, or a person acting under a TEP, must not contravene the program.

Maximum penalty—835 penalty units (\$83,500.00).

The maximum penalty for a corporation is five times the penalty for an individual.

What penalties exist for contravention of a condition of approval (s432A)?

A person must not, without reasonable excuse, contravene a condition of an approval of a transitional environmental program.

Maximum penalty—835 penalty units (\$83,500.00)

The maximum penalty for a corporation is five times the penalty for an individual.

MFB-05-12 – Water Resources (Fitzroy Basin) Plan 1999

This document can be found at:

<http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WaterRFBPlan99.pdf>

Fitzroy Basin

resource operations plan

January 2004

Amended July 2009
(revision 2)

Prepared by:

Water Planning Group

Department of Environment and Resource Management

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Chapter 1

Introduction

This Fitzroy Basin Resource Operations Plan January 2004 implements the Water Resource (Fitzroy Basin) Plan 1999.

A water resource plan (WRP) is a plan prepared under the provisions of the *Water Act 2000* (Water Act), approved by the Minister and is subordinate legislation. A WRP sets the strategic framework for the allocation and sustainable management of water.

A resource operations plan (ROP) is a plan prepared under the provisions of the Water Act by the chief executive to implement a WRP for certain water in all or part of the plan area. A ROP defines the rules that guide the allocation and management of water to achieve the objectives set in the WRP.

The scope of the Fitzroy Basin Resource Operations Plan is detailed in Chapter 2.

Chapter 2

Scope of Resource Operations Plan

Overview

The Water Act specifies the elements that a resource operations plan (ROP) must contain or address – for instance its name, the area and the water to which it applies, the water resource plan (WRP) it is being prepared for, and the infrastructure involved. This chapter outlines some of these requirements.

2.1 WRP under which the ROP is made

The ROP is made to implement the Water Resource (Fitzroy Basin) Plan 1999.

2.2 Name of the ROP

The name of this ROP is the Fitzroy Basin Resource Operations Plan January 2004.

2.3 Commencement of the ROP

The Fitzroy Basin ROP was approved by the Governor in Council on 18 December 2003 and came into effect on 9 January 2004. The ROP commenced on the first business day after the ROP took effect.

Amendments to the ROP take effect on the day approval by the Governor in Council is notified in the Government Gazette. Amendments to the ROP commence on the first business day after the amendment to the ROP takes effect.

2.4 ROP area

The area to which the ROP applies is the entire Fitzroy River Basin covered by the WRP. The area covered is shown in Map A.

2.5 Water to which the ROP applies

The ROP applies to water in each watercourse, lake or spring, and water conserved by a weir, dam or barrage constructed in, on or over a watercourse, lake, or spring.

2.6 Water infrastructure to which the ROP applies

The ROP applies to the infrastructure outlined in the attachments for the following water supply schemes:

- Dawson Valley Water Supply Scheme Attachment 4.1D;
- Nogoia Mackenzie Water Supply Scheme Attachment 4.2D;
- Lower Fitzroy Water Supply Scheme Attachment 4.3D; and
- Fitzroy Barrage Water Supply Scheme Attachment 4.4D.

2.7 Sustainable management and allocation of water

The WRP states:

‘Water in the plan area must be managed in an integrated and sustainable way that seeks to achieve a balance in providing

- security for water users in the plan area;
- security for holders of resource operations licences in the plan area;
- for further water-related development in the plan area; and
- for environmental water requirements for aquatic ecosystems in the plan area.’

These outcomes are to be achieved through the environmental flow objectives, water allocation security objectives and strategies specified in the WRP.

2.8 Zones

For the purpose of defining the location of a water allocation within a particular reach of river, geographic zones have been defined in parts of the ROP area.

The attachments to this chapter define these zones, according to the river systems in the ROP area. The river systems and relevant attachments are:

- The Dawson River Attachment 2.1;
- The Nogoia and Mackenzie rivers Attachment 2.2; and
- The Fitzroy River Attachment 2.3.

The zones are shown in maps in each of these attachments.

Chapter 3

Assessment

Overview

Assessment framework

The assessment program is intended to assist in determining how effective the Water Resource Plan (WRP) strategies are in achieving the WRP's specified outcomes.

The outcomes relate to:

- Security for water users and holders of resource operations licences; and
- Providing environmental water for aquatic ecosystems.

The strategies specified in the WRP are designed to meet environmental flow objectives and water allocation security objectives that will in turn achieve these outcomes. The Resource Operations Plan (ROP) has been developed to ensure that these objectives are satisfied. The management arrangements in the ROP for supplemented water supply schemes and associated infrastructure, and those for unsupplemented water are dealt with in Chapter 4 and Chapter 5 respectively.

The assessment program will check for compliance with the management arrangements in the ROP and, over the long term, will assist in determining how effectively the strategies in the WRP are achieving the WRP outcomes.

The assessment framework is outlined in Figure 1.

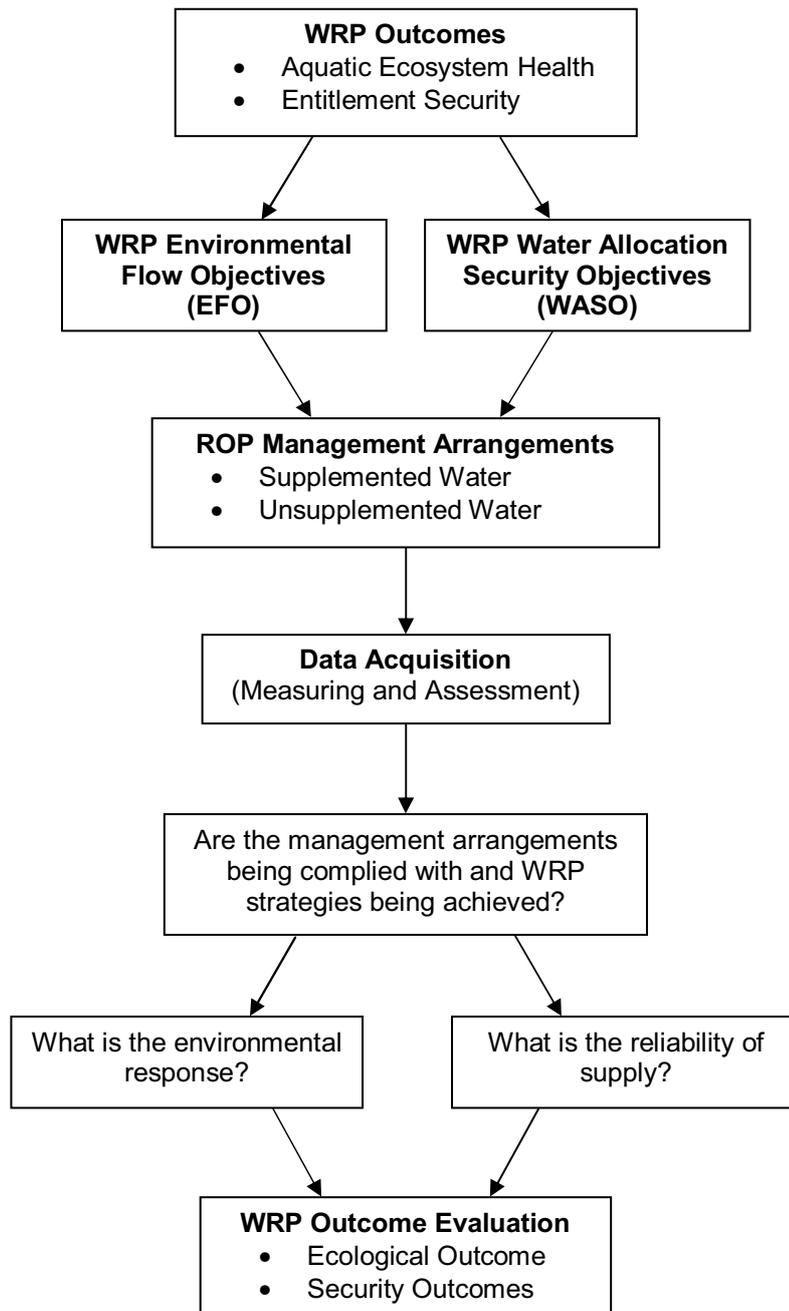
The assessment program seeks to establish whether:

- The management rules are being complied with;
- The water resource plan is contributing to the ecological outcome; and
- The water resource plan is contributing to the security outcomes.

The information obtained by the monitoring activities of the assessment program will also contribute to an improved information base for future water planning within the Fitzroy Basin.

The responsibilities for monitoring and reporting activities required by the assessment program rest with the State Government and the holders of Resource Operations Licences (ROL holders).

Figure 1: Assessment Framework



Aquatic ecosystem assessment in the Fitzroy Basin

The framework to assess the ecological performance of the strategies in the WRP is designed to confirm the detail of the implicit assumptions of the plan. The relevant assumptions fall into two categories:

- Specific flows create the aquatic conditions necessary to provide opportunity for an ecological response (for example, the first post-winter flow will create the conditions that enable yellowbelly fish to spawn and their eggs to hatch).
- Specific aquatic conditions provide opportunities for ecological responses (for example, if water velocity is sufficient to keep yellowbelly fish eggs suspended in the water column for approximately 2 to 3 weeks after spawning, the eggs and larvae have an increased chance of surviving)

The framework requires detailed understanding of the biology of organisms in order to find critical ecological responses (for example, death of individuals, breeding behaviour, successful recruitment) that depend on specific aquatic conditions (for example, water depth, water velocity, water temperature, length of time of inundation and seasonal timing).

Ecological responses might not necessarily be elicited given the provision of suitable aquatic conditions because other influences may prevent the response (for example, a chemical spill could kill all of the fish that would have otherwise spawned). Flow management can provide the opportunity for an ecological response but not guarantee the response.

The basis of the framework is as follows:

- Organisms respond to real-time specific aquatic conditions such as hydraulic characteristics of water depth and velocity;
- Water availability is currently managed by controlling hydrologic characteristics;
- Management of hydrologic characteristics controls the availability of specific aquatic conditions that give opportunities for ecological response; and
- Therefore, availability of specific aquatic conditions is the mediator for ecological responses to water management.

In the framework, the assessment of the effectiveness of delivery of ecological outcomes requires confirmation of:

- The provision of specific aquatic conditions that give opportunities for ecological response;
- The specifics of the aquatic conditions necessary for the ecological response; and
- The hydraulic model linking flow to specific aquatic conditions.

Related monitoring activities

Other monitoring programs being carried out in the Fitzroy Basin are addressing different questions and hence collect different information. This includes the water quantity and quality monitoring programs carried out by the department. Other programs are conducted by agencies such as the Environmental Protection Agency, the Department of Primary Industries, universities and Cooperative Research Centres (CRCs). These other programs include short-term, localised projects of only 2 or 3 years that are targeted at significant issues. However, although at this point they are not integral to the ROP, they may provide data and findings suitable for integration at some later stage. The studies will also contribute to the knowledge

base used to develop future water resource plans.

Metering water entitlements

Measuring water diversion and use is fundamental to responsible management of the State's water resources. Meters and/or other flow measurement devices are required to provide data for water management activities, including:

- Demonstrating compliance with management rules;
- Equitable sharing of available water;
- Property scale water management; and
- Water resource planning.

All water allocations will be metered. In addition, water licences identified by criteria set out in Section 5.5 of Chapter 5 will be amended to provide for metering.

3.1 Performance assessment

The assessment of the overall performance of the water resource plan will incorporate analysis of the data collected from monitoring programs.

3.1.1 Aquatic ecosystem monitoring program

The aquatic ecosystem monitoring and reporting requirements are specified in Attachment 3.1.

3.1.2 Other monitoring programs

Information collected as part of other monitoring and assessment programs in the catchment may be used in the assessment of the ecological outcomes detailed in the water resource plan. These may include (but are not limited to) ROL holder monitoring, the state monitoring program (www.nrw.qld.gov.au/water/monitoring/pdf/numeric.pdf), community monitoring programs, the National Action Plan for Salinity and Water Quality and specific research projects.

3.2 ROL holder monitoring and reporting requirements

The monitoring and reporting requirements for the ROL holder for the Dawson Valley Water Supply Scheme are given in Attachment 4.1G.

The monitoring and reporting requirements for the ROL holder for the Nogo Mackenzie Water Supply Scheme are given in attachment 4.2G.

The monitoring and reporting requirements for the ROL holder for the Lower Fitzroy Water Supply Scheme are given in Attachment 4.3G.

The monitoring and reporting requirements for the ROL holder for the Fitzroy Barrage Water Supply Scheme are given in Attachment 4.4G.

3.3 Departmental water monitoring data collection standard

Where this plan requires monitoring by a ROL holder, including measurement, collection, analysis and storage of data, the ROL holder must ensure the monitoring is consistent with the

Water Monitoring Data Collection Standard.

The Water Monitoring Data Collection Standard may be reviewed and updated by the chief executive at any time.

The chief executive must notify the ROL holder at least 20 business days before any substantive changes are made to the Water Monitoring Data Collection Standard.

3.4 Departmental water monitoring data reporting standard

Where this plan requires transfer of data or reporting by a ROL holder, the ROL holder must ensure the transfer or reporting is consistent with the Water Monitoring Data Reporting Standard.

The Water Monitoring Data Reporting Standard may be reviewed and updated by the chief executive at any time.

The chief executive must notify the ROL holder at least 20 business days before any substantive changes are made to the Water Monitoring Data Reporting Standard.

3.5 Monitoring data must be made available

The ROL holder must transfer monitoring data to the chief executive upon request, and within the time requested.

Chapter 4

Supplemented water supply schemes

Overview

Supplemented water is water that is supplied from a water supply scheme managed under a Resource Operations Licence (ROL).

Unsupplemented water management (for example, waterharvesting), which is covered in Chapter 5, is the responsibility of the department.

Water supply schemes and their operation

Supplemented water management arrangements detailed in this Resource Operations Plan (ROP) cover the following water supply schemes:

- The Nogoia Mackenzie Water Supply Scheme;
- The Dawson Valley Water Supply Scheme;
- The Lower Fitzroy Water Supply Scheme; and
- The Fitzroy Barrage Water Supply Scheme.

The approximate extent of these water supply schemes is shown in Map B.

Callide Valley Water Supply Scheme

This ROP does not deal with the Callide Valley Water Supply Scheme, which will be subject to an amendment to the ROP at a later stage.

In the interim, the scheme will continue to be operated and managed in accordance with SunWater's existing Interim Resource Operations Licence, issued in November 2000, unless otherwise amended.

Monitoring and reporting

If, as a result of the monitoring required under this ROP, the ROL holder becomes aware of an incident or storage operation practice that may cause, or threaten to cause, material or serious environmental harm as defined by the Environmental Protection Act 1994 (EP Act), the ROL holder has an obligation under Section 320 of the EP Act to report the incident to the Environmental Protection Agency. This may include water released from storages not meeting the relevant water quality guidelines as determined by the Environmental Protection Policy 1997.

4.1 Dawson Valley Water Supply Scheme

Overview

This section specifies the water management arrangements for the Dawson Valley Water Supply Scheme, which extends some 338 km along the Dawson River from the Glebe Weir pond to the downstream end of the Boolburra waterhole, which is near Duinga, or approximately 18 km upstream of the Fitzroy River junction.

Priority group for authorisations supplied through Dawson channel system

Existing authorisations supplied through the Theodore and Gibber Gonyah channel systems have been converted as medium A priority water allocations, except where part or all of an authorisation has been converted as high priority water allocation under the conversion rules.

Sub-schemes

The Dawson Valley Water Supply Scheme is divided into two sub-schemes. The upper Dawson sub-scheme includes Glebe, Gylanda, Orange Creek, Theodore, and Moura weirs and the Moura Offstream Storage, while the lower Dawson sub-scheme includes Neville Hewitt Weir.

Releases may not be made from the upper sub-scheme to supply water orders or maintain storage levels in the lower sub-scheme. The lower sub-scheme independently achieves higher reliabilities than the upper sub-scheme without the need for releases from the upper sub-scheme.

Environmental management rules

The operating rules include strategies for meeting environmental flow requirements. Provisions are made for passing first post-winter flows and seasonal base flows.

For the upper Dawson sub-scheme, the first post-winter flow management strategy will be activated by specified flow criteria for flows downstream of Glebe Weir. For the lower Dawson sub-scheme, the strategy will be activated by specified flow criteria for flows either immediately downstream of Neville Hewitt Weir or downstream of the Don River junction. Management strategies apply for 21 days following activation, during which the ROL holder will be required, subject to specified exceptions, to pass inflows. There are no specific restrictions on taking supplemented water during this period.

The ROP also includes seasonal base flow management strategies for Theodore, Moura and Neville Hewitt weirs. The strategies require the ROL holder to pass base flows through these weirs whenever specified flow and storage level criteria occur.

Water sharing rules

The water sharing rules specify the way the available water will be shared between the water allocation priority groups, namely medium, medium A and high.

The water sharing rules include announced allocation rules for medium, medium A and high priority water allocations, rules for sharing water to deal with occurrences of low water

availability (critical water supply water sharing rules), provision for the transfer of water from one water year to another, and provision for seasonal water assignment.

Seasonal assignment of water allocations for distribution losses associated with the Theodore or Gibber Gunyah channels is currently not permitted.

The ROP maintains the 20% announced allocation differential for medium A priority water allocations.

The critical water supply water sharing rules define how the available supplies are to be shared when available supplies are low, including securing supplies for essential water needs. The arrangements for July to September are activated only when the announced allocations cannot be met from available supplies.

4.1.1 Extent of the water supply scheme

The extent of the Dawson Valley Water Supply Scheme is:

- The Dawson River from the upstream limit of Glebe Weir (AMTD 356.5 km) to the downstream limit of the Boolburra waterhole (AMTD 18.37 km); and,
- Sections of tributaries of the Dawson River that contain water from natural waterholes and infrastructure within the above section of the Dawson River.

The Dawson Valley Water Supply Scheme is divided into:

- The upper Dawson sub-scheme; and
- The lower Dawson sub-scheme.

The extent of the upper Dawson sub-scheme is from the upstream limit of Glebe Weir (AMTD 356.5 km) to the effective upstream limit of Neville Hewitt Weir (AMTD 113 km), which is the upstream extent of the Harcourt waterhole.

The lower Dawson sub-scheme extends from the effective upstream limit of Neville Hewitt Weir (AMTD 113 km) to the downstream limit of Boolburra waterhole (AMTD 18.37 km), which is near Duaringa.

4.1.2 Water allocations associated with the water supply scheme

Authorisations supplied through the Dawson Valley Water Supply Scheme have been converted to water allocations under the rules given in Attachment 4.1B.

Details of water allocations converted from authorisations supplied through the Dawson Valley Water Supply Scheme are given in Attachment 4.1A.

The total volume of supplemented water allocations in the Dawson Valley Water Supply Scheme, for each zone and priority group, at commencement of the ROP, is given in Attachment 4.1C.

Water supplied under a water allocation may only be used for the purpose stated on that water allocation.

4.1.3 Continuing interim water allocations associated with the water supply scheme

An interim water allocation for 105 ML held by SunWater for the Back Creek Water Area will not be converted to a water allocation until the future arrangements for administration of the area and the volume and ownership details for the water allocation are resolved to the satisfaction of the chief executive. These matters will be resolved following a review of the Back Creek Water Area referred to in Section 6.2.5 of Chapter 6.

4.1.4 Infrastructure associated with the water supply scheme

The infrastructure associated with the Dawson Valley Water Supply Scheme is defined in Attachment 4.1D.

Infrastructure details defined in Attachment 4.1D may not be changed unless the change is provided for in Chapter 8.

4.1.5 Infrastructure operating rules

The rules for infrastructure operation and environmental management for the Dawson Valley Water Supply Scheme are given in Attachment 4.1E.

4.1.6 Water sharing rules

The water sharing rules for the Dawson Valley Water Supply Scheme are given in Attachment 4.1F.

4.1.7 Monitoring and reporting requirements for Resource Operations Licence holder

The monitoring and reporting requirements for the ROL holder for the Dawson Valley Water Supply Scheme are given in Attachment 4.1G.

4.1.8 Water allocation change rules

The water allocation change rules for the Dawson Valley Water Supply Scheme are given in Attachment 4.1H.

4.1.9 Amending critical water supply management arrangements

The rules for amending critical water supply management arrangements for the Dawson Valley Water Supply Scheme are given in Attachment 4.1I.

4.2 Nogo Mackenzie Water Supply Scheme

Overview

This section specifies the water management arrangements for the Nogo Mackenzie Water Supply Scheme, which extends for some 398 km along the Nogo and Mackenzie rivers from the Fairbairn Dam pond to the Springton Creek junction. The Springton Creek junction is located approximately 29 km upstream from the Dawson River junction.

Environmental management rules

The operating rules include strategies for meeting environmental flow requirements. Provisions are made for passing first post-winter flows and seasonal base flows.

For Fairbairn Dam, the first post-winter flow management strategy will be activated by specified flow criteria for flow in the Mackenzie River immediately downstream of the Comet River junction. For Bedford Weir, the first post-winter flow management strategy will be activated by specified flow criteria for flow in the Mackenzie River immediately downstream of Bingegang Weir. The management strategy applies for Fairbairn Dam for 19 days following activation, and 21 days for Bedford Weir, during which the ROL holder will be required, subject to specified exceptions, to pass inflows to Fairbairn Dam and Bedford Weir through these storages. There are no requirements under the management strategy applying to Selma, Bingegang or Tartrus weirs. There are no specific restrictions on taking supplemented water during this period.

The discharge capacity of the outlet of Fairbairn Dam will be increased from its current (approximately) 600 ML/day limit to up to about 1,500 ML/day to achieve the first post-winter flow objectives at Bedford and Bingegang Weirs. The implementation schedule provided in Attachment 9 gives a timeframe for the ROL holder to comply with this higher release rate requirement.

The ROP also includes seasonal base flow management strategies for Bedford, Bingegang and Tartrus weirs. The strategies require the ROL holder to pass base flows through these weirs whenever specified time of year, flow and storage level criteria occur.

Water sharing rules

The water sharing rules specify the way the available water will be shared between the water allocation priority groups, namely medium and high.

The water sharing rules include announced allocation rules for medium and high priority water allocations, rules for sharing water to deal with occurrences of low water availability (critical water supply water sharing rules), provision for the transfer of water from one water year to another, and provision for seasonal water assignment.

Seasonal assignment of water allocations for distribution losses associated with the Selma or Weemah channels and Blackwater pipeline is currently not permitted.

The critical water supply water sharing rules define how the available supplies are to be shared when available supplies are low, including securing supplies for essential purposes.

4.2.1 Extent of the water supply scheme

The extent of the Nogo Mackenzie Water Supply Scheme is:

- The Nogo River from the upstream limit of Fairbairn Dam (AMTD 737.5 km) to the Comet River junction (AMTD 611.5 km);
- The Mackenzie River from the Comet River junction (AMTD 611.5 km) to the Springton Creek junction (AMTD 339.3 km); and
- Sections of tributaries of these rivers that contain water from natural waterholes and infrastructure within the above sections of the Nogo and Mackenzie rivers.

4.2.2 Water allocations associated with the water supply scheme

Authorisations supplied through the Nogo Mackenzie Water Supply Scheme have been converted to water allocations under the rules given in Attachment 4.2B.

Details of water allocations converted from authorisations supplied through the Nogo Mackenzie Water Supply Scheme are given in Attachment 4.2A.

The total volume of supplemented water allocations in the Nogo Mackenzie Water Supply Scheme, for each zone and priority grouping, at commencement of the ROP, is given in Attachment 4.2C.

Water supplied under a water allocation may only be used for the purpose stated on that water allocation.

4.2.3 Infrastructure associated with the water supply scheme

The infrastructure associated with the Nogo Mackenzie Water Supply Scheme is defined in Attachment 4.2D.

The infrastructure details defined in Attachment 4.2D may not be changed unless the change is provided for in Chapter 8.

4.2.4 Infrastructure operating rules

The rules for infrastructure operation and environmental management for the Nogo Mackenzie Water Supply Scheme are given in Attachment 4.2E.

4.2.5 Water sharing rules

The water sharing rules for the Nogo Mackenzie Water Supply Scheme are given in Attachment 4.2F.

4.2.6 Monitoring and reporting requirements for Resource Operations Licence holder

The monitoring and reporting requirements for the ROL holder for the Nogo Mackenzie Water Supply Scheme are given in Attachment 4.2G.

4.2.7 Water allocation change rules

The water allocation change rules for the Nogo Mackenzie Water Supply Scheme are given in Attachment 4.2H.

4.2.8 Amending critical water supply management arrangements

The rules for amending critical water supply management arrangements for the Nogoia Mackenzie Water Supply Scheme are given in Attachment 4.2I.

4.3 Lower Fitzroy Water Supply Scheme

Overview

This section specifies the water management arrangements for the Lower Fitzroy Water Supply Scheme, which extends for some 68 km along the Fitzroy River from the Eden Bann Weir pond to the upstream limit of the Fitzroy Barrage.

Conversion of area-based water licences on and downstream of Eden Bann Weir pond

The area-based water licences from the Eden Bann Weir pond to the upstream limit of the Fitzroy Barrage pond have been converted to medium priority water allocations, and will be supplied by the ROL holder for the Lower Fitzroy Water Supply Scheme.

Conjunctive operation of Eden Bann Weir and Fitzroy Barrage

The Lower Fitzroy Water Supply Scheme, based on Eden Bann Weir, and the Fitzroy Barrage Water Supply Scheme, based on the Fitzroy Barrage, will be operated in conjunction.

Releases will be made from Eden Bann Weir to maintain the level of water stored in the Barrage at about 0.4 metres below full supply level. This will enable the Barrage fishway to continue to function, will minimise pumping costs for Barrage water users, and support continued recreational use.

Releases from Eden Bann Weir to the Barrage will cease when the weir level falls to EL 9.55 m AHD (overflow level for original waterhole at Eden Bann). Provision is made for releases to the Barrage to resume when the level in the Barrage is very low and water is available from the weir.

While releases from Eden Bann Weir to the Barrage will cease at EL 9.55 m AHD, releases will continue to be made to supply water allocation holders upstream of the Barrage pond. This practice will cease when weir releases are no longer practicable, or restrictions are imposed through the critical water supply water sharing rules.

Environmental management rules

Seasonal base flows will be passed through Eden Bann Weir as a consequence of the seasonal base flow management rules for the Fitzroy Barrage Water Supply Scheme and the requirement for releases from Eden Bann Weir to maintain the level in the Barrage.

Water sharing rules

The water sharing rules specify the way the available water will be shared between the water allocation priority groups, namely medium and high.

The water sharing rules include announced allocation rules for medium and high priority water allocations, rules for sharing water to deal with occurrences of low water availability (critical water supply water sharing rules), provision for the transfer of water from one water year to another, and provision for seasonal water assignment.

The critical water supply water sharing rules prevent medium priority water extractions whenever the Barrage is approximately 3 metres below full supply level. This is necessary to protect high priority water allocations such as those held by Stanwell Power Station and

Rockhampton City Council. The rules also restrict the amount of high priority water allocation that may be taken during these periods.

Seasonal assignment of water allocations for distribution losses associated with the Stanwell pipeline is currently not permitted.

4.3.1 Extent of the water supply scheme

The extent of the Lower Fitzroy Water Supply Scheme is:

- The Fitzroy River from the upstream limit of Eden Bann Weir (AMTD 183.4 km) to the upstream limit of the Fitzroy Barrage (AMTD 115.0 km); and
- Sections of tributaries of the Fitzroy River that contain water from natural waterholes and infrastructure within the above section of the Fitzroy River.

4.3.2 Water allocations associated with the water supply scheme

Authorisations supplied through the Lower Fitzroy Water Supply Scheme have been converted to water allocations under the rules given in Attachment 4.3B.

Details of water allocations converted from authorisations supplied through the Lower Fitzroy Water Supply Scheme are given in Attachment 4.3A.

The total volume of supplemented water allocations in the Lower Fitzroy Water Supply Scheme, for each zone and priority grouping, at commencement of the ROP, is given in Attachment 4.3C.

Water supplied under a water allocation may only be used for the purpose stated on that water allocation.

4.3.3 Infrastructure associated with the water supply scheme

The infrastructure associated with the Lower Fitzroy Water Supply Scheme is defined in Attachment 4.3D.

Infrastructure details defined in Attachment 4.3D may not be changed unless the change is provided for in Chapter 8.

4.3.4 Infrastructure operating rules

The rules for infrastructure operation and environmental management for the Lower Fitzroy Water Supply Scheme are given in Attachment 4.3E.

4.3.5 Water sharing rules

The water sharing rules for the Lower Fitzroy Water Supply Scheme are given in Attachment 4.3F.

4.3.6 Monitoring and reporting requirements for Resource Operations Licence holder

The monitoring and reporting requirements for the ROL holder for the Lower Fitzroy Water Supply Scheme are given in Attachment 4.3G.

4.3.7 Water allocation change rules

The water allocation change rules for the Lower Fitzroy Water Supply Scheme are given in Attachment 4.3H.

4.3.8 Amending critical water supply management arrangements

The rules for amending critical water supply management arrangements for the Lower Fitzroy Water Supply Scheme are given in Attachment 4.3I.

4.4 Fitzroy Barrage Water Supply Scheme

Overview

This section specifies the water management arrangements for the Fitzroy Barrage Water Supply Scheme, which extends for some 55 km along the Fitzroy River.

Conversion of existing authorisations to water allocations

Water entitlements for Fitzroy Barrage irrigators have been converted to medium priority water allocations, which will be supplied by the ROL holder for the Fitzroy Barrage Water Supply Scheme.

Conjunctive operation of Eden Bann Weir and Fitzroy Barrage

The Lower Fitzroy Water Supply Scheme, based on Eden Bann Weir, and the Fitzroy Barrage Water Supply Scheme, based on the Fitzroy Barrage, will be operated in conjunction.

Releases will be made from Eden Bann Weir to maintain the level of water stored in the Barrage at about 0.4 metres below full supply level. This will enable the Barrage fishway to continue to function, will minimise pumping costs for Barrage water users, and support continued recreational use.

Releases from Eden Bann Weir to the Barrage will cease when the weir level falls to EL 9.55 m AHD (overflow level for original waterhole at Eden Bann). Provision is made for releases to resume when the level within the Barrage is very low and water is available from the weir.

Environmental management rules

The ROP includes a seasonal base flow management strategy for the Barrage. The strategy requires the ROL holder to pass base flows through the Barrage whenever specified flow and storage level criteria occur. The flow criteria relate to inflows to Eden Bann Weir.

Water sharing rules

The water sharing rules specify the way the available water will be shared between the water allocation priority groups, namely medium and high.

The water sharing rules include announced allocation rules for medium and high priority water allocations, rules for sharing water to deal with occurrences of low water availability (critical water supply water sharing rules), provision for the transfer of water from one water year to another, and provision for seasonal water assignment.

The critical water supply water sharing rules prevent medium priority water extractions whenever the Barrage is approximately 3 metres below full supply level. This is necessary to protect high priority water allocations such as those held by Stanwell Power Station and Rockhampton City Council. The rules also restrict the amount of high priority water allocation that may be taken during these periods.

4.4.1 Extent of the water supply scheme

The extent of the Fitzroy Barrage Water Supply Scheme is:

- The Fitzroy River from the upstream limit of the Fitzroy Barrage (AMTD 115.0 km) to the Fitzroy Barrage (AMTD 59.6 km); and
- Sections of tributaries of the Fitzroy River that contain water from the Fitzroy Barrage.

4.4.2 Water allocations associated with the water supply scheme

Authorisations supplied through the Fitzroy Barrage Water Supply Scheme have been converted to water allocations under the rules given in Attachment 4.4B.

Details of water allocations converted from authorisations supplied through the Fitzroy Barrage Water Supply Scheme are given in Attachment 4.4A.

The total volume of supplemented water allocations in the Fitzroy Barrage Water Supply Scheme, for each zone and priority grouping, at the commencement of the ROP, is given in Attachment 4.4C.

Water supplied under a water allocation may only be used for the purpose stated on that water allocation.

4.4.3 Infrastructure associated with the water supply scheme

The infrastructure associated with the Fitzroy Barrage Water Supply Scheme is defined in Attachment 4.4D.

Infrastructure details defined in Attachment 4.4D may not be changed unless the change is provided for in Chapter 8.

4.4.4 Infrastructure operating rules

The rules for infrastructure operation and environmental management for the Fitzroy Barrage Water Supply Scheme are given in Attachment 4.4E.

4.4.5 Water sharing rules

The water sharing rules for the Fitzroy Barrage Water Supply Scheme are given in Attachment 4.4F.

4.4.6 Monitoring and reporting requirements for Resource Operations Licence holder

The monitoring and reporting requirements for the ROL holder for the Fitzroy Barrage Water Supply Scheme are given in Attachment 4.4G.

4.4.7 Water allocation change rules

The water allocation change rules for the Fitzroy Barrage Water Supply Scheme are given in Attachment 4.4H.

4.4.8 Amending critical water supply management arrangements

The rules for amending critical water supply management arrangements for the Fitzroy Barrage Water Supply Scheme are given in Attachment 4.4I.

Chapter 5

Unsupplemented water management

Overview

Unsupplemented water is water that is not supplied from a water supply scheme managed under a resource operations licence.

Unsupplemented water management is the responsibility of the department.

Supplemented water management within a water supply scheme, which is covered in Chapter 4, is the responsibility of a Resource Operations Licence (ROL) holder.

Unsupplemented water management areas

Unsupplemented water management arrangements detailed in this Resource Operations Plan (ROP) cover the following water management areas:

- The Dawson Valley Water Management Area in Section 5.1 covering the Dawson River from the Glebe Weir pond to the Fitzroy River junction;
- The Nogoia Mackenzie Water Management Area in Section 5.2 covering the Nogoia and Mackenzie rivers from the Fairbairn Dam pond to the Dawson River junction; and
- The Fitzroy Water Management Area in Section 5.3 covering the Fitzroy River from the Dawson River junction to the Fitzroy Barrage.

The approximate extent of these water management areas is shown in Map C.

Over time, future additions to the ROP will progressively extend the unsupplemented water management arrangements to other parts of the Fitzroy basin.

Seasonal assignment of water licences outside water management areas

Section 5.4 specifies those areas outside of those water management areas established under this ROP where seasonal water assignments can be made, and the associated rules.

Additional areas and rules for seasonal water assignment may be established under the amendment provisions given in Chapter 8.

Amendment of water licences and metering outside water management areas

Section 5.5 sets out the criteria under which metering of water licences will be required and provides for the amendment of those affected licences in areas outside the water management areas established under this ROP.

Apart from these changes, existing authorisations outside the specified water management areas will continue to be subject to their current terms and conditions unless they are amended either by a change to the ROP, for consistency with the Water Resource Plan (WRP), or as a consequence of other routine actions under the Water Act.

5.1 Dawson Valley Water Management Area

Overview

This section specifies the unsupplemented water management arrangements for the Dawson River within the Dawson Valley Water Management Area, which extends some 356 km from the Glebe Weir pond to the Fitzroy River junction.

The water management area overlaps the Dawson Valley Water Supply Scheme, which ends at the Boolburra waterhole near Duaringa about 18 km upstream of the Fitzroy River junction.

These unsupplemented water management arrangements thus refer to taking water under high stream flow conditions (waterharvesting) within the bounds of the Dawson Valley Water Supply Scheme and to taking any water downstream of the Boolburra waterhole.

Zones

The location from which water may be taken under a water allocation is specified as a zone. Zones for the Dawson River are specified in Attachment 2.1.

Amending waterharvesting authorisations

The WRP specifies that a ROP must address any economic impacts associated with a decline in the performance of existing waterharvesting authorisations downstream of the proposed Nathan Dam. At this point the operational details for the Nathan Dam development are not available, therefore options to address any impacts can not be assessed nor can existing waterharvesting licences be converted to water allocations under this ROP.

The WRP indicated that the way in which such impacts might be addressed include amending the terms and conditions of existing waterharvesting authorisations, conversion of existing waterharvesting authorisations to water allocations from the proposed Nathan Dam or by other agreed actions.

The operating rules for waterharvesting given in this ROP apply before the Nathan Dam development proceeds. After the ROP has commenced, existing waterharvesting licences will be amended for consistency with these operating rules. Other amendments include the addition of a zone for the specification of the location for each licence. Volumetric limits and maximum rates for taking water will not be applied to waterharvesting licences at this stage.

Metering will continue to be a requirement for taking unsupplemented water under waterharvesting conditions.

Permanent trading and seasonal assignment of unsupplemented (waterharvesting) water in the Dawson can not occur until water allocations have been established under a future amendment to the ROP.

Operating and environmental management rules for waterharvesting licences

The operating rules for waterharvesting include arrangements under which water may be taken and the strategies for meeting environmental flow requirements. Provision for passing part of the first post-winter flow event is an example of these strategies.

During the first post-winter flow management strategy, announced waterharvesting periods for taking water for all waterharvesting will be determined on a 30 cumec passing flow for a period that depends on a number of specified factors.

Licences (not for waterharvesting) downstream of the Boolburra waterhole

Area-based licences in the water management area situated downstream of the Boolburra waterhole continue as water licences under this ROP. These licences have not been converted to water allocations and there are no operating rules specified in the ROP for these licences.

Back Creek Water Board

The ROP allows for the possible future grant of a water licence to the Back Creek Water Board under arrangements given in Section 6.2.5 of Chapter 6.

5.1.1 Extent of the Dawson Valley Water Management Area

The extent of the Dawson Valley Water Management Area is:

- The Dawson River from the upstream limit of Glebe Weir (AMTD 356.5 km) to the Fitzroy River junction; and
- Sections of tributaries of the Dawson River where flows in the above section of the Dawson River are accessible.

5.1.2 Amending waterharvesting authorisations

Waterharvesting licences on the Dawson River between the upstream limit of Glebe Weir and the Fitzroy River junction will be amended under the rules given in Attachment 5.1A.

Processing of these amendments, under Section 217 of the Water Act, will commence as soon as possible after commencement of this ROP.

5.1.3 Operating rules for water licences for waterharvesting

The operating rules for water waterharvesting licences with 15 and 30 cumec flow conditions are given in Attachment 5.1B.

5.2 Nogoia Mackenzie Water Management Area

Overview

This section specifies the unsupplemented water management arrangements for the Nogoia and Mackenzie rivers within the Nogoia Mackenzie Water Management Area, which extends for some 427 km from the Fairbairn Dam pond to the Dawson River junction.

The water management area overlaps the Nogoia Mackenzie Water Supply Scheme, which ends at the Springton Creek junction about 29 km upstream from the Dawson River junction.

These unsupplemented water management arrangements thus refer to taking water under high stream flow conditions (waterharvesting) within the bounds of the Nogoia Mackenzie Water Supply Scheme and to taking any water downstream of the Springton Creek junction.

Zones

The location from which water may be taken under a water allocation is specified as a zone. Zones for the Nogoia and Mackenzie rivers are specified in Attachment 2.2.

Conversion of waterharvesting authorisations to water allocations

Waterharvesting authorisations on the Nogoia and Mackenzie rivers downstream from the Theresa Creek junction have been converted to water allocations.

For these water allocations, the total volumetric limit is approximately 60,000 ML and the total maximum rate for taking water is about 36 cumec.

Conversion of area irrigated authorisations downstream of Springton Creek junction to water allocations

Area irrigated authorisations on the Mackenzie River downstream of the Springton Creek junction have been converted to water allocations.

For these water allocations, the total volumetric limit is 720 ML.

Amendment of existing waterharvesting authorisations upstream of Theresa Creek junction

Waterharvesting authorisations on the Nogoia River from the Fairbairn Dam pond downstream to the Theresa Creek junction remain as water licences under this ROP. These licences are not being converted to water allocations because the performance of waterharvesting in this reach does not have a specified water allocation security objective in the WRP.

Waterharvesting in this reach is permitted only when Fairbairn Dam overflows at greater than 30 cumec, which occurs in fewer than 30 per cent of years.

These waterharvesting licences will be amended for consistency with the operating rules and to specify a volumetric limit and a maximum rate for taking water.

Unsupplemented water allocations

An unsupplemented water allocation is described in terms of volume, location, the purpose for which water may be taken, the maximum rate for taking water and the flow conditions under which it may be taken.

The volume specification for unsupplemented water allocations comprises two elements – a volumetric limit and a nominal volume.

The volumetric limit is the maximum amount of water that may be taken under a water allocation in a water year. The amount of water actually taken is dependent on the flow conditions and rate for taking water stated for the water allocation, the operating rules in the ROP and availability of water in the locality at the time, subject to the total amount taken not exceeding the volumetric limit for the allocation.

The nominal volume, as defined in the Water Act, is a number used to calculate the allocation's share of the water available to be taken by holders of water allocations in all water allocation groups in a water resource plan area. The nominal volume represents the long-term average amount of water entitled to be taken under the allocation, which establishes a uniform measure for all unsupplemented water entitlements throughout the basin. The nominal volume is also relevant in relation to a basis on which a reconfiguration of a water allocation is permitted.

The nominal volume does not affect how much water can actually be taken within a particular water year or flow event.

Operating and environmental management rules

The operating rules for waterharvesting include arrangements under which water may be taken and the strategies for meeting environmental flow requirements. Specification of volumetric limits and provisions for passing part of the first post-winter flow event are examples of these strategies.

Under the first post-winter flow management strategy, announced waterharvesting periods for all waterharvesting will be determined on a 4,320 ML/day (50 cumec) passing flow for a period that depends on a number of specified factors.

The operating rules for low stream flow condition (up to 9 ML/day passing flow) water allocations apply only to those water allocations converted from area-based licences downstream of Springton Creek. These rules include specific monitoring requirements for drawdown of waterholes and the circumstances when limitations may be applied.

Rules for seasonal water assignment are specified in the operating rules. A holder of a water allocation may apply to seasonally assign to another person, for the current water year, the benefit of all or part of the water associated with the allocation. Seasonal water assignment is not permitted for waterharvesting licences on the Nogoia River upstream of the Theresa Creek junction.

Water allocation change rules

The water allocation change rules specify those changes that are permitted, and changes that are prohibited. Applications for any changes that are not expressly permitted (and not prohibited) would be considered through the public processes given in the Water Act.

For instance, permitted changes include the relocation, subdivision and amalgamation of allocations subject to the specified arrangements.

Prohibited changes include the relocation of a water allocation to an area outside of where water allocations have been established in the Fitzroy Basin.

5.2.1 Extent of Nogoia Mackenzie Water Management Area

The extent of the Nogoia Mackenzie Water Management Area is:

- The Nogoia River from the upstream limit of Fairbairn Dam (AMTD 737.5 km) to the Comet River junction (AMTD 611.5 km); and
- The Mackenzie River from the Comet River junction (AMTD 611.5 km) to the Dawson River junction (AMTD 310.3 km); and
- Sections of tributaries of the Nogoia and Mackenzie rivers where flows in the above river sections are accessible.

5.2.2 Conversion of authorisations to water allocations

Waterharvesting authorisations on the Nogoia and Mackenzie rivers from the Theresa Creek junction downstream to the Dawson River junction have been converted to water allocations under the rules given in Attachment 5.2B.

Area irrigated authorisations on the Mackenzie River from the Springton Creek junction downstream to the Dawson River junction have been converted to water allocations under the rules given in Attachment 5.2C.

Details of water allocations converted from authorisations in the Nogoia Mackenzie Water Management Area are given in Attachment 5.2A.

The total volume for unsupplemented water allocations for each zone at commencement of the ROP are given in Attachment 5.2E.

5.2.3 Amending waterharvesting authorisations

Waterharvesting licences on the Nogoia River from the upstream limit of Fairbairn Dam to the Theresa Creek junction will be amended under the rules given in Attachment 5.2D.

Processing of these amendments, under Section 217 of the Water Act, will commence as soon as possible after commencement of this ROP.

5.2.4 Operating rules

The operating rules for:

- Water allocations and water licences with 2,592 and 4,320 ML/day passing flow conditions are given in Attachment 5.2F; and
- Water allocations with up to 9 ML/day passing flow conditions are given in Attachment 5.2G.

5.2.5 Water allocation change rules

The water allocation change rules are given in Attachment 5.2H.

5.2.6 Zones

Zones for the Nogoia and Mackenzie Rivers are given in Attachment 2.2.

5.2.7 Water allocation groups

Water allocation groups for the Nogoia Mackenzie Water Management Area are given in Table 1.

Table 1: Water allocation groups

Location for water allocation	Zone	Water allocation group	Flow conditions for water allocations
Mackenzie River from the Isaac Mackenzie waterharvesting upstream limit to the Dawson River junction	Mackenzie A Mackenzie B Mackenzie C Mackenzie D Mackenzie E	Class 1A	2,592 ML/day passing flow
		Class 1B	4,320 ML/day passing flow
Nogoia and Mackenzie rivers from the Comet Mackenzie waterharvesting upstream limit to the Isaac Mackenzie waterharvesting upstream limit	Mackenzie F Mackenzie G Mackenzie H Mackenzie I Mackenzie J Mackenzie K	Class 2A	2,592 ML/day passing flow
		Class 2B	4,320 ML/day passing flow
Nogoia river from the Theresa Creek junction to the Comet Mackenzie waterharvesting upstream limit	Mackenzie L	Class 3A	2,592 ML/day passing flow
Mackenzie River from the Springton Creek junction to the Dawson River junction	Mackenzie A	Class 4C	No flow condition, and 9 ML/day passing flow

5.3 Fitzroy Water Management Area

Overview

This section specifies the unsupplemented water management arrangements for the Fitzroy River within the Fitzroy Water Management Area, which extends for some 250 km from the Dawson River junction to the Fitzroy Barrage.

The water management area overlaps both the Lower Fitzroy Water Supply Scheme and the Fitzroy Barrage Water Supply Scheme.

These unsupplemented water management arrangements thus refer to taking water under high stream flow conditions (waterharvesting) within the bounds of both water supply schemes and to taking any water upstream of the Eden Bann Weir pond.

Zones

The location from which water may be taken under a water allocation is specified as a zone. Zones for the Fitzroy River are defined in Attachment 2.3.

Conversion of waterharvesting authorisations to water allocations

Waterharvesting authorisations on the Fitzroy River have been converted to water allocations.

For these water allocations, the total volumetric limit is approximately 46,000 ML and the total maximum rate for taking water is about 7.5 cumec.

Conversion of authorisations (other than for waterharvesting) upstream of Eden Bann Weir pond to water allocations

Authorisations (other than for waterharvesting) upstream of the Eden Bann Weir pond have been converted to water allocations.

For these water allocations, the total volumetric limit is about 12,300 ML.

Unsupplemented water allocations

An unsupplemented water allocation is described in terms of volume, location, the purpose for which water is used, the maximum rate for taking water and the flow conditions under which it may be taken.

The volume specification for unsupplemented water allocations comprises two elements – a volumetric limit and a nominal volume.

The volumetric limit is the maximum amount of water that may be taken under a water allocation in a water year. The amount of water taken is dependent on the flow conditions and rate for taking water stated for the water allocation, the operating rules in the ROP and availability of water in the locality at the time, subject to the total amount taken not exceeding the volumetric limit for the allocation.

The nominal volume, as defined in the Water Act, is a number used to calculate the allocation's share of the water available to be taken by holders of water allocations in all water allocation groups in a water resource plan area. The nominal volume represents the

long-term average amount of water entitled to be taken under the allocation, which establishes a uniform measure for all unsupplemented water entitlements throughout the basin. The nominal volume is also relevant in relation to a basis on which a reconfiguration of a water allocation is permitted.

The nominal volume does not affect how much water can actually be taken within a particular water year or flow event.

Operating rules

The operating rules for waterharvesting include arrangements under which water may be taken and the strategies for meeting environmental flow requirements. Specification of volumetric limits and provisions for passing part of the first post-winter flow event are examples of these strategies.

Under the first post-winter flow management strategy, announced waterharvesting periods for all waterharvesting will be determined on a 6,000 ML/day (approximately 70 cumec) passing flow for a period that depends on a number of specified factors.

The operating rules for low stream flow condition (up to 260 ML/day passing flow) water allocations apply to those water allocations that have been converted from authorisations (other than for waterharvesting) upstream of the Eden Bann Weir pond. These rules include specific monitoring requirements for drawdown of waterholes and the circumstances when limitations may be applied.

Rules for seasonal water assignment are specified in the operating rules. A holder of a water allocation may apply to seasonally assign to another person, for the current water year, the benefit of all or part of the water associated with the allocation.

Water allocation change rules

The water allocation change rules specify those changes that are permitted, and changes that are prohibited. Applications for any changes that are not expressly permitted (and not prohibited) would be considered through the public processes given in the Water Act.

For instance, permitted changes include the relocation, subdivision and amalgamation of allocations subject to the specified arrangements.

Prohibited changes include the relocation of a water allocation to an area outside of where water allocations have been established in the Fitzroy Basin.

5.3.1 Extent of the Fitzroy Water Management Area

The extent of the Fitzroy Water Management Area is:

- The Fitzroy River from the Dawson River junction (AMTD 310.3 km) to the Fitzroy Barrage (AMTD 59.6 km); and
- Sections of tributaries of the Fitzroy River where flows in the above section of the Fitzroy River are accessible.

5.3.2 Conversion of authorisations to water allocations

Waterharvesting authorisations on the Fitzroy River from the Dawson River junction to the

Fitzroy Barrage have been converted to water allocations under the rules given in Attachment 5.3B.

All other authorisations on the Fitzroy River from the Dawson River junction to the upstream limit of Eden Bann Weir (AMTD 183.4 km) have been converted to water allocations under the rules given in Attachment 5.3C.

Details of water allocations converted from authorisations in the Fitzroy Water Management Area are given in Attachment 5.3A.

Total volumes for unsupplemented water allocations for each zone as at commencement of the ROP are given in Attachment 5.3D.

5.3.3 Operating rules

The operating rules for:

- Water allocations with 2,592 ML/day and 4,320 ML/day passing flow conditions are given in Attachment 5.3E; and
- Water allocations with up to 260 ML/day passing flow conditions are given in Attachment 5.3F.

5.3.4 Water allocation change rules

Water allocation change rules are given in Attachment 5.3G.

5.3.5 Zones

Zones for the Fitzroy River are given in Attachment 2.3.

5.3.6 Water allocation groups

Water allocation groups for the Fitzroy Water Management Area are given in Table 2.

Table 2: Water allocation groups

Location for water allocation	Zone	Water allocation group	Flow conditions for water allocations
Fitzroy River from the Dawson River junction to the Fitzroy Barrage	Fitzroy A Fitzroy B Fitzroy C Fitzroy D Fitzroy E	Class 5A	2,592 ML/day passing flow
		Class 5B	4,320 ML/day passing flow
Fitzroy River from the Dawson River junction to the upstream limit of Eden Bann Weir	Fitzroy D Fitzroy E	Class 6C	No flow condition, and 9 ML/day passing flow
Fitzroy River from the Dawson River junction to the upstream limit of Eden Bann Weir	Fitzroy D Fitzroy E	Class 7D	260 ML/day passing flow

5.4 Seasonal water assignment of water licences outside water management areas

Overview

This section provides for the seasonal water assignment of water licences, under Section 230 of the Water Act, in areas outside of water management areas established under the ROP.

The seasonal water assignment arrangements set out in this section will not apply to an area that is subsequently included within the bounds of a water management area established under a future amendment of the ROP.

5.4.1 Seasonal water assignment rules

This section does not apply to seasonal water assignments in areas within the bounds of a water management area established under the ROP.

Areas where seasonal water assignment of water licences is permitted outside of water management areas established under the ROP, and the rules for those seasonal water assignments, are given in Attachment 5.4.

5.5 Metering water licences

Overview

This section provides for the chief executive to amend a water licence to make the fitting and operation of a water meter or other approved flow measurement device a condition of the licence, subject to the criteria specified in Section 5.5.1.

Where meters or other approved flow measurement devices are to be installed as a requirement of the ROP, affected water licensees will be invited to participate in the planning and management of the project.

A project team will be established for each implementation area. This team, to be made up of departmental staff and licensees, will manage the process to ensure that local conditions and issues are addressed. The project may include:

- Consultation with affected water licensees;
- Establishment of project management guidelines;
- Evaluation of existing works for meter installation requirements for user and regulatory needs;
- Preliminary design and costing of meter installations;
- Consideration of financial arrangements for metering; and
- Contractual arrangements for the supply and installation of metering devices.

5.5.1 Requirement for metering

Installation of a meter or other approved flow measuring device is required where a water licence:

- Requires that water taken be metered; or
- States a volumetric limit or maximum annual diversion; or
- Is in an area where there are:
 - Significant risks of environmental or resource damage; or
 - Disputes over sharing available water.

5.5.2 Amendment of licences

Any water licence for which flow measurement is required will be amended to provide for a meter or other approved flow measuring device to be installed in accordance with arrangements prescribed by a Water Regulation made under the Water Act.

Chapter 6

Granting of new water entitlements

Overview

This chapter provides for the granting of new water entitlements for the taking of water. In particular, it provides for:

- Water licences that may be granted to particular groups of water users (Section 6.1);
- Water licences and water allocations to be granted to specified entities (Section 6.2);
- The process and options for the release of unallocated water (Sections 6.4, 6.5 and 6.6); and
- The process and requirements for provision of water to projects of significant economic or social importance to the State (Section 6.7).

Grant of particular water licences for taking of water

If an application for taking water, lodged under Chapter 2 Part 6 Division 2 of the Water Act, falls within one of the categories of application covered by Sections 6.1.1 to 6.1.6, the chief executive will deal with the application. The categories of application are discussed below.

Landholders may apply for a water licence to take water for stock and domestic purposes. Section 6.1.1 sets out how applications made by landholders without an alternative water supply for stock and domestic purposes will be decided.

Applications for or about a water licence to take water from watercourses, lakes and springs that flow into the Fitzroy River below the Fitzroy Barrage will be decided in accordance with Section 6.1.2. Section 6.1.2 sets out how these applications will be decided. The Fitzroy Barrage is the lowest reporting point on the Fitzroy River, and it is at this point, or above, that stream flow is measured, and environmental flow objective and water allocation security objective performance evaluated. The diversion of water from watercourses that do not enter the Fitzroy River upstream of the Fitzroy Barrage will not affect those measures of performance. However, the Water Resource Plan (WRP) still requires that specified impact assessment criteria must be considered in making a decision concerning any application to take water.

Holders of mining tenure (for example, a mineral development licence or mining lease) may make an application for or about a water licence to take water. Section 6.1.3 sets out how these applications will be decided. Any water licence issued would be limited to enabling removal of mine site seepage or runoff that is unavoidably being or proposed to be discharged to a watercourse. The arrangements would need to form part of an approved overall mine site environmental management strategy. These circumstances are more likely to arise on older mine sites where historical mining practices may have led to poor quality water entering watercourses which can not be avoided. In that instance the issue of a licence could allow that water to be taken from the watercourse and suitably stored and or treated.

Local governments and the State may make an application for or about a water licence to take water. Section 6.1.4 sets out how these applications will be decided. Any licence issued will be limited to taking of water for the construction and maintenance of public assets, such as

roads and bridges. Currently, temporary permits are issued for individual projects and localities for comparatively small volumes. The proposed approach will provide a more streamlined and effective means of addressing these needs.

If a licence has expired and there was no application lodged within the specified time in the Water Act for the licence to be reinstated or replaced, the licensee may apply for a new licence to take water. Section 6.1.5 sets out how these applications will be decided. Any licence issued will be limited to circumstances where it can be shown that at the time the licence expired, the works associated with the licence were installed and there had been continuing use of the entitlement in the intervening period.

Under Section 6.1.6 applications may be made that do not increase the amount of water taken. For example this section covers amending existing authorisations where there is no increase in the amount of water taken.

Grant of water licences and water allocations to specified entities

Section 6.2 specifies the water licences and water allocations to be granted to specified entities. Most of these water licences and allocations are to be granted to replace a range of existing authorisations. The exception is the water licence for a water supply to the town of Rolleston. The issue of this water licence is urgently required and considered to be in the broader public interest.

These water licences and allocations will be granted following approval of the ROP without application or other process.

Process for dealing with applications for water licences

Section 6.3 requires the chief executive to refuse any application to take water made prior to commencement of the Resource Operations Plan (ROP), unless the application is in one of the categories that may be dealt with under Section 6.1 discussed above.

Applications made after commencement of the ROP will be refused unless the applications are in one of the categories that may be dealt with under Section 6.1, or in connection with processes outlined under sections 6.5, 6.6 or 6.7 discussed below.

Release of unallocated water by grant of water allocation

Section 6.4 details the process that will apply for release of unallocated water in the Mackenzie and Fitzroy rivers through sale of unsupplemented water allocations.

If water taken under an allocation granted under Section 6.4 is proposed to be used for irrigation, then the use of the water will require an approved Land and Water Management Plan under Section 73 of the Water Act.

Release of unallocated water by grant of water licence

Section 6.5 details the process that will apply for release of unallocated water through sale of water licences. The release will only be available in the Isaac/Connors, lower Mackenzie and Fitzroy River catchments, excluding the Dawson River catchment, Fitzroy River and Lower Mackenzie River.

A water licence granted via this process is subject to the provisions of the Water Act that

apply to water licences, and it should be noted that:

- The licence is not tradable separate from land to which it is attached;
- The licence does not have any specified reliability of supply; and
- At times of water shortage, the chief executive may limit the taking of water under a water licence or permit as provided in Section 25 of the Water Act.

If water taken under a licence granted under Section 6.5 is proposed to be used for irrigation, then the use of the water will require an approved Land and Water Management Plan under Section 73 of the Water Act.

Triggers for additional unallocated water release

The volumes of release identified under Sections 6.4 and 6.5 may not meet current viable, sustainable demand, and/or additional demand may be identified in the period after the ROP commencement but before completion of the next phase of the planning process through the Central Queensland Regional Water Supply Study (CQRWSS). Under those circumstances, provision of a mechanism that permits release of additional water within defined constraints and without compromise to other future planning processes, is appropriate where unallocated water reserves allow. Section 6.6 details the triggers for, and volumetric constraints on such additional release.

Such additional release is possible in the Isaac/Connors and lower Mackenzie and Fitzroy catchments because of the volume of unallocated water that is still available in these systems.

Significant projects

The ROP provides for the setting aside of reserves of water for projects determined by the Queensland Government to be of significant economic or social importance to the State. These reserves are designed to be a small, one-off source of last resort that is available to support significant regional development projects where there is no opportunity for trading or access to 'unallocated' water, and when there is no other cost-effective water supply available.

Applicants for this water will need to provide assessments of alternative piped and groundwater supply opportunities for benchmarking against comparable local industries, and show that best water use efficiency, demand management and wastewater recycling/reuse practices are to be utilised.

6.1 Water licence applications under Chapter 2 Part 6 Division 2 of the Water Act

Under this section the chief executive may grant an application for or about a water licence to take water made under Chapter 2 Part 6 Division 2 of the Water Act.

6.1.1 Stock and domestic use

Landholders anywhere in the Fitzroy Basin may make an application for a water licence to take water for stock and domestic purposes.

The chief executive must deal with an application in accordance with this section and the provisions of the Water Act.

However, the chief executive must refuse the application if:

- an alternative water supply is available to the applicant, such as a supply from a farm dam or a bore;
- the application is to take water from a watercourse in which water is managed under a ROL or IROL; or
- the application is to take water from sections of a watercourse where water allocations have been granted.

When granting a water licence under this section of the ROP, the chief executive must limit the volume that can be taken in any year.

The maximum annual volume calculated for domestic purposes is:

- 1 ML; or
- An alternative volume determined by the chief executive based on consideration of the circumstances.

The maximum annual volume calculated for stock watering is:

- A volume equivalent to 1 ML per 250 ha of land without an alternative water supply; or
- An alternative volume determined by the chief executive based on a consideration of the circumstances. (Note: The volume equivalent to 1 ML per 250 ha is the minimum value for the purpose of this section, which would be increased if actual stocking rates and the particular situation indicate larger water requirements. Annual consumptive requirements would be assessed on industry standards, for example, an average annual consumption of 16,000 litres per head per annum would be assumed for beef cattle)

The total maximum annual volume (volumetric limit) on the licence will be the sum of the volume allowed for stock purposes and that allowed for domestic purposes.

6.1.2 Downstream locations

For the purposes of this section, a ‘downstream location’ means a location within the plan area on any watercourse, lake or spring that does not provide tributary inflow to the Fitzroy River upstream of the Fitzroy Barrage.

Application may be made for a water licence to take water from a downstream location.

The chief executive must deal with the application in accordance with this section and the provisions of the Water Act.

In deciding whether to grant or refuse an application, the chief executive will take into consideration the criteria in Section 14 of the WRP.

The purchase price for a water licence will be at a fixed price per megalitre of maximum annual volume of take of water. The chief executive will determine the fixed price per megalitre of maximum annual volume of take having regard to matters including:

- market value of water entitlements in the Fitzroy plan area and relativity of product;
- market value of water entitlements in adjacent plan areas and relativity of product;
- capacity to pay; and
- any other matters.

6.1.3 Mining tenure

For the purposes of this section, ‘mining tenure’ means a mineral development licence or mining lease granted under the *Mineral Resources Act 1989*.

The holder of a mining tenure may make application for a water licence to take water.

The chief executive must deal with the application in accordance with this section and the provisions of the Water Act.

Any water licence issued, in accordance with this section, must be limited to enabling removal of mine site seepage or runoff that is unavoidably being discharged or proposed to be discharged to a watercourse. The arrangements would need to form part of an approved overall mine site environmental management strategy.

A condition of a water licence under this section must be that the water may only be taken if there would be inconsequential effect on the flow naturally occurring in the watercourse downstream of the mining tenure.

6.1.4 Local governments and the State

A local government or the State may make application for a water licence to take water.

The chief executive must deal with the application in accordance with this section and the provisions of the Water Act.

Any water licence issued, in accordance with Section 6.1.4, will be limited to the taking of water required for the construction and maintenance of public assets such as roads and bridges.

The chief executive must refuse any application to take water from a watercourse in which water is managed under a ROL or IROL.

The chief executive must refuse any application to take water from sections of a watercourse where water allocations have been established.

In deciding whether to grant or refuse an application, the chief executive will take into consideration the criteria in Section 14 of the WRP.

6.1.5 Previous licences

If a licence has expired and there was no application lodged within the specified time in the Water Act for the licence to be reinstated or replaced, the landholder may make application for a new licence to take water.

The chief executive must deal with the application in accordance with this Section and the provisions of the Water Act.

The chief executive must refuse the application if:

- The works associated with the licence that has expired were not installed at the time the licence expired;
- There has not been continuing use of water associated with the licence that expired; and

- Other licences of the same type and in the same area have been converted to water allocations.

If the chief executive approves the application, the volume entitled to be taken under the new licence will not exceed that of the previous licence.

6.1.6 Other applications for or about a water licence

The chief executive may grant water licences that do not increase the amount of water that is authorised to be taken.

The chief executive must deal with the application in accordance with this section and the provisions of the Water Act.

6.2 Process for grant of water licences and water allocations to specified entities

Following approval of this ROP, the chief executive may grant the following water licences and water allocations under Section 122 and 212 of the Water Act, subject to any additional conditions determined by the chief executive:

6.2.1 Woorabinda Aboriginal Council

Licence details

Licensee:	Woorabinda Aboriginal Council
Period:	10 years
Water:	Mimosa Creek
Location:	Lot 6 on Plan No WNA141
Volumetric limit:	150 ML per water year
Rate:	7 L/s
Purpose:	Any

Reason for grant

Part of the water supply for Woorabinda township is drawn from galleries in the sands of Mimosa Creek. These galleries were constructed prior to 1950. This type of activity now requires an authorisation under the Water Act.

6.2.2 Environmental Protection Agency

Licence details

Licensee:	Environmental Protection Agency
Period:	10 years
Water:	Carnarvon Creek
Location:	Lot 236 on Plan No NPW490
Volumetric limit:	15 ML per water year
Rate:	7 L/s
Purpose:	Any

Reasons for grant

A permit to take water from Carnarvon Creek to provide water for camping facilities at Carnarvon National Park was previously granted under the *Water Act 1926/1983*. This form of authority is no longer available under the current legislation. It is appropriate that this activity be authorised by a water licence under the Water Act. The water licence replaces the permit.

6.2.3 Mount Morgan Shire Council

Licence details:

Licensee:	Mount Morgan Shire Council
Period:	10 years
Water:	Dee River
Location:	Lot 201 on Plan No RN836502
Volumetric limit:	584 ML per water year
Rate:	37 L/s
Purpose:	Any

Reason for grant:

Mount Morgan Shire Council's (MMSC) existing No 7 Dam was raised in 1999 to a capacity of 2,930 ML to increase the reliability of the Mount Morgan town water supply. The grant of a water licence to the MMSC has been put on hold pending preparation of this ROP. The hydrologic model (IQQM) for the Fitzroy Basin includes the raised dam. The water licence authorises the taking of water from this dam.

6.2.4 Bauhinia Shire Council

Licence details:

Licensee:	Bauhinia Shire Council
Period:	10 years
Water:	Comet River
Location:	Lot 71 on Plan No CP856877
Volumetric limit:	400 ML per water year
Rate:	1,000 L/s
Purpose:	Any

Conditions to include: Water may only be taken when the passing flow exceeds 12 cumec.

Reason for grant:

Bauhinia Shire Council urgently requires a water licence to provide for a new water supply for the town of Rolleston. A reliable supply of 60 ML per annum is needed. The proposed scheme comprises two 500 L/s pumps delivering water to a 290 ML capacity offstream storage. The hydrologic model (IQQM) for the Fitzroy Basin includes the proposed scheme. The proposed scheme has wide community support, including industry sectors in the Central Highlands.

6.2.5 Back Creek Water Supply Area

A water licence for taking of unsupplemented (waterharvesting) water from the Dawson River may be granted for the Back Creek Water Supply Area once the future arrangements for administration of the area and the volume of the required waterharvesting entitlement are resolved to the satisfaction of the chief executive.

Reason for grant:

The Back Creek Water Area and Board was originally established by Order in Council in 1960 for the purpose of supplying the stock and domestic water requirements on 7 properties along Back Creek from the Dawson River. By Order in Council in 1987 the Board was dissolved and an administrator was appointed to manage the affairs of the Board. The arrangements for supply of water to the area from the Dawson River at Moura Weir have not been effective for a number of years. A review will be undertaken to establish the future arrangements for administration of the area and to determine whether a waterharvesting entitlement is needed for the supply of the stock and domestic water requirements of the area and the appropriate details of any entitlement. The grant of a water licence for waterharvesting, if required, would replace historic arrangements for supply of water to the area.

An interim water allocation for 105 ML was granted to SunWater in December 2000, for supply to the Back Creek Water Area from Moura Weir, pending a review of the Back Creek Water Area. The volume and ownership details for this allocation would also be integral to the abovementioned review.

6.2.6 Rockhampton City Council

Medium priority water allocation specifications

Water allocation holder:	Rockhampton City Council
Resource Operations Licence:	Fitzroy Barrage Water Supply Scheme
Location:	Zone Fitzroy A
Nominal Volume:	575 ML per water year
Purpose:	Agriculture
Priority Group:	Medium

Reason for grant

The WRP identified an amount of 575 ML of unallocated medium priority water supply from the Fitzroy Barrage. This amount is the difference between the total allocatable agricultural supply from the Fitzroy Barrage of 12,335 ML and the total amount of water allocation for existing water users of 11,760 ML. This allocation is granted to the Rockhampton City Council as the owner of the Fitzroy Barrage.

6.2.7 SunWater

Medium priority water allocation specifications

Water allocation holder:	SunWater
Resource Operations Licence:	Nogoa Mackenzie Water Supply Scheme
Location:	Zone Mackenzie N
Nominal Volume:	155 ML per water year
Purpose:	Any
Priority Group:	Medium

High priority water allocation specifications

Water allocation holder:	SunWater
Water supply scheme:	Nogoa Mackenzie Water Supply Scheme
Location:	Zone Mackenzie N
Nominal Volume:	45 ML per water year
Purpose:	Any
Priority Group:	High

Reason for grants

Water has historically been taken from Fairbairn Dam to supply public amenities, including the recreation area and the Fairbairn Dam township. This water was previously taken by the State, as the operator of the dam, and accordingly no formal authorisation was required at that time. The grant of these allocations will formalise the continued take of water for this public purpose. The grant is made to SunWater who has responsibility for supplying this water.

6.2.8 JN, VC, & DC Kavanagh

Licence details:

Licensee:	JN, VC, DC Kavanagh
Period:	10 Years
Water:	Sandy Creek (stream classification 130.01.41.01)
Location:	Lot 5 RP619639
Attached lands:	Lot 5 RP619639
Maximum area to be irrigated:	100 hectares

Rate: 200l/s

Purpose: Agriculture

Conditions to include: Water that is taken under the authority of this water licence must only be water that is impounded under the authority of water licence 57852F.

Reason for grant:

On 25 August 1998 JN, AJ, DC, & GM Kavanagh were granted an authority to construct a water storage on Sandy Creek for the purpose of irrigation. Upon the granting of the authority to construct the dam it was intended to also approve an authority to take water stored in the dam for irrigation/agricultural requirements. Due to the administrative arrangements in place at the time, the authority to take water was not issued. The issue of this authority will enable the licensee to use the water stored in the dam for the purpose it was intended.

6.3 Process for dealing with applications for water licences

This section only applies to applications for taking water made under Chapter 2 Part 6 Division 2 of the Water Act.

6.3.1 Process for dealing with applications for water licences made prior to commencement of this ROP

Following approval of this ROP, the chief executive must refuse all applications for water licences to take water made prior to commencement of this ROP, other than those applications dealt with under Section 6.1.

6.3.2 Process for dealing with applications for water licences made after commencement of this ROP

The chief executive must refuse all applications for water licences to take water made after commencement of this ROP, other than those dealt with under sections 6.1, 6.5, 6.6 or 6.7.

6.4 Release of unallocated water by grant of water allocation

6.4.1 Volume and location of initial release

This section provides for two separate releases of unsupplemented water allocations as follows:

- Group one release: Up to 8,000 ML nominal volume for water allocations to be located in the lower Mackenzie River in zones Mackenzie A, Mackenzie B, Mackenzie C, Mackenzie D and/or Mackenzie E (Mackenzie River from the Dawson River junction to the Isaac Mackenzie waterharvesting upstream limit); and
- Group two release: Up to 7,000 ML nominal volume for water allocations to be located in the Fitzroy River in zones Fitzroy A, Fitzroy B, Fitzroy C, Fitzroy D and/or Fitzroy E (Fitzroy River from the Fitzroy Barrage to the Dawson River junction).

The group one release will proceed as soon as practicable after the approval of the ROP. The group two release will proceed when the specified conditions in Section 6.6.2 are met.

Additional water may also be granted through Section 6.6 if the specified triggers are met.

6.4.2 Water allocation specifications

Water allocations granted under the process detailed in Section 6.4.3 will be for the taking of unsupplemented water under conditions commonly referred to as waterharvesting. The management rules set out in Chapter 5 will apply to each water allocation.

A water allocation granted under Section 6.4.3 will specify:

- A nominal volume, which will be the volume purchased through the process set out in Section 6.4.3;
- A volumetric limit, which will be determined from the nominal volume as follows:
 - For a water allocation with a Mackenzie location, the volumetric limit (in megalitres) will be equal to the nominal volume (in megalitres) multiplied by 1.20; and
 - For a water allocation with a Fitzroy location, the volumetric limit (in megalitres) will be equal to the nominal volume (in megalitres) multiplied by 1.35;
- A maximum rate that the water may be taken at, which will be determined from the volumetric limit as follows:
 - For a water allocation with a Mackenzie location, the maximum rate (in litres per second) will be equal to the volumetric limit (in megalitres) multiplied by 0.503; and
 - For a water allocation with a Fitzroy location, the maximum rate (in litres per second) will be equal to the volumetric limit (in megalitres) multiplied by 0.276;
- A location which identifies the zone from which water can be taken;
- A purpose for the use of the water taken under the allocation; and
- A passing flow condition of 4,320 megalitres per day.

In the context of this specification:

- ‘Nominal volume’ represents the estimated long-term average amount of water entitled to be taken under the allocation;
- ‘Volumetric limit’ means the maximum amount of water that may be taken in a water year under the allocation;
- ‘Maximum rate’ means the maximum rate that water may be taken averaged over a

- specified time period;
- ‘Passing flow condition’ means the stream flow nominally required to pass downstream while water is being taken under the water allocation; and
- ‘Purpose’ means the purpose for which the water can be taken which will be specified as either ‘any’ or ‘agriculture’ where:
 - ‘Agriculture’ means that the water allocation will be used primarily for agricultural purposes; and
 - ‘Any’ means that the water allocation can be used for any purpose.

6.4.3 Process for tendering for a water allocation

The chief executive will grant water allocations by inviting tenders to purchase an allocation for a nominal volume of water. The process outlined below will apply.

a) Preliminary

Prior to the public invitation to tender, the chief executive will determine the minimum price criterion per megalitre for the water being released to tender.

The chief executive may alter the minimum price criteria at any time.

b) Invitation to tender

The chief executive will publicly call for tenders and make relevant information about the tender available, including the conditions of tender. Particular conditions on tender process include the following:

- Participation in the tender will be open to all prospective tenderers;
- The minimum price criteria will not be publicly advertised;
- The tender will be open for a time period specified by the chief executive;
- The tender must be made in the form approved by the chief executive; and
- A tender will become a binding offer for the bid volume at the bid price.

c) Dealing with tenders

The chief executive will deal with tenders as follows:

- Tenders will be publicly opened;
- All tenders will be assessed against the minimum price criterion;
- Tenders with a bid price below the minimum price criterion will be unsuccessful;
- Tenders with a bid price equal to or above the minimum price criteria will be ranked in order of bid prices, from highest to lowest;
- Ranked tenders will be accepted in order of bid price, until all of the total release volume has been sold;
- Where two or more tenders have the same bid price, and the combined volumes being sought cannot be met from the remaining release volume, then each of those tenderers will be offered a proportionate share of the remaining water;
- If the release is under-subscribed, the chief executive will either:
 - Offer the balance of the total release volume to unsuccessful tenderers at the lowest accepted bid price; or
 - Add the balance of the total release volume to the release volume available under Section 6.6; and

- Where an offer is made to unsuccessful tenderers, the offer will be for the bid volume included in their tender. The offer will be made to tenderers in order of bid price and will continue until all of the release has been sold, or all tenderers have been approached. Any remaining balance of the total release volume will be added to the release volume available under Section 6.6.

d) Grant and registration

- On the completion of the sale of a water allocation through the above process, the chief executive will grant the water allocation to the buyer and the registrar will record the water allocation on the water allocation register, in accordance with Section 122 of the Water Act. The water allocation has effect from the day it is recorded on the water allocation register.

e) Definition of terms

In the context of the tender process outlined above:

- ‘Total release volume’ is the total nominal volume to be released;
- ‘Bid price’ is the price per megalitre of nominal volume that the tenderer offers for the proposed water allocation;
- ‘Bid volume’ is the amount of nominal volume tendered for at the bid price;
- ‘Ranked tenders’ are tenders with a bid price equal to or above the minimum price criteria which have been ranked in order of bid prices, from highest to lowest;
- ‘Under-subscribed’ means that the total amount of nominal volume sought at bid prices that are equal to or above the minimum price criteria is less than the total release volume; and
- ‘Lowest accepted bid price’ is the lowest bid price which exceeds the minimum price criteria.

6.5 Release of unallocated water by grant of water licence

The processes for dealing with unallocated water by grant of water licences are covered in Section 6.5.

6.5.1 Volume and location of release

The chief executive will initially release unallocated water by grant of water licences of up to 12,000 ML of total maximum annual volume in the Isaac/Connors, lower Mackenzie and Fitzroy River catchments, excluding the Dawson River catchment, Fitzroy River and lower Mackenzie River. This initial release will commence as soon as practicable after the approval of the ROP under the process specified in Section 6.5.3.

Any part of the unallocated water volume not granted in the initial release will be added to the release volume available under Section 6.6.

Following the initial process for granting water licences under Section 6.5.3, the chief executive may decide under Section 6.6 to make additional releases of unallocated water. At the discretion of the chief executive, additional releases of unallocated water to be granted as water licences may be made either by:

- The process specified in Section 6.5.3;
- The process specified in Section 6.5.4; or
- The process specified in Section 6.5.5.

6.5.2 Water licence specifications

A water licence granted under the processes detailed in Sections 6.5.3, 6.5.4 or 6.5.5 may specify:

- A maximum annual volume specified as a volumetric limit;
- A location;
- The land to which the licence attaches;
- A purpose for the use of the water taken under the licence;
- A passing flow condition;
- A first post-winter flow condition;
- A maximum rate that the water may be taken at;
- A seasonal base flow condition; and
- Any other details and conditions decided by the chief executive.

In the context of water licence specification:

- ‘Location’ for a water licence to take from a watercourse means the AMTD on the river or creek at the point where the water must be taken;
- ‘Purpose’ means the purpose for which the water can be taken which will be specified as either ‘any’ or ‘agriculture’ where:
 - ‘Agriculture’ means that the water licence will be used primarily for agricultural purposes; and
 - ‘Any’ means that the water licence can be used for any purpose;
- ‘Passing flow condition’ means the stream flow nominally required to pass downstream while water is being taken under the water licence;

- ‘Maximum rate’ means the maximum rate that water may be taken; and
- The basis for determination of the passing flow condition, first post-winter flow condition, seasonal base flow condition and maximum rate of take will be established through a set of guidelines to be published prior to the public notification of a water release under Sections 6.5.3 b), 6.5.4 b) or 6.5.5 b).

6.5.3 Granting water licences under Section 212 of the Water Act by inviting offers to purchase water

The chief executive will grant water under a water licence by inviting offers to purchase a water licence for a maximum annual volume of water.

The process outlined in this section provides for the granting of water licences under Section 212 of the Water Act following an amendment of the ROP in accordance with Section 106(b) of the Water Act.

The process outlined below will apply.

a) Preliminary

Prior to public notification of a water release under Section 6.5.3 b), the chief executive will determine:

- The minimum price per megalitre of maximum annual volume for the water being released; and
- Evaluation criteria for offers.

The chief executive may alter the minimum price at any time.

Evaluation criteria may include, but not be limited to, benchmarking of water use efficiency against comparable regional and/or industry standards and consideration of risk management strategies for water use, to establish individual licence limits on maximum annual volume of take. Offerers may also need to demonstrate they can physically access the water bid for.

b) Public notification of water release

The chief executive will publicly call for offers and make relevant information about the offer available, including details of how the offers will be evaluated. Particular conditions on the offer process will include the following:

- Participation in the offer process will be open to all prospective offerers;
- The minimum price will not be publicly advertised;
- The offer will be open for a time period specified by the chief executive; and
- The offer must be made in the form approved by the chief executive.

The chief executive may require a one-off, non-refundable, offer processing fee to be lodged with the offer or prior to the offer details being publicly advertised in accordance with Section 6.5.3 d).

c) Offers considered

The chief executive will assess all offers against price and the publicly advertised evaluation criteria.

The chief executive may invite an offerer to make an amendment of a stated type to its offer within a stated timeframe. Without limiting the type of amendment that may be invited, the chief executive may invite an amendment to include a draft flow condition or limit on annual volume of take that would apply to the proposed licence. An offerer amending its offer as invited may also alter its bid price. If the offerer does not take up this invitation within the timeframe, the offer will be regarded as unsuccessful.

d) Public notification of offers

All offers that meet the conditions on the offer process, evaluation criteria and minimum price will be ranked in order of their bid price. Subsequently, for those ranked offers that sum within, or up to, the total release volume, proposed water licences will be advertised as a proposed amendment to the ROP. For each of the proposed water licences advertised in the proposed amendment, the following will be specified:

- The name of the proposed licensee;
- The land on which the water is to be used;
- The maximum annual volume (specified as a volumetric limit);
- The location where the water is proposed to be taken; and
- Where information on any draft conditions the chief executive proposes to apply to the proposed water licence can be viewed.

The chief executive will invite submissions on matters relating to the proposed amendment to the ROP within a specified timeframe.

e) Review of submissions and settling of offers

Review of submissions and settling of offers will be undertaken in accordance with the following:

- The chief executive may collate information about the submissions and refer the collated information and submissions to a Referral Panel established under Section 1004 of the Water Act for review and recommendation on how the submissions and offers should be dealt with;
- The chief executive must consider the submissions received, and if a submission has been referred to a Referral Panel, the recommendations of the Panel, and for each offer:
 - Accept the offer;
 - Invite the offerer to make an amendment of a stated type to its offer; or
 - Refuse the offer;
- An offerer amending its offer as invited may also alter its bid price;
- If an offerer amends its offer as invited, the chief executive will accept the offer, provided that the offer still meets the evaluation criteria and any altered bid price still meets the minimum price criteria;
- If the chief executive accepts the offer, the offerer must pay the bid price by the specified date in order for the offer to be regarded as a successful offer; otherwise the offer will be unsuccessful; and
- If the chief executive refuses the offer, the offer is unsuccessful.

f) Amendment of ROP and grant of licences

The chief executive will amend the ROP to specify the details for water licences for all successful offers. Following amendment of the ROP, the chief executive will, under Section

212 of the Water Act, grant a water licence to the successful offerers in accordance with the details specified in the ROP.

g) Unsuccessful offerers advised

On amendment of the ROP, the chief executive will advise any offerers whose offer has been unsuccessful and will provide reasons the offer was unsuccessful.

h) Definition of terms

In the context of the offer process outlined above:

- ‘Total release volume’ is the total maximum annual volume to be granted in the release;
- ‘Bid price’ is the price per megalitre of maximum annual volume of take that the offerer offers for the proposed water licence; and
- ‘Draft condition’ means a condition that the chief executive proposes to attach to any licence granted as a result of the offer process.

6.5.4 Granting water licences under Section 212 of the Water Act by application and purchase at a fixed price

The chief executive will grant water under a water licence by inviting applications to purchase a water licence for a maximum annual volume of water. The purchase price for a water licence will be at a fixed price per megalitre of maximum annual volume of take of water.

The process outlined in this section provides for the granting of water licences under Section 212 of the Water Act following an amendment of the ROP in accordance with Section 106(b) of the Water Act.

The process outlined below will apply.

a) Preliminary

Prior to public notification of a water release under Section 6.5.4 b), the chief executive will determine:

- The fixed price per megalitre of maximum annual volume for the water being released; and
- Evaluation criteria for applications.

Evaluation criteria may include, but not be limited to, benchmarking of water use efficiency against comparable regional and/or industry standards and consideration of risk management strategies for water use, to establish individual licence limits on maximum annual volume of take. Applicants may also need to demonstrate they can physically access the water applied for.

b) Public notification of water release

The chief executive will publish a notice to advise interested parties of the water release and make relevant information about the release available, including details of how applications will be evaluated. Particular conditions on the release process may include the following:

- The fixed price per megalitre of maximum annual volume of take of water;
- Conditions for taking water made available under the release;

- Application requirements and details of how the applications will be evaluated; and
- Applications must be made in the form approved by the chief executive.

The chief executive may require a one-off, non-refundable, application processing fee to be lodged with the application or prior to the proposed licence details being publicly advertised in accordance with Section 6.5.4 d).

c) Applications considered

The chief executive will assess applications against the publicly advertised evaluation criteria.

The chief executive may invite an applicant to make an amendment of a stated type to its application within a stated timeframe. Without limiting the type of amendment that may be invited, the chief executive may invite an amendment to include a draft flow condition or limit on annual volume of take that would apply to the proposed licence. If the applicant does not take up this invitation within the timeframe, the application will not be accepted.

d) Public notification of applications

For each application that meets the conditions on the release process and the evaluation criteria, proposed water licences will be advertised as a proposed amendment to the ROP. For each proposed water licence advertised in the proposed amendment, the following will be specified:

- The name of the proposed licensee;
- The land on which the water is to be used;
- The maximum annual volume (specified as a volumetric limit);
- The location where the water is to be taken; and
- Where information on any draft conditions the chief executive proposes to apply to the proposed water licence can be viewed.

The chief executive will invite submissions on matters relating to the proposed amendment to the ROP within a specified timeframe.

e) Review of submissions and decisions on applications

Review of submissions and decisions on an application will be undertaken in accordance with the following:

- The chief executive may collate information about the submissions and refer the collated information and submissions to a Referral Panel established under Section 1004 of the Water Act for review and recommendation on how the submissions and applications should be dealt with;
- The chief executive must consider the submissions received, and if a submission has been referred to a Referral Panel, the recommendations of the Panel, and for each application, either:
 - Decide the details for the water licence that may be granted following an amendment to the ROP; or
 - Refuse the application.
- If the details decided by the chief executive for the water licence are not accepted by the applicant, the chief executive will refuse the application.
- If the chief executive decides that a water licence may be granted following an

amendment of the ROP, the applicant must pay the price for the water licence by the date specified by the chief executive; otherwise the application will be refused.

f) Amendment of ROP and grant of licences

The chief executive will amend the ROP to specify the details of water licences that may be granted. Following amendment of the ROP, the chief executive will, under Section 212 of the Water Act, grant the water licences in accordance with the details specified in the ROP.

g) Refused applications

On amendment of the ROP, the chief executive will advise any applicant whose application has been refused and provide reasons for refusing the application.

6.5.5 Granting of water licences by application under Section 206 of the Water Act and purchase at a fixed price

The chief executive will grant water under a water licence by inviting applications to purchase a water licence for a maximum annual volume of water. The purchase price for a water licence will be at a fixed price per megalitre of maximum annual volume of take of water.

The process outlined in this section provides for the granting of water licences by application made under Section 206 of the Water Act.

The process outlined below will apply.

a) Preliminary

Prior to public notification that applications may be made to purchase water under this section, the chief executive will determine:

- The fixed price per megalitre of maximum annual volume for the water being released; and
- Evaluation criteria for applications.

Evaluation criteria may include, but not be limited to, benchmarking of water use efficiency against comparable regional and/or industry standards and consideration of risk management strategies for water use, to establish individual licence limits on maximum annual volume of take. Applicants may also need to demonstrate they can physically access the water applied for.

b) Public notification of water release

The chief executive will publish a notice to advise interested parties of the water release and to make relevant information about the release available. Particular conditions on the release process may include the following:

- The fixed price per megalitre of maximum annual volume of take of water;
- Conditions for taking water made available under the release;
- Application requirements and details of how the applications will be evaluated; and
- Applications must be made under Section 206 of the Water Act.

c) Processing applications

The chief executive will decide applications made under Section 206 under the provisions of the Water Act.

6.6 Triggers for release of additional unallocated water

6.6.1 Volume, location and process for release

This section provides for the release of up to 20,000 ML of water in addition to the provisions of Sections 6.4 and 6.5. This additional water will be only released when the requirements of Section 6.6.2 are met.

Water can only be made available in the Isaac/Connors, lower Mackenzie and Fitzroy River catchments, excluding the Dawson River catchment. The proportion of water made available in any system will be determined by the level of justified need identified through Section 6.6.2.

Water in the lower Mackenzie River (zones Mackenzie A to Mackenzie E) and Fitzroy River will be released as tradable water allocations granted through the process identified in Section 6.4.3, and subject to the specification provisions of Section 6.4.2. The volume of release will be assessed as nominal volume.

Water in the Isaac/Connors, lower Mackenzie and Fitzroy River catchments, excluding the Dawson River catchment, lower Mackenzie River and Fitzroy River will be released as water licences granted through the processes specified in Section 6.5. The volume of release will be assessed as maximum annual volume of take.

6.6.2 Trigger assessment

The need for release of additional water under this Section 6.6 will be assessed by the chief executive having regard to the following:

- The broad socio-economic profile of the catchment being evaluated, and the socio-economic justification for additional water supplies;
- Current water use efficiency, demand management and water need profiles for proponents who express an interest or need for the water;
- Trading market characteristics, and access to alternative water supplies through trading, improved demand management and/or wastewater reuse; and
- The likely timeframe in which additional water will be required.

The purpose of this assessment will be to determine valid need for water, assess the opportunity to meet those needs through means other than release of unallocated water and, when appropriate, establish the timing, quantum and location of any additional water release.

6.7 Significant projects

6.7.1 Limits on application and volume of grant

The Coordinator-General will determine which projects are considered projects of State or regional significance, where:

- “a project of State significance” means a project declared under the *State Development and Public Works Organisation Act 1971* to be a significant project;
- “a project of regional significance” means a project the Coordinator-General, having regard to the matters mentioned in the *State Development and Public Works Organisation Act 1971*, section 27, decides is a project of regional significance for the purposes of this plan.

The process detailed in Section 6.7.3 provides for the granting of water licences for these projects in situations where no other cost-effective source of water is available.

The cumulative volume of licences granted by the chief executive under this Section 6.7 must not exceed:

- 600 ML of maximum annual volume of take in the upper Mackenzie River system (the catchment of the Mackenzie River upstream of the Isaac Mackenzie waterharvesting upstream limit identified in Attachment 2.2); or
- 600 ML of maximum annual volume of take in the Dawson River system; or
- 1,000 ML of maximum annual volume of take in the Fitzroy Basin not including the upper Mackenzie River and Dawson River systems.

6.7.2 Water licence specifications

A water licence granted under the process detailed in Section 6.7.3 will specify:

- A maximum annual volume; and
- A location.

A water licence granted under the process detailed in Section 6.7.3 may specify:

- The land to which the licence attaches;
- A purpose for the use of the water taken under the licence, which will be ‘any’;
- A passing flow condition;
- A first post-winter flow condition;
- A maximum rate that the water may be taken at;
- A seasonal base flow condition; and
- Any other details and conditions decided by the chief executive.

In the context of water licence specification:

- ‘Location’ means the AMTD on the river or creek at the point where the water must be taken;
- A purpose of ‘any’ means that the water licence can be used for any purpose;
- ‘Passing flow condition’ means the stream flow nominally required to pass downstream while water is being taken under the water licence;
- ‘Maximum rate’ means the maximum rate that water may be taken averaged over a specified time period; and

- The basis for determination of the passing flow condition, first post-winter flow condition, seasonal base flow condition and maximum rate of take will be established through a set of published guidelines.

6.7.3 Granting of water licences to take an annual maximum volume of water

An entity requiring water for a project deemed by the Coordinator-General to be a project of State significance or a project of regional significance may make an application for a licence to take water under this Section 6.7. The process outlined below will apply to assessment of applications and grant of licences.

a) Consideration of applications

Each application must be accompanied by an appropriate report providing:

- Detailed description of the project water supply balance including a breakdown of predicted unit water needs by major components of use, timing of supply requirements, and planned wastewater discharge characteristics;
- Details of proposed risk management strategy for water use and disposal;
- Costed evaluation of the identified least-cost pumped/piped water supply option to meet project water needs;
- Costed evaluation of the identified least-cost option for improved water use efficiency and/or wastewater reuse to meet as much as possible of the project water needs;
- If a potential groundwater resource is available, costed evaluation of the least-cost groundwater development to meet project water needs; and
- Evaluation of the local surface water hydrology to establish that sufficient water is available to meet the proposed application, without compromising environmental flow requirements and/or other downstream users.

The chief executive must deal with each application in accordance with this section and the provisions of the Water Act taking into account the following:

- The chief executive must refuse any application to take water in an area where unallocated water is being made available in a suitable timeframe under Section 6.4, 6.5 or 6.6;
- The chief executive must refuse any application to take water from a watercourse in which water is managed under a ROL or IROL;
- The chief executive must refuse any application to take water from sections of a watercourse where water allocations have been granted;
- Where necessary the chief executive may require an applicant to provide more detailed information to justify the planned water balance and/or cost of alternative water supplies;
- The chief executive must refuse an application if an alternative, feasible, cost-effective supply (benchmarked against best practice) is available to the applicant; and
- The justified annual maximum volume of take for a licence granted under this Section 6.7 will be assessed by the chief executive having regard to the following:
 - Current water use efficiency, demand management and water need profiles of the applicant;
 - Access to alternative water supplies through piped supplies, groundwater development, improved demand management and/or wastewater reuse;
 - The likely timeframe in which additional water will be required; and
 - The needs of any other projects in the same catchment that are deemed to be of economic or social importance to the State.

b) Determination of price to be paid for a licence

The price to be paid for a licence granted under this section will be determined by the chief executive based on an assessment of the likely market value of the water.

c) Amendment to application

The chief executive may invite an applicant to make an amendment of a stated type to its application within a stated timeframe. Without limiting the type of amendment that may be invited, the chief executive may invite an amendment to include a draft flow condition that would apply to the proposed licence. If the applicant does not take up this invitation within the timeframe, the application will be regarded as unsuccessful.

d) Public notification of applications

Each application will be advertised as a draft amendment to the ROP. The following information will be specified for each application:

- The proposed licence volume;
- The location where the water is proposed to be taken; and
- Any draft conditions the chief executive proposes to apply to the proposed licence.

The chief executive will invite submissions on matters relating to the draft ROP amendment within a specified timeframe.

e) Review of submissions and settling of applications

Review of submissions and settling of applications will be undertaken in accordance with the following:

- The chief executive may collate information about the submissions and refer the collated information and submissions to a Referral Panel established under Section 1004 of the Water Act for review and recommendation on how the submissions and applications should be dealt with;
- The chief executive must consider the submissions received, and if a submission has been referred to a Referral Panel, the recommendations of the Panel, and for each application:
 - Accept the application; or
 - Accept the application subject to conditions; or
 - Invite the applicant to make an amendment of a stated type to its application; or
 - Refuse the application;
- If an applicant amends its application as invited, the chief executive will accept the application, provided that the application still meets the evaluation criteria;
- If the chief executive accepts the application, the applicant must pay the specified price by the specified date in order for the application to be regarded as a successful application; otherwise the application will be unsuccessful; and
- If the chief executive refuses the application, the application is unsuccessful.

f) Amendment of ROP and grant of licences

The chief executive will amend the ROP to specify the details of all successful applications. Following amendment of the ROP to include details of the successful applications, the chief executive will, under Section 212 of the Water Act, grant a licence to the successful applicants in accordance with the details specified in the ROP.

6.7.4 Cancellation of licences

Any licence granted in accordance with this Section 6.7 of the ROP must be cancelled and the volume of the licence revert to the available reserve, if the relevant project:

- Has not commenced productive operation that relies on the taking or interfering with water authorised under the licence within 3 years of the grant of the licence; or
- Ceases productive operation that relies on the taking of water authorised under the licence.

Where any licence is cancelled, the proponent may reapply in accordance with Section 6.7.3 if the appropriate conditions of application are met.

6.8 Lower Fitzroy Reservations

This section specifies the following reserves of unallocated water:

- Nominal volume of 30,000 ML of high reliability water from the Fitzroy River for urban and industrial supplies in the Gladstone area (the *Gladstone reserve*)
- Nominal volume of 4,000 ML of high reliability water from the Fitzroy River for urban supplies in the Capricorn Coast area (the *Capricorn Coast reserve*).

6.8.1 Granting from the Gladstone reserve

The chief executive may grant a supplemented water allocation to Gladstone Area Water Board under Section 122 of the *Water Act 2000* for all or part of the unallocated water held as Gladstone reserve if:

- (a) Gladstone Area Water Board makes a submission to the chief executive requesting the release of all or part of the Gladstone reserve, and the submission demonstrates to the satisfaction of the chief executive that there is a formal agreement with the proponent of the additional water infrastructure necessary to supply the water allocation.
- (b) The granting is consistent with:
 - (i) the environmental flow objectives for the *Water Resource (Fitzroy Basin) Plan 1999*; and
 - (ii) the water allocation security objectives for the *Water Resource (Fitzroy Basin) Plan 1999*:
 - (A) generally; and
 - (B) in particular, for the priority group to which the water allocation will belong; and
 - (iii) the resource operations licence for the scheme under which the water allocation would be supplied.

6.8.2 Granting from the Capricorn Coast reserve

The chief executive may grant a supplemented water allocation to Rockhampton Regional Council under Section 122 of the *Water Act 2000* for all or part of the unallocated water held as Capricorn Coast reserve if:

- (a) Rockhampton Regional Council makes a submission to the chief executive requesting the release of all or part of the Capricorn Coast reserve, and the submission demonstrates to the satisfaction of the chief executive that there is a formal agreement with the proponent of the additional water infrastructure necessary to supply the water allocation.
- (b) The granting is consistent with:
 - (i) the environmental flow objectives for the *Water Resource (Fitzroy Basin) Plan 1999*; and
 - (ii) the water allocation security objectives for the *Water Resource (Fitzroy Basin) Plan 1999*:
 - (A) generally; and
 - (B) in particular, for the priority group to which the water allocation will belong; and
 - (iii) the resource operations licence for the scheme under which the water allocation would be supplied.

Chapter 7

Meeting future water requirements

Overview

This chapter focuses on potential future releases of water in the Fitzroy Basin in addition to those dealt with in Chapter 6 of this Resource Operations Plan (ROP).

Unallocated water available for future release

The Water Resource Plan (WRP) provides for additional water allocations in a number of parts of the basin. These include 190,000 ML of medium priority water allocations from the Dawson River for the proposed Nathan Dam Project.

The Plan overview of the WRP also identified estimated quantities of water potentially available at other locations within the basin including:

- Up to 300,000 ML of mean annual diversion from the Isaac/Connors and Lower Fitzroy River systems;
- Up to 40,000 ML of mean annual diversion from the Comet/Nogoa/Mackenzie River system;
- Up to 11,500 ML of mean annual diversion from the upper Dawson River.

The 'unallocated' water reflects a potential to take additional unsupplemented water without impact on the objectives of the WRP. It generally represents a low reliability resource and it is likely that useful access to this water will require significant new storage infrastructure (either in or off stream).

Since development of the initial Water Resource Plan, it has been recognised that extensive overland flow capture in some catchments (for example, the Comet River) already utilises a significant proportion of the available 'unallocated' water. The WRP was amended in 2005 to address overland flow management.

In addition, continued drought conditions experienced in Central Queensland have highlighted the potential impact of severe long-term climate patterns and climatic change on the long-term yield of water supply infrastructure. This, too, has potential implications for future water supply releases.

Central Queensland Regional Water Supply Strategy

The Central Queensland Regional Water Supply Strategy (CQRWSS) was released in December 2006.

It was developed in response to the severe drought conditions in Central Queensland and the need to develop a strategic water supply plan for the region.

The strategy is an adaptive long-term statement, outlining equitable and timely solutions to the urban, industrial/mining and agricultural water needs of the Central Queensland region. Through a coordinated regional approach the strategy was tailored to achieve optimum social,

environmental and economic outcomes for the region.

Together, the elements of the strategy provide a basis for allocating and managing the regions' water resources, and for planning for infrastructure developments, to 2020 and beyond.

The strategy identifies a range of options for meeting future water demands, including water trading, improved water use efficiency and reuse, and potential additional water infrastructure supply sources.

The additional water infrastructure supply sources proposed to be developed include:

- Raising of Eden Bann Weir and construction of Rookwood Weir, to meet the short- to medium-term needs of Rockhampton, Gladstone and the Capricorn Coast areas, along with construction of a pipeline from Rockhampton to Gladstone, and construction of a pipeline from Rockhampton to the Capricorn Coast;
- Construction of a water pipeline from the Burdekin to Moranbah, which became operational in 2007, to meet the short- to medium-term needs for coal mining in the northern Bowen Basin;
- Construction of the Connors River Dam, to meet the medium- to long-term urban and mining needs of the Isaac Connors area, along with construction of associated distribution pipelines;
- Construction of Nathan Dam, to meet future supply needs in the Dawson region.

The CQRWSS identifies the following reservations of unallocated water to provide high-priority supplies to meet urban, industrial and mining demands in the region:

- Reservation of up to 30,000 ML/a of reliable water from the Lower Fitzroy for urban and industrial purposes for the Gladstone Area Water Board, or other entity that may arise from a review of the institutional arrangements;
- Reservation of 4,000 ML/a of reliable water from the Lower Fitzroy for urban needs on the Capricorn Coast;
- Reservation of the balance of available water from the Lower Fitzroy for urban, industrial and agricultural purposes in the Lower Fitzroy;
- Reservation of water for urban and other purposes in other systems in the Fitzroy Basin where unallocated water is available.

The CQRWSS also identifies that water needs to be reserved in association with the proposed water infrastructure.

Section 6.8 currently includes water reservations for Gladstone and the Capricorn Coast. It is anticipated that future amendments may need to be made to this plan relating to these and other reservations and the future release of this water, in particular once specific water infrastructure project details are more certain. Water release and/or reservation strategies identified under the CQRWSS are an amendment contemplated by this plan.

Chapter 8

Amending the Resource Operations Plan

Overview

Section 106 of the Water Act provides that amendments can be made to a resource operations plan (ROP) through a simplified process, rather than following the formal public notification and submission processes required under the Water Act, if:

- The amendment is one that would correct a minor error or make a change that is not a change of substance; or
- It is stated in the ROP as an amendment that can be made under Section 106(b).

Section 8.1 details the amendments that can be made under Section 106(b) of the Water Act.

8.1 Amending the Resource Operations Plan

The following amendments may be made to the ROP under Section 106 (b) of the Water Act:

- a) An amendment necessary to implement an amendment to the Water Resource Plan (WRP) made under Section 57(b) of the Water Act.
- b) An amendment that provides for improved or more efficient monitoring for assessing the WRP outcomes. Examples of such amendments may include:
 - Changing indicators for ecological monitoring; and
 - An increase or addition to monitoring requirements, if further information is required;
 - A reduction or removal of monitoring requirements, if no further information or benefit is gained from the continuation of the monitoring requirements
- c) An amendment to change the infrastructure details in Attachments 4.1D, 4.2D, 4.3D or 4.4D provided the amendment is one of the following and does not adversely impact on the achievement of the WRP objectives:
 - An amendment to correct an error in the details shown in Attachments 4.1D, 4.2D, 4.3D or 4.4D (for example, revision of surface area, storage volume, spillway and/or outlet discharge relationships);
 - The installation of, or modification to, a fish transfer system on any of the infrastructure detailed;
 - The installation of, or modification to, multi-level inlet works on any of the infrastructure detailed; and
 - An increase in the discharge capacity of the Fairbairn Dam river outlet works to up to 1,600 ML/day (when the level of water stored by the dam is EL 199.0 m AHD), and any associated modifications to the outlet works, including if necessary, installation of multi-level inlet works.
- d) An amendment to change the guidelines for the evaluation of flow attributes in making a decision to activate the first post-winter flow management strategies in Attachment 4.1E, 4.2E, 4.3E and 4.4E;
- e) An amendment to add or change the fishway management strategies in Attachments 4.1E, 4.2E, 4.3E and 4.4E;
- f) An amendment to Attachments 4.1E, 4.2E, 4.3E, 4.4E, 4.1F, 4.2F, 4.3F and 4.4F where the amendment is necessary to implement a decision to amend the rules under Attachment 4.1I, 4.2I, 4.3I and 4.4I;

-
- g) An amendment to change the rules for transfer of water between water years in Section 3.2 of Attachments 4.1F, 4.2F, 4.3F and 4.4F;
 - h) An amendment to change the rules for seasonal assignment in Section 4.2 of Attachments 4.1F, 4.2F, 4.3F and 4.4F;
 - i) An amendment to change:
 - Table 1, Table 2, Table 3 or Table 4 in Attachment 4.1H; or
 - Table 1 or Table 2 in Attachment 4.2H;
 - j) An amendment to change the specified continuous period for the purpose of the maximum rate for taking water in Attachment 5.2F, 5.2G, 5.3E and 5.3F;
 - k) An amendment to add or change an area where seasonal water assignments of water licences are allowed in Attachment 5.4, provided that each water licence to take water in the area specifies the amount of water that may be taken;
 - l) An amendment to add or change the seasonal water assignment rules for an area where seasonal water assignments are allowed in Attachment 5.4, provided that the objectives of the WRP have been considered in the development of or changes to the seasonal water assignment rules;
 - m) An amendment in relation to the release process and triggers for release in Sections 6.4, 6.5, 6.6 and 6.7 of Chapter 6;
 - n) An amendment to provide for the grant of licences in accordance with the process specified in Sections 6.5.3 f) and 6.7.3 f) of Chapter 6;
 - o) An amendment to accommodate the outcomes of the Central Queensland Regional Water Supply Study; and
 - p) An amendment to the implementation schedule in Attachment 9.

Chapter 9

Implementation of the Resource Operations Plan

Overview

Section 98 of the Water Act provides for the Resource Operations Plan (ROP) to include an implementation schedule setting out arrangements for progressive implementation of the requirements of the plan over a period of 5 years.

9.1 Implementation schedule for the ROP

Details of how the ROP will be implemented are specified in the implementation schedule in Attachment 9.1.

9.2 Transitional arrangements for the Fitzroy Barrage Water Supply Scheme

Prior to commencement of this ROP, the department was responsible for supplemented water management in the Fitzroy Barrage Water Supply Scheme. The following transitional arrangements will apply to the shift in responsibility for this scheme from the department to the Resource Operations Licence (ROL) holder for the Fitzroy Barrage Water Supply Scheme.

9.2.1 Seasonal water assignments

Seasonal water assignments approved by the chief executive prior to the issue of a ROL will continue to have effect until the end of the 2003/04 water year. Seasonal water assignments approved by the chief executive will be administered by the ROL holder from the date of issue of the ROL.

9.3 Amendments to the ROP

Details of amendments to the ROP are specified in Attachment 9.2.

Glossary

‘AHD’ means Australian height datum, which references a level or height to a standard base level.

‘AMTD’ means adopted middle thread distance, which is the distance in kilometres (km) that a specific point in a watercourse is from the watercourse’s mouth or junction with the main watercourse and is measured along the middle of a watercourse.

‘authorisation’ as defined in the Water Resource Plan, means a licence, permit, or other authority to take water given under the Act or the repealed Act, other than a permit for stock or domestic purposes.

‘channel system’ as defined in the Water Resource Plan, means a system of channels, canals, pumps and pipelines and other works used for the distribution of water to water users in a water supply scheme.

‘cease to flow’ level for a waterhole, means the level at which water stops flowing from a waterhole over its downstream control.

‘critical water supply’ management arrangements and water sharing rules mean the management arrangements and rules in the Resource Operations Plan that apply during periods of low water availability.

‘cumec’ means cubic metre per second.

‘department’ means the Department of Natural Resources and Mines.

‘distribution loss’ means water that is lost when delivering water for water allocations in reticulated areas via constructed infrastructure through processes such as (but not limited to) evaporation, seepage, pipeline leakage, accidental loss through temporary pipe failure (breaks), loss through pressure relief systems and scouring.

‘domestic purposes’ as defined in the *Water Act 2000*, includes irrigating a garden, not exceeding 0.25 hectares, cultivated for domestic use and not for the sale, barter or exchange of goods produced in the garden.

‘ecological asset’ means a species, group of species, a biological function, particularly ecosystem or place of value for which the conditions created by water are directly critical.

‘ecological outcome’ as defined in the *Water Act 2000*, means a consequence for an ecosystem in its component parts specified for aquifers, drainage basins, catchments, subcatchments and watercourses.

‘environmental flow objective’ as defined in the *Water Act 2000*, means a flow objective for the protection of the health of natural ecosystems for the achievement of ecological outcomes. The environmental flow objectives are specified in the Water Resource Plan.

‘high priority water allocation’ means a water allocation belonging to the high priority group. The water allocation security objectives for the high priority group are specified in the

Water Resource Plan.

‘interim resource operations licence (IROL)’ as defined in the *Water Act 2000*, means a licence granted under s. 175 of the Act. The purpose of an interim resource operations licence is to make provision for how infrastructure and water is managed before the details have been established through an approved resource operations plan.

‘interim water allocation (IWA)’ as defined in the *Water Act 2000*, means an authority to take water managed under an interim resource operations licence that represents a volumetric share of water and any conditions attached to that authority.

‘IQQM computer program’ means the department’s Integrated Quantity and Quality Modelling computer program, and associated statistical analysis and reporting programs, that simulate daily stream flows, flow management, storages, releases, instream infrastructure, water extractions, water demands and other hydrologic events in the Water Resource Plan area.

‘mean annual diversion (MAD)’ means the long-term average annual volume of water diverted.

‘medium priority water allocation’ means a water allocation belonging to the medium priority group. The water allocation security objectives for the medium priority group are specified in the Water Resource Plan.

‘medium A priority water allocation’ means a water allocation belonging to the medium A priority group. The water allocation security objectives for the medium A priority group are specified in the Water Resource Plan.

‘multi-level outlet’ means an outlet arrangement on a dam or weir that allows stored water to be released downstream from selected levels below the stored water surface.

‘nominal volume’ for a water allocation, as defined in the *Water Act 2000*, means:

- a) For a water allocation managed under a resource operations licence the number used to calculate the allocation’s share of the water available to be taken by holders of water allocations in the same priority group; and
- b) For a water allocation not managed under a resource operations licence the number used to calculate the allocations share of the water available to be taken by holders of water allocations in all water allocation groups in a water resource plan area.

‘NR&M’ means the Department of Natural Resources and Mines.

‘overland flow water’ is defined in the *Water Act 2000*. Overland flow water includes floodwater and water flowing over land other than in a watercourse or lake.

‘proponent’ has the same definition meaning as in the *State Development and Public Works Organisation Act 1971*.

‘resource operations licence (ROL)’ means a licence granted under the *Water Act 2000* to make provision for how infrastructure and water are managed under an approved resource operations plan.

‘resource operations plan (ROP)’ means a plan approved under Section 103 of the *Water*

Act 2000. A resource operations plan, prepared by the chief executive implements a water resource plan for any water in the plan area in all or part of the plan area.

‘seasonal water assignment’ of an interim water allocation, a water allocation or water licence as defined in the *Water Act 2000*, means the assignment by the holder of the allocation or licence of the benefit under the allocation or licence to another person, for a water year, of all or part of the water that may be taken under the allocation or licence.

‘stock purposes’ in relation to taking water, as defined in the *Water Act 2000*, means watering stock that would normally be depastured on the land on which the water is, or is to be, used.

‘stratification’ means the formation of layers of water in a dam or weir that do not readily mix with each other.

‘supplemented water’ as defined in the Water Resource Plan, means water supplied under an interim resource operations licence, resource operations licence or other authority to operate water infrastructure.

‘tailwater’ means the flow of water immediately downstream of a dam or weir. Tailwater includes all water passing the water storage, for example, controlled releases and uncontrolled overflows.

‘thermocline’ means the depth in the water column of a dam or weir where a distinct change in temperature occurs due to stratification.

‘unsupplemented water’ means water that is not supplemented water.

‘volumetric limit’ for a water allocation, as defined in the *Water Act 2000*, means the maximum volume of water that may be taken under the allocation during the period of time, or in the circumstances, stated in the resource operations plan under which the allocation is managed, unless Section 120B(3) of the Act applies.

‘Water Act’ means the *Water Act 2000*.

‘water allocation’ means an authority to take water granted under Section 121 or 122 of the *Water Act 2000*. A water allocation can only be issued under an approved resource operations plan.

For supplemented water, a water allocation may be specified in terms of:

- The nominal volume of water for the allocation;
- The location from which the water may be taken under the allocation;
- The purpose for which water may be taken under the allocation; and
- The priority group to which the allocation belongs.

For unsupplemented water, a water allocation may be specified in terms of:

- The nominal volume of water for the allocation;
- The volumetric limit for the allocation;
- The location from which the water may be taken under the allocation;
- The purpose for which water may be taken under the allocation;

- The maximum rate for taking water;
- The flow conditions under which water may be taken; and
- The water allocation group to which the allocation belongs.

‘water allocation change rules’ means the rules included in the Resource Operations Plan that define how certain attributes of a water allocation may be changed, for example, a change to the location from which water can be taken or the subdivision or amalgamation of a water allocation.

‘water allocations register,’ means the register required under Section 148 of the *Water Act 2000*. The register records details of water allocations and other interests and dealings in a water allocation on a similar basis to that for land titles.

‘water allocation security objective (WASO)’ as defined in the *Water Act 2000*, means an objective that may be expressed as a performance indicator and is stated in a water resource plan for the protection of the probability of being able to obtain water in accordance with a water allocation.

‘waterharvesting’ means taking of unsupplemented water during specified high flow events, and generally involves storing the water offstream for later use.

‘water licence’ means a licence granted under the *Water Act 2000*. A water licence is for the taking of and using water or interfering with the flow of water. The authority to construct the works associated with the water licence is given under the *Integrated Planning Act 1997*.

‘water resource plan’ means a plan approved under the *Water Act 2000*. A water resource plan details the plan area, the water to which the plan applies and what the plan aims to achieve.

‘water sharing rules’ for a water entitlement, means the water sharing rules included in the Resource Operations Plan. For example, the water sharing rules for water supply schemes in the Resource Operations Plan include rules for announced allocations, critical water supply water sharing arrangements and seasonal water assignments.

‘zone’ means a geographic location defined by a reach of a watercourse. The location for a water allocation is specified as a zone.

Map A: Map of Plan Area



Map B: Supplemented Water Supply Schemes



Map C: Unsupplemented Water Management Areas



Attachment 2.1

Scope of Plan

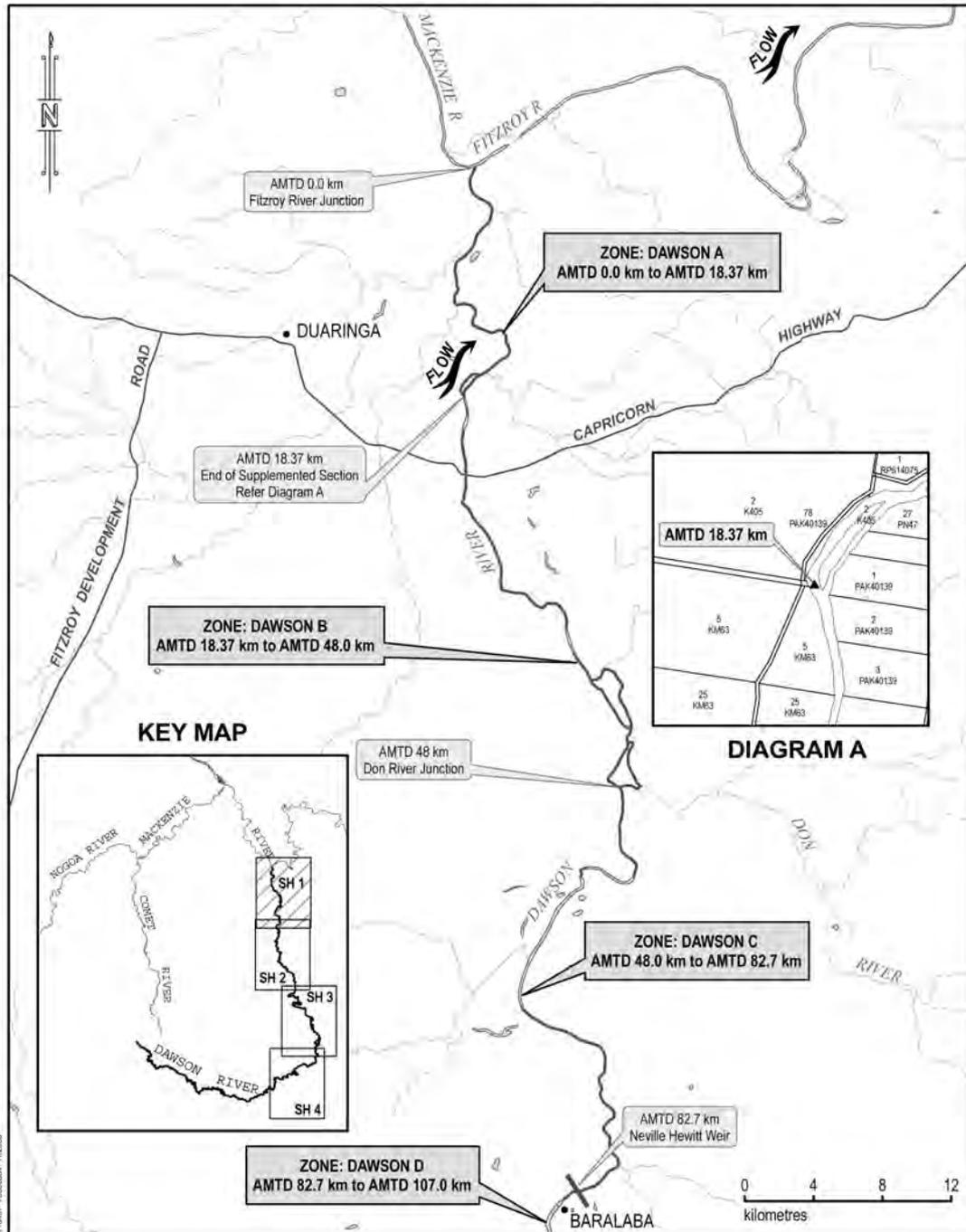
Zones for Dawson River

Zones that apply to the Dawson River

Zone	AMTD (km)	Description
Dawson A	0 - 18.37	Fitzroy River junction to end of supplemented section (downstream end of Boolburra waterhole)
Dawson B	18.37 - 48	End of supplemented section to Don River junction
Dawson C	48 - 82.7	Don River junction to Neville Hewitt Weir
Dawson D	82.7 - 107	Neville Hewitt Weir to effective upstream limit of Neville Hewitt Weir
Dawson E	107 - 133	Effective upstream limit of Neville Hewitt Weir to Mimosa Creek junction
Dawson F	133 - 150.2	Mimosa Creek junction to Moura Weir
Dawson G	150.2 - 167	Moura Weir to effective upstream limit of Moura Weir
Dawson H	167 - 228.5	Effective upstream limit of Moura Weir to Theodore Weir
Dawson I	228.5 - 242	Theodore Weir to effective upstream limit of Theodore Weir
Dawson J	242 - 270.7	Effective upstream limit of Theodore Weir to Orange Creek Weir
Dawson K	270.7 - 311	Orange Creek Weir to effective upstream limit of Gylanda Weir
Dawson L	311 - 326.2	Effective upstream limit of Gylanda Weir to Glebe Weir
Dawson M	326.2 - 356.5	Glebe Weir to upstream limit of Glebe Weir

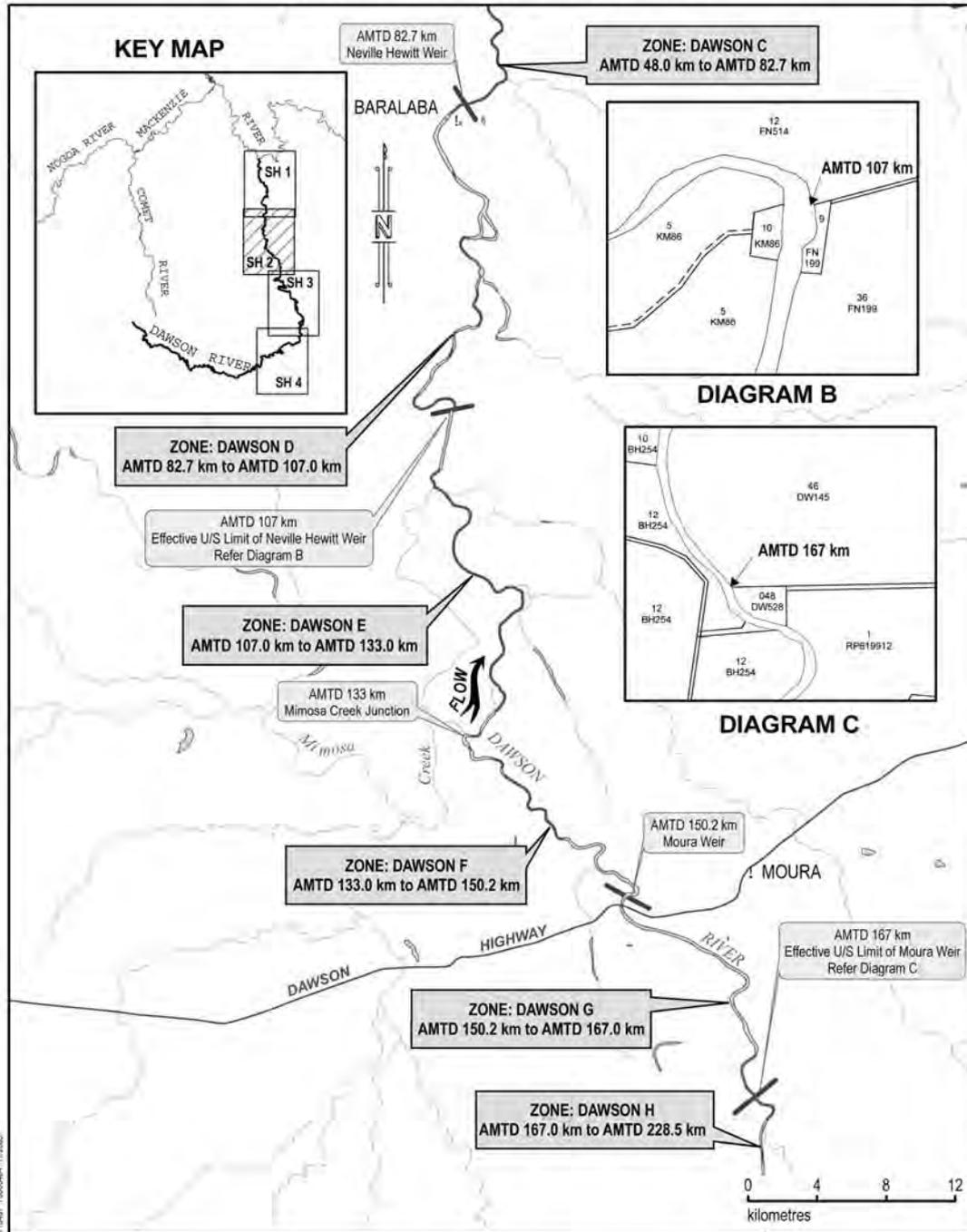
- a) Zones are also depicted on the following sheet maps.
- b) AMTD - the Adopted Middle Thread Distance (AMTD) is the distance in kilometres along the middle of a stream from its mouth or junction with the main river.
- c) Upstream limit – the upstream limit of an instream storage is the adopted upstream extent of the storage.
- d) Effective upstream limit - the effective upstream limit of an instream storage is the upstream limit of where access to stored water is expected most of the time under typical operating conditions.
- e) Each zone includes those sections of tributaries where there is access to flow or pondage from the Dawson River.

Zones: Dawson A, B, C



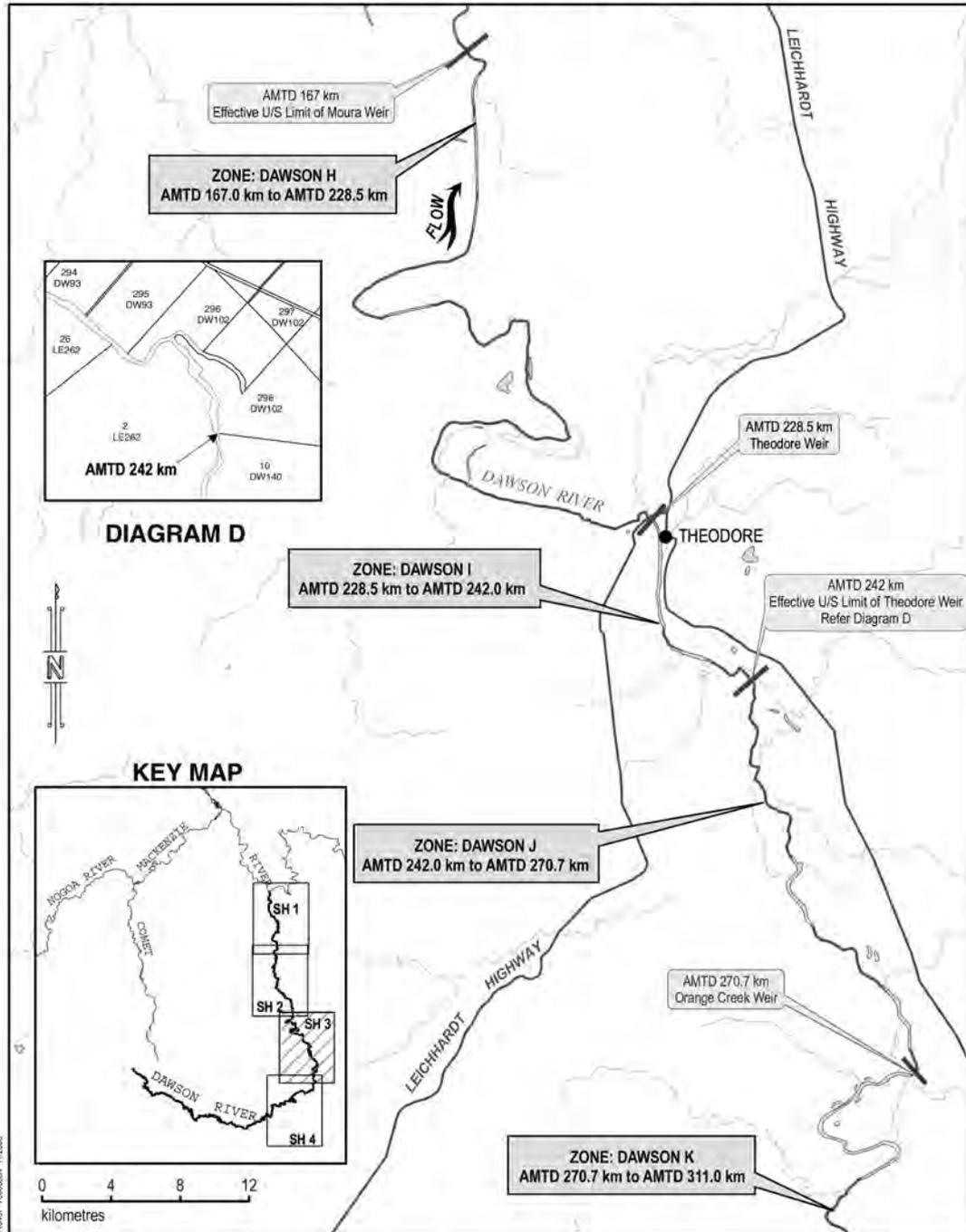
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Zones: Dawson D, E, F, G



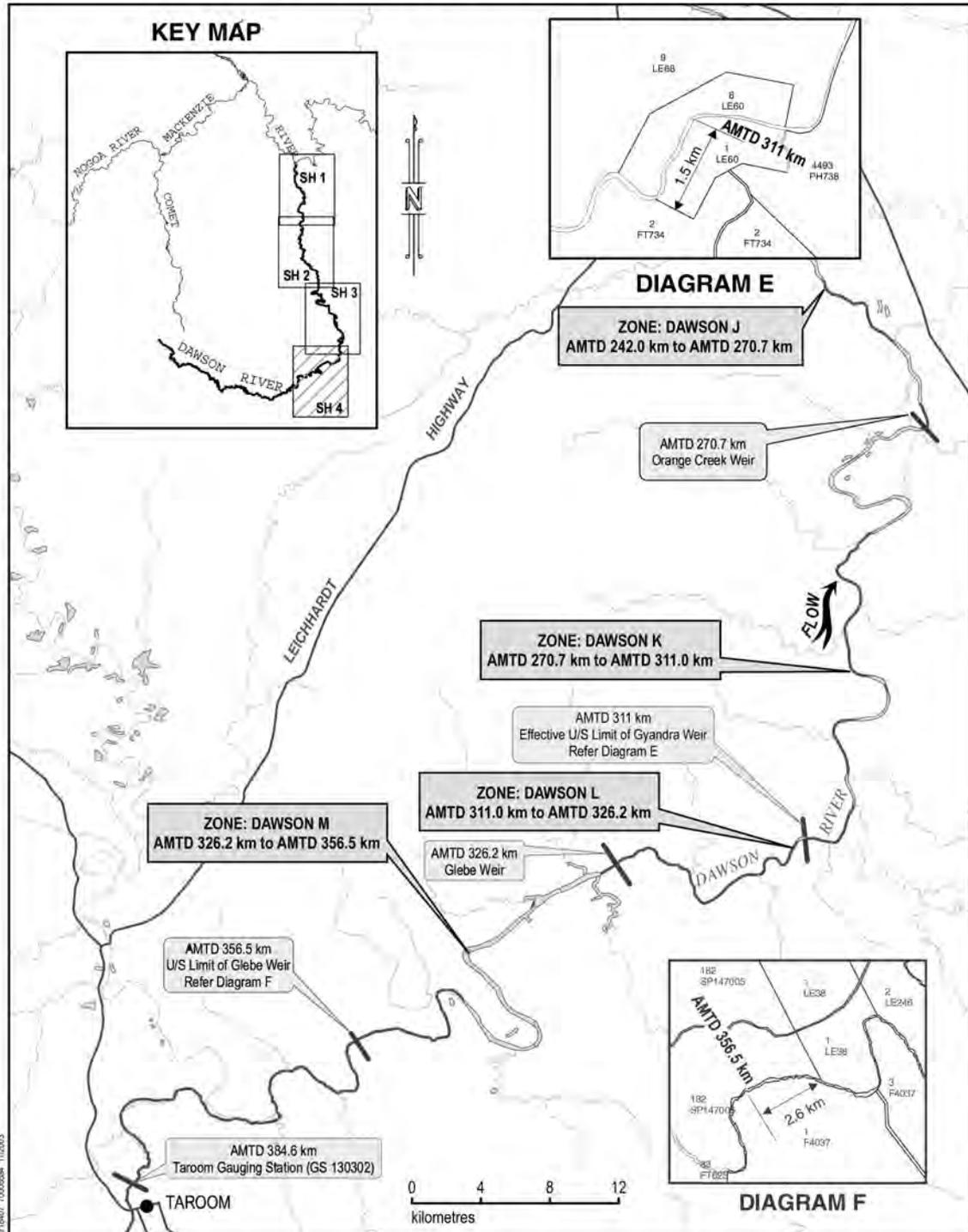
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Zones: Dawson H, I, J



Sheet No 3

Zones: Dawson K, L, M



Sheet No 4

Attachment 2.2

Scope of Plan

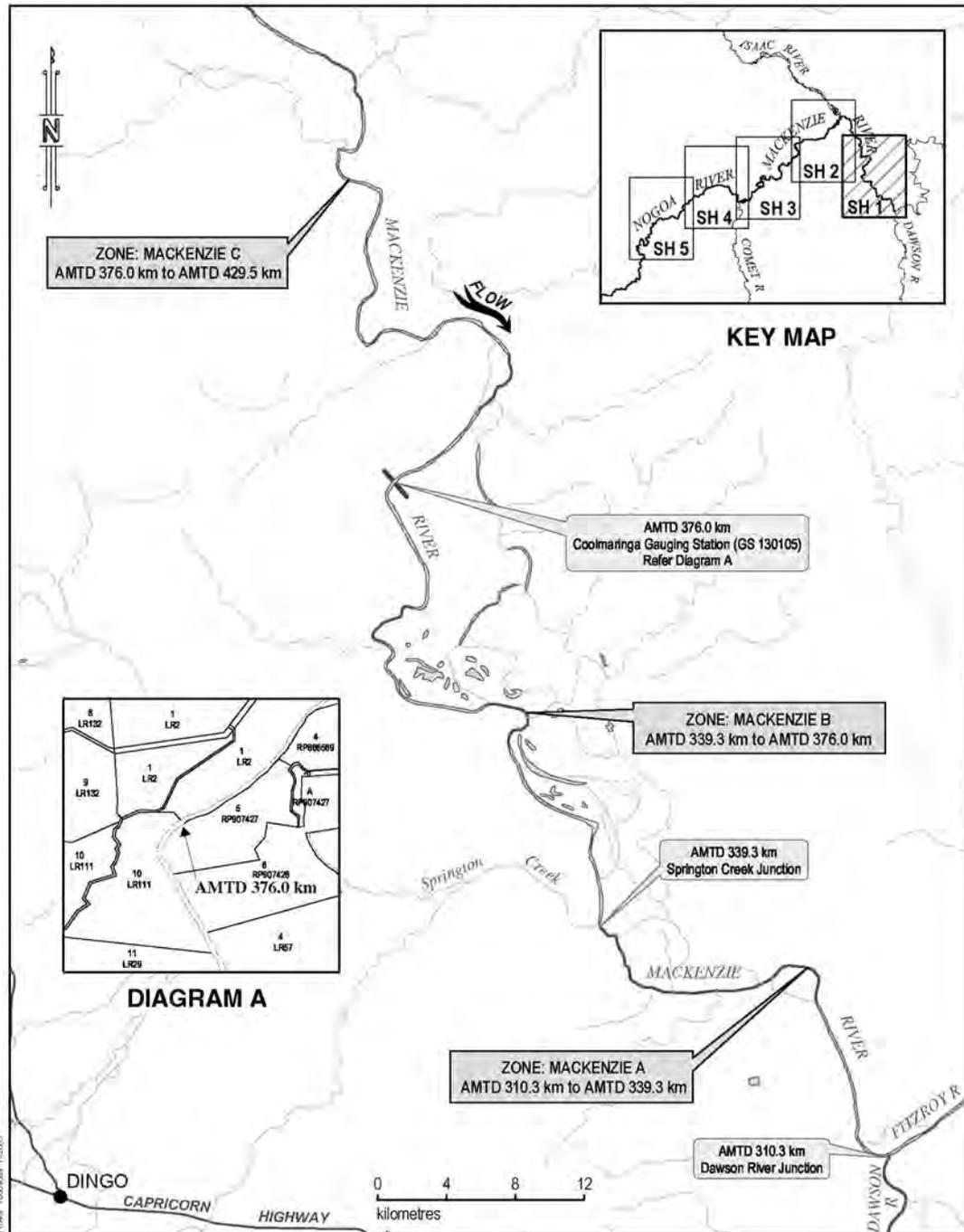
Zones for Nogoia and Mackenzie rivers

Zones that apply to the Nogoia and Mackenzie rivers

Zone	AMTD (km)	Description
Mackenzie A	310.3 - 339.3	Dawson River junction to Springton Creek junction
Mackenzie B	339.3 - 376.0	Springton Creek junction to Coolmaringa Gauging Station (GS130105)
Mackenzie C	376.0 - 429.5	Coolmaringa Gauging Station (GS130105) to Tartus Weir
Mackenzie D	429.5 - 460.5	Tartus Weir to effective upstream limit of Tartus Weir
Mackenzie E	460.5 - 465.5	Effective upstream limit of Tartus Weir to Isaac Mackenzie waterharvesting upstream limit
Mackenzie F	465.5 - 489.2	Isaac Mackenzie waterharvesting upstream limit to Bingegang Weir
Mackenzie G	489.2 - 513.0	Bingegang Weir to effective upstream limit of Bingegang Weir
Mackenzie H	513.0 - 548.8	Effective upstream limit of Bingegang Weir to Bedford Weir
Mackenzie I	548.8 - 585.8	Bedford Weir to effective upstream limit of Bedford Weir
Mackenzie J	585.8 - 611.5	Effective upstream limit of Bedford Weir to Comet River junction
Mackenzie K	611.5 - 615.1	Comet River junction to Comet Mackenzie waterharvesting upstream limit
Mackenzie L	615.1 - 649	Comet Mackenzie waterharvesting upstream limit to Theresa Creek junction
Mackenzie M	649 - 685.6	Theresa Creek junction to Fairbairn Dam
Mackenzie N	685.6 - 737.5	Fairbairn Dam to upstream limit of Fairbairn Dam

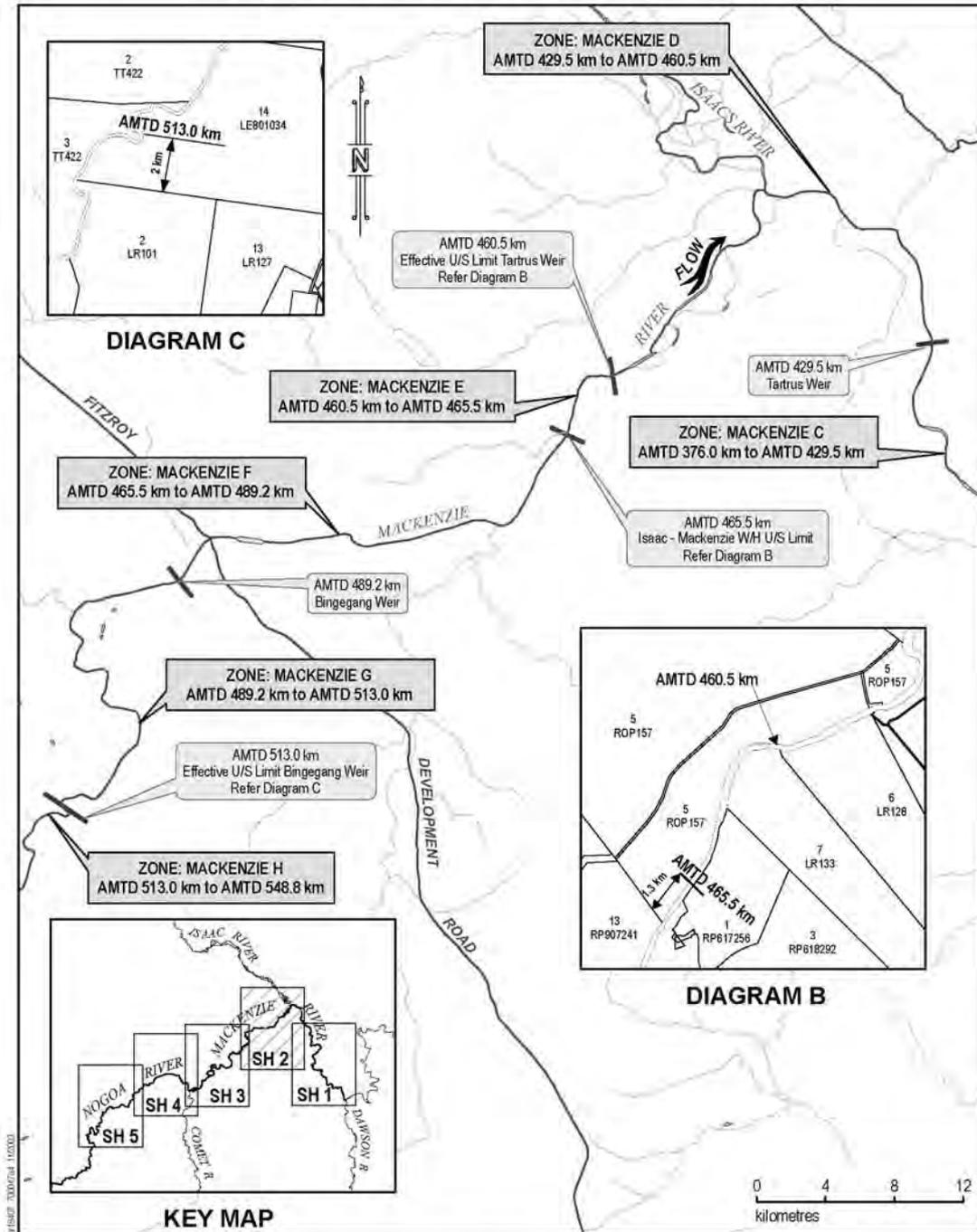
- a) Zones are also depicted on the following sheet maps.
- b) AMTD - the Adopted Middle Thread Distance (AMTD) is the distance in kilometres along the middle of a stream from its mouth or junction with the main river.
- c) Upstream limit – the upstream limit of an instream storage is the adopted upstream extent of the storage.
- d) Effective upstream limit - the effective upstream limit of an instream storage is the upstream limit of where access to stored water is expected most of the time under typical operating conditions.
- e) Each zone includes those sections of tributaries where there is access to flow or pondage from the Nogoia or Mackenzie rivers.

Zones: Mackenzie A, B, C



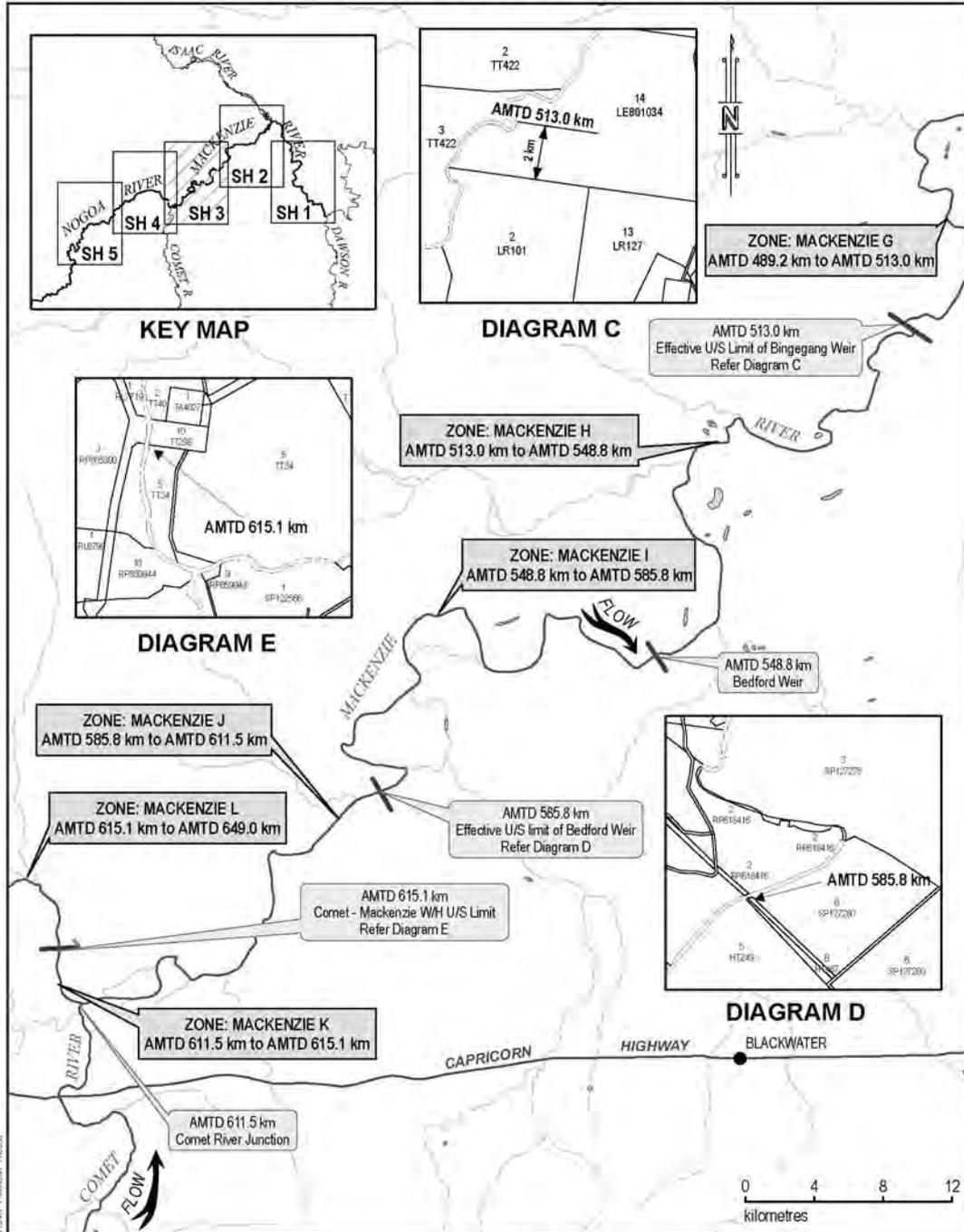
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Zones: Mackenzie C, D, E, F, G



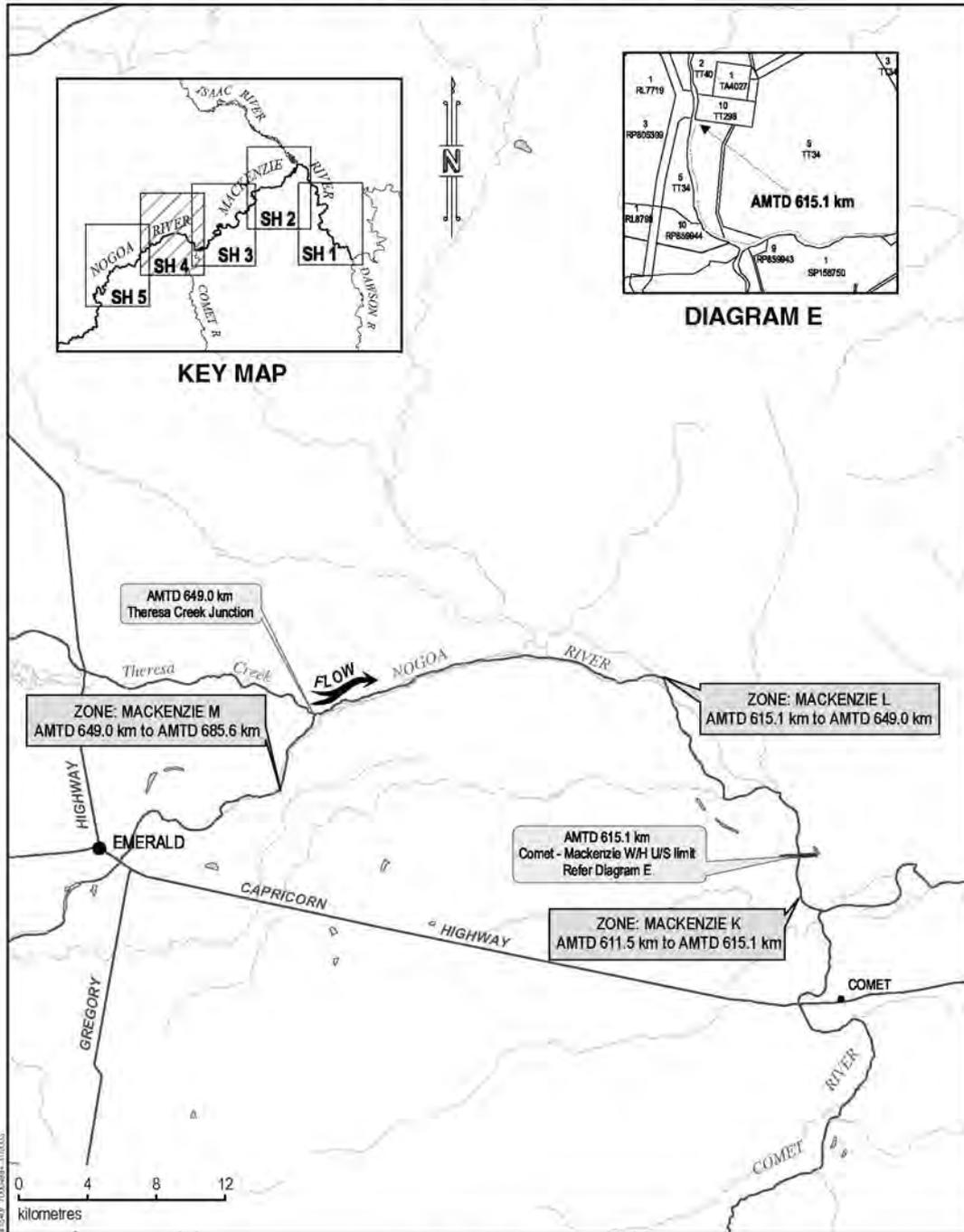
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Zones: Mackenzie H, I, J, K



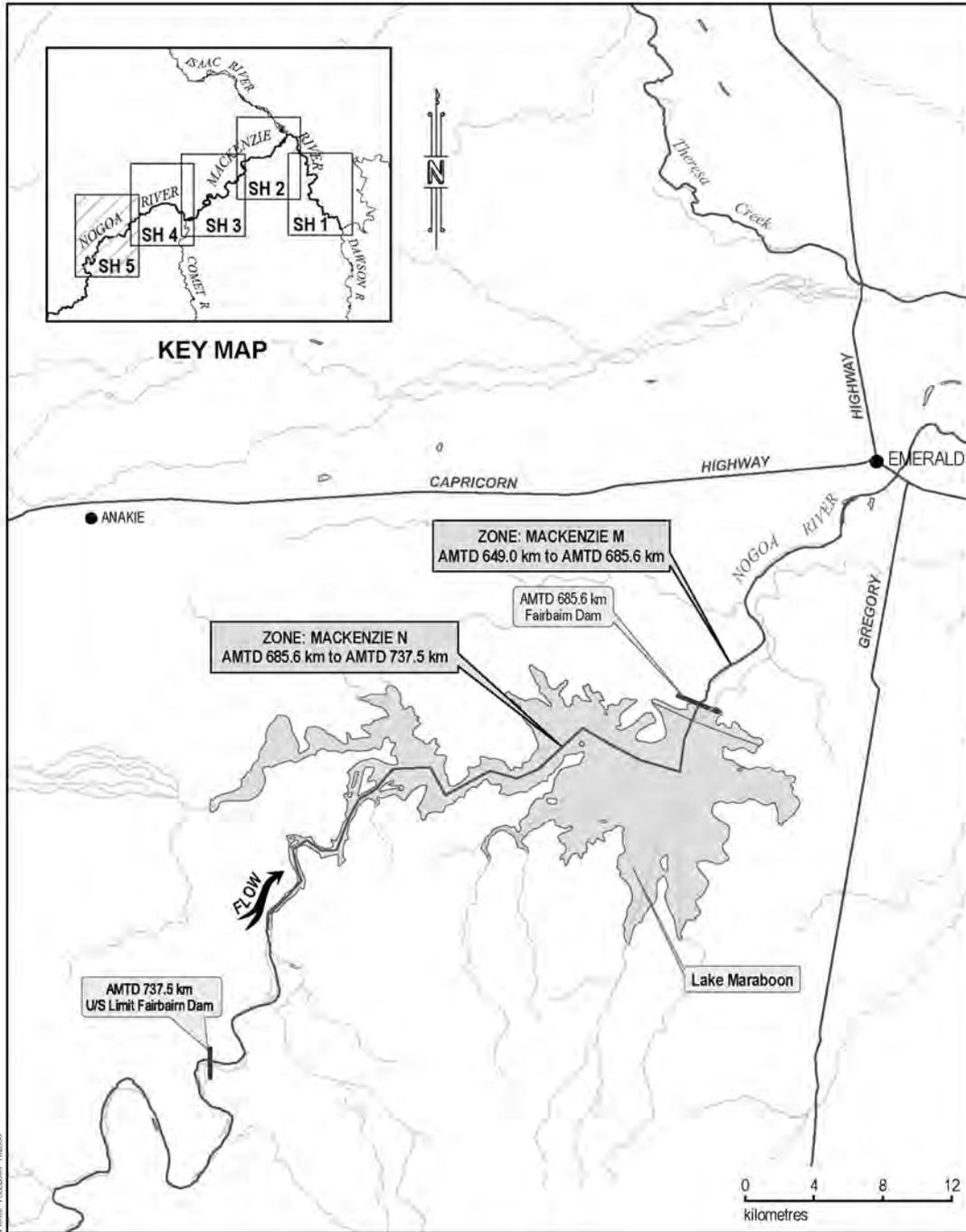
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Zones: Mackenzie L, M



Sheet No 4

Zones: Mackenzie M, N



Sheet No 5

Attachment 2.3

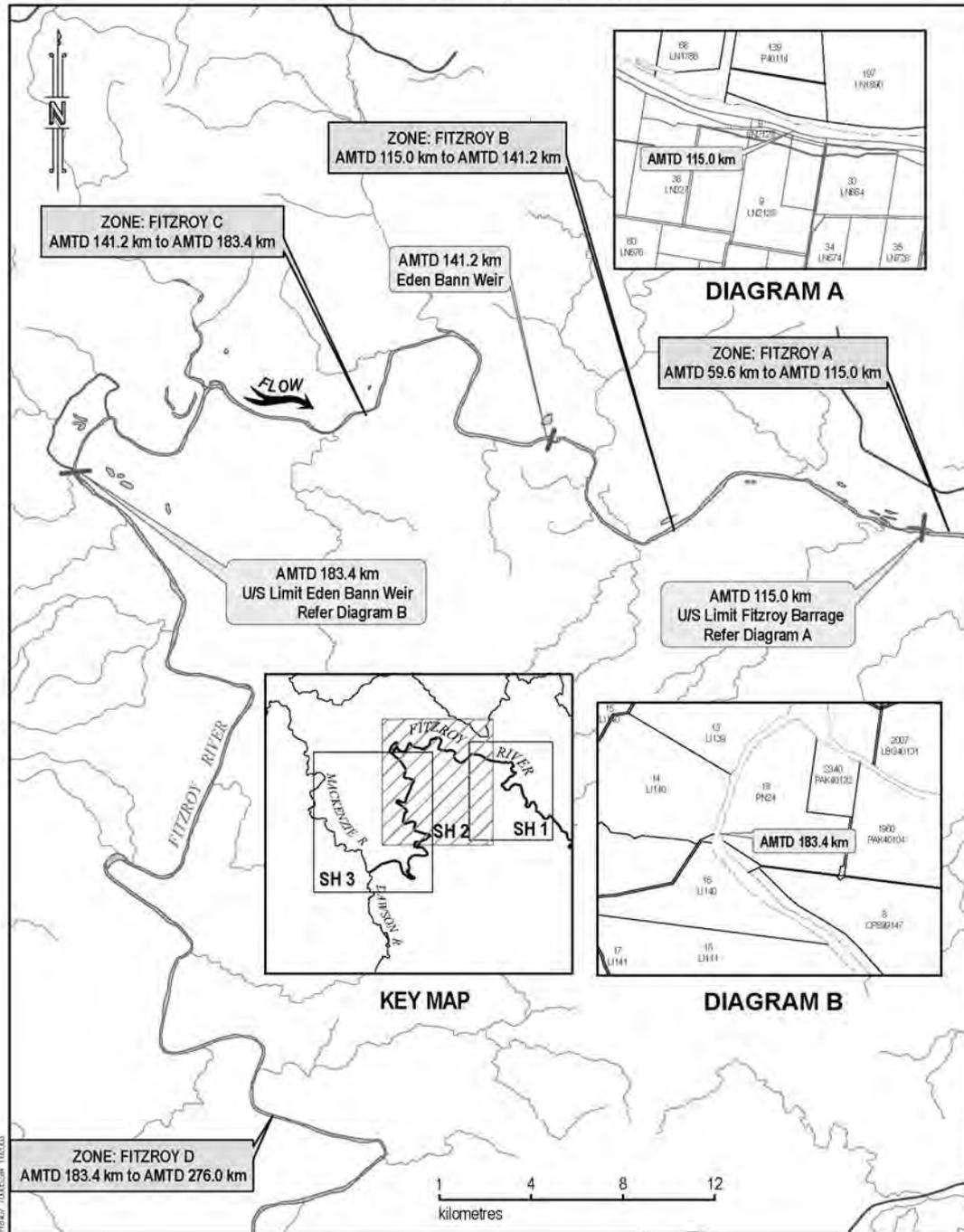
Scope of Plan Zones for Fitzroy River

Zones that apply to the Fitzroy River

Zone	AMTD (km)	Description
Fitzroy A	59.6 - 115.0	Fitzroy Barrage to Upstream limit of Fitzroy Barrage
Fitzroy B	115.0 - 141.2	Upstream limit of Fitzroy Barrage to Eden Bann Weir
Fitzroy C	141.2 - 183.4	Eden Bann Weir to Upstream limit of Eden Bann Weir
Fitzroy D	183.4 - 276.0	Upstream limit of Eden Bann Weir to Riverslea Gauging Station (GS 130003B)
Fitzroy E	276.0 - 310.3	Riverslea Gauging Station (GS 130003B) to Dawson River junction

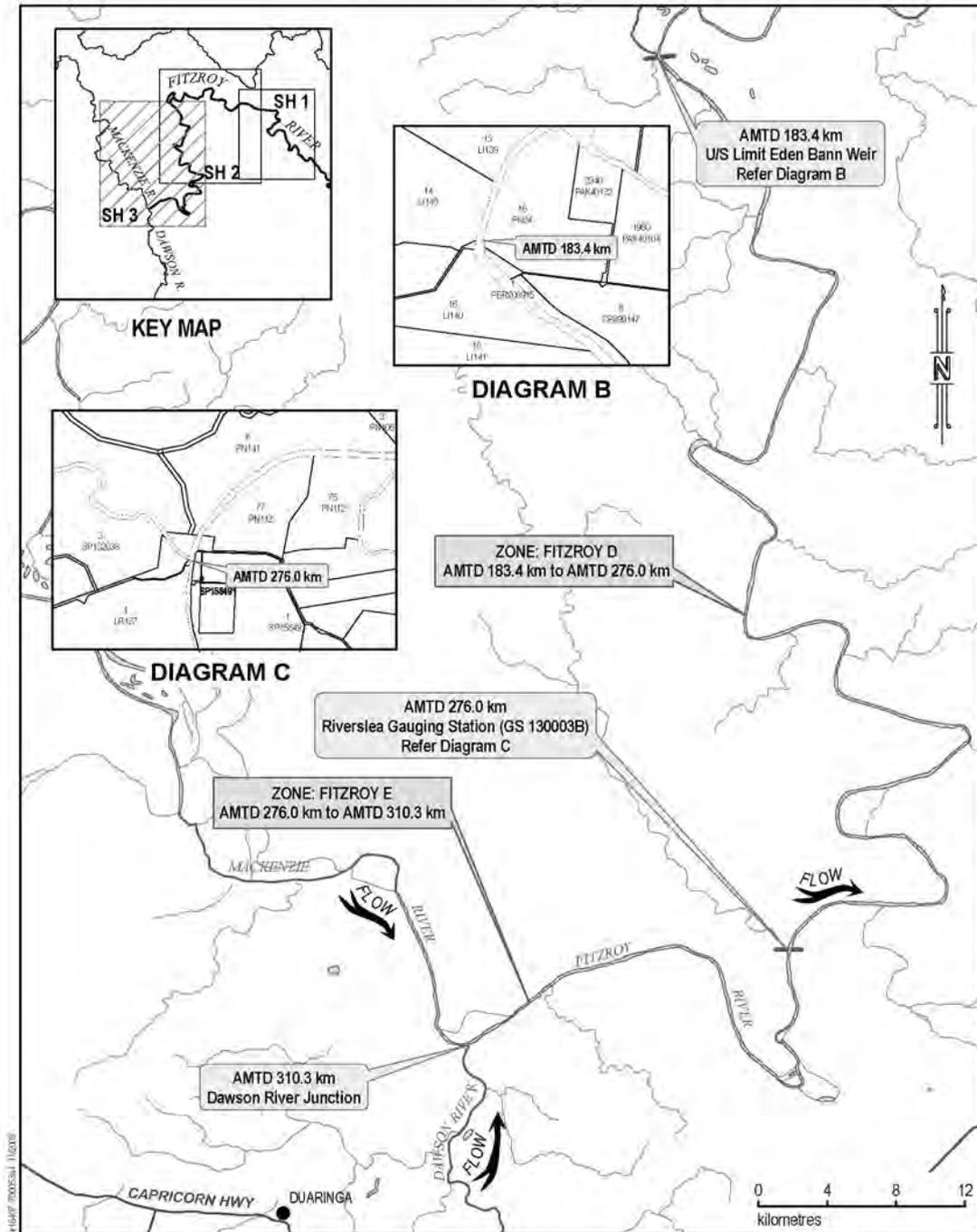
- a) Zones are also depicted on the following sheet maps.
- b) AMTD - the Adopted Middle Thread Distance (AMTD) is the distance in kilometres along the middle of a stream from its mouth or junction with the main river.
- c) Upstream limit – the upstream limit of an instream storage is the adopted upstream extent of the storage.
- d) Each zone includes those sections of tributaries where there is access to flow or pondage from the Fitzroy River.

Zones: Fitzroy B, C, D



Sheet No 2

Zones: Fitzroy D, E



Sheet No 3

Attachment 3.1

Monitoring and reporting requirements

State program: aquatic ecosystem

1 Summary of methodology

The chief executive will implement a natural ecosystem monitoring and assessment program in accordance with the Water Resource Plan (WRP). The program will seek to assess the WRP's contribution towards the ecological outcome. Assessment will be made of how the environmental management rules provide flows that create specific aquatic conditions which are essential for particular aspects of riverine ecosystems.

Monitoring will collect information on:

- Whether specific aquatic conditions that are essential for particular aspects of the river's ecosystems are created by flows provided under the environmental management rules; and
- The way that particular biological and physical aspects of riverine ecosystems respond to specific aquatic conditions created by flows provided under the environmental management rules.

Specific aquatic conditions may include:

- Hydraulic characteristics such as water depth and water velocity;
- Water temperature;
- Seasonal timing; and
- Duration of flow.

Biological and physical responses may include:

- The breeding/spawning of particular species of aquatic plants and animals;
- Removal of encroaching sediment and vegetation from particular areas of the river and its banks;
- Movement of particular species of animals;
- Absence of physiological stress to individual plants; and
- Completion of life stages/recruitment of particular species of aquatic plants and animals.

Sites will be established in areas that are influenced by environmental management rules. Timing of data collection will depend on targeted flow events, including those provided under the environmental management rules.

The chief executive will work with stakeholders to determine the indicators (species, particular ecological response and specific aquatic conditions) and sites for the program.

2 Reporting

The information from the monitoring program will be used in compiling the annual report on the WRP.

Attachment 4.1A

Dawson Valley Water Supply Scheme

Details of conversions to water allocations

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
322	[REDACTED]	[REDACTED]	TC		1/2	Dawson B	Agriculture	400	Medium	46316S
			TC		1/2					
324	DUARINGA SHIRE COUNCIL		SP		1	Dawson B	Any	91	High	102914
330	[REDACTED]	[REDACTED]	SP		1	Dawson B	Any	7	Medium	52855S
325	[REDACTED]	[REDACTED]	SP		1	Dawson B	Any	1	Medium	25498S
738	[REDACTED]	[REDACTED]	SP		1	Dawson B	Agriculture	50	Medium	40109S
332	[REDACTED]	[REDACTED]	TC		1/2	Dawson B	Agriculture	75	Medium	46365S
			TC		1/2					
319	SUNWATER		SP		1	Dawson B	Any	259	High	102931
326	[REDACTED]	[REDACTED]	SP		1	Dawson B	Agriculture	100	Medium	48363S
328	[REDACTED]	[REDACTED]	SP		1	Dawson B	Agriculture	50	Medium	28481S
338	[REDACTED]	[REDACTED]	TC		1/3	Dawson C	Agriculture	120	Medium	19417S
			TC		1/3					
			TC		1/3					
351	[REDACTED]	[REDACTED]	TC		1/2	Dawson C	Agriculture	150	Medium	48525S
			TC		1/2					
349	[REDACTED]	[REDACTED]	SP		1	Dawson C	Agriculture	150	Medium	37902S
334	[REDACTED]	[REDACTED]	TC		1/2	Dawson C	Agriculture	400	Medium	46381S
			TC		1/2					
740	EASTFIELD PTY LTD ACN 010400852		SP		1	Dawson C	Agriculture	300	Medium	38026S
342	[REDACTED]	[REDACTED]	TC		1/2	Dawson C	Agriculture	300	Medium	35499S
			TC		1/2					

Note that Attachment 4.1A shows details of relevant authorisations supplied through the Dawson Valley Water Supply Scheme as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
336	[REDACTED]	[REDACTED]	SP		1	Dawson C	Agriculture	200	Medium	25711S
347	[REDACTED]	[REDACTED]	TC		1/4	Dawson C	Agriculture	150	Medium	36811S
	[REDACTED]	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/4					
354	[REDACTED]	[REDACTED]	TC		1/3	Dawson C	Agriculture	16	Medium	46341S, 52843S
	[REDACTED]	[REDACTED]	TC		1/3					
	[REDACTED]	[REDACTED]	TC		1/3					
345	[REDACTED]	[REDACTED]	TC		1/2	Dawson C	Agriculture	100	Medium	51481S
	[REDACTED]	[REDACTED]	TC		1/2					
353	[REDACTED]	[REDACTED]	SP		1	Dawson C	Any	5	Medium	48403S
355	[REDACTED]	[REDACTED]	TC		1/2	Dawson C	Any	1	Medium	52850S
	[REDACTED]	[REDACTED]	TC		1/2					
385	[REDACTED]	[REDACTED]	TC		1/2	Dawson D	Any	10	Medium	27764S
	[REDACTED]	[REDACTED]	TC		1/2					
394	[REDACTED]	[REDACTED]	TC		1/6	Dawson D	Agriculture	2000	Medium	51455S, 52833S
	[REDACTED]	[REDACTED]	TC		1/6					
	[REDACTED]	[REDACTED]	TC		1/6					
	[REDACTED]	[REDACTED]	TC		1/6					
	[REDACTED]	[REDACTED]	TC		1/6					
	[REDACTED]	[REDACTED]	TC		1/6					
356	BANANA SHIRE COUNCIL		SP		1	Dawson D	Any	182	High	102905
359	BARALABA GOLF CLUB INCORPORATED		SP		1	Dawson D	Agriculture	36	Medium	45391S
358	BENLEITH WATER BOARD		SP		1	Dawson D	Any	91	High	102911
386	[REDACTED]	[REDACTED]	TC		1/2	Dawson D	Agriculture	400	Medium	52839S
	[REDACTED]	[REDACTED]	TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
388	██████	██████████	SP		1	Dawson D	Agriculture	300	Medium	45315S
743	██████	██████████	TC		1/3	Dawson D	Agriculture	300	Medium	38904S
	██████	██████████	TC		1/3					
	██████	██████████	TC		1/3					
500	██████	██████	TC		1/4	Dawson D	Any	2	Medium	52874S
	██████	██████	TC		1/4					
	██████	██████	TC		1/4					
	██████	██████	TC		1/4					
363	██████	██████	TC		1/4	Dawson D	Agriculture	80	Medium	33398S
	██████	██████	TC		1/4					
	██████	██████	TC		1/4					
	██████	██████	TC		1/4					
392	████	██████████	TC		1/2	Dawson D	Agriculture	250	Medium	102571
	████	██████████	TC		1/2					
390	████	██████████	SP		1	Dawson D	Agriculture	250	Medium	102572
361	██████	██████████	TC		1/2	Dawson D	Agriculture	150	Medium	37597S, 37598S
	██████	██████████	TC		1/2					
746	██████	██████████	SP		1	Dawson D	Agriculture	400	Medium	46331S, 46332S
742	██████	██████████	TC		1/4	Dawson D	Any	15	Medium	48365S
	██████	██████████	TC		1/4					
	██████	██████	TC		1/4					
	██████	██████████	TC		1/4					
383	██████	██████████	TC		1/2	Dawson D	Agriculture	70	Medium	52845S
	██████	██████████	TC		1/2					
357	██████	██████████	TC		1/2	Dawson D	Any	1	High	52854S
	██████	██████████	TC		1/2					
320	SUNWATER		SP		1	Dawson D	Agriculture	74	High	102932

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
321	SUNWATER		SP		1	Dawson D	Any	300	High	102933
865			SP		1	Dawson E	Agriculture	2000	Medium	48526S, 59702S
395			SP		1	Dawson E	Agriculture	520	Medium	25001S
400			TTE	TRUSTEE UNDER INSTRUMENT 706965765	1	Dawson E	Agriculture	200	Medium	40169S
			TTE							
423			TC		1/2	Dawson G	Agriculture	276	Medium	101518
			TC							
872			TC		1/2	Dawson G	Any	4	Medium	102703
			TC							
398	BANANA SHIRE COUNCIL		SP		1	Dawson G	Any	714	High	102929
411	BANANA SHIRE COUNCIL		SP		1	Dawson G	Any	86	High	102906
432			TC		1/2	Dawson G	Agriculture	400	Medium	46315S
			TC							
427			TC		1/2	Dawson G	Agriculture	1000	Medium	51459S, 51460S
			TC							
407			TC		1/2	Dawson G	Agriculture	400	Medium	46359S, 46360S
			TC							
413			SP		1	Dawson G	Agriculture	20	Medium	28560S
431			SP		1	Dawson G	Any	5	Medium	28726S
405	CALUNGBA PTY LTD		SP		1	Dawson G	Agriculture	1200	Medium	48593S
429		NIEL	SP		1	Dawson G	Agriculture	2000	Medium	48595S, 48596S, 48597S, 52801S
879			SP		1	Dawson G	Agriculture	394	Medium	48450S
896			SP		1	Dawson G	Agriculture	10	Medium	173947
897			SP		1	Dawson G	Agriculture	15	Medium	173949
924			SP		1	Dawson G	Any	1	High	48450S

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
422	ILLFRACOMBE INVESTMENTS PTY LTD		SP		1	Dawson G	Any	26	Medium	46364S
923	ILLFRACOMBE INVESTMENTS PTY LTD		SP		1	Dawson G	Any	6	High	46364S
409	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson G	Agriculture	172	Medium	07564S, 07565S
			TC		1/2					
415	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson G	Agriculture	24	Medium	27077S
			TC		1/2					
403	MOURA AND DISTRICT GOLF CLUB INCORPORATED		SP		1	Dawson G	Agriculture	120	Medium	48340S
340	MOURA COAL MINING PTY LIMITED		SP		1	Dawson G	Any	1192	High	12752S
425	██████████	██████████	SP		1	Dawson G	Agriculture	300	Medium	46314S, 51414S
419	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson G	Any	5	Medium	41240S
			TC		1/2					
412	QUEENSLAND NITRATES PTY LTD ACN 079889268		SP		1	Dawson G	Any	1320	High	102918
870	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson G	Agriculture	370	Medium	28939S, 28940S
			TC		1/2					
868	██████████	██████████	SP		1	Dawson G	Agriculture	205	Medium	41181S, 46348S, 46349S
863	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson G	Agriculture	1963	Medium	07259S, 07606S, 07901S, 08233S, 13259S
			TC		1/2					
417	WASHPOOL WATER BOARD		SP		1	Dawson G	Any	222	Medium	34995S
451	██████████ ██████████ ██████████ ██████████	██████████ ██████████ ██████████ ██████████	TC		1/4	Dawson H	Agriculture	400	Medium	48306S
			TC		1/4					
			TC		1/4					
			TC		1/4					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
442	██████	██████████	TC		1/2	Dawson H	Agriculture	1200	Medium	51456S, 51457S, 51458S, 52899S
	██████	██████████	TC		1/2					
464	██████	██████████	TC		1/2	Dawson H	Agriculture	70	Medium	46338S
	██████	██████████	TC		1/2					
461	██████████	██████████	SP		1	Dawson H	Agriculture	200	Medium	48483S
439	██████	██████████	TC		1/6	Dawson H	Any	8	Medium	52823S
	██████	██████████	TC		1/6					
	██████████	██████████	TC		1/6					
	██████████	██████████	TC		1/6					
	██████	██████████	TC		1/6					
	██████	██████████	TC		1/6					
469	██████████	██████████	TC		1/2	Dawson H	Agriculture	150	Medium	52829S
	██████████	██████████	TC		1/2					
436	██████	██████████	TC		1/2	Dawson H	Any	7	Medium	37943S
	██████	██████████	TC		1/2					
459	██████	██████████	TC		1/3	Dawson H	Agriculture	300	Medium	46377S
	██████	██████	TC		1/3					
	██████	██████████	TC		1/3					
455	██████	██████████	TC		1/2	Dawson H	Agriculture	400	Medium	46382S
	██████	██████████	TC		1/2					
437	██████████	██████████	TC		1/3	Dawson H	Agriculture	1000	Medium	36643S, 52819S, 52820S
	██████████	██████████	TC		1/3					
	██████████	██████████	TC		1/3					
453	██████	██████████	TC		1/2	Dawson H	Agriculture	120	Medium	46393S
	██████	██████████	TC		1/2					
467	██████████	██████████	TC		1/2	Dawson H	Agriculture	120	Medium	18596S, 59736S
	██████████	██████████	TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
440	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson H	Agriculture	400	Medium	46310S, 48371S
			TC		1/2					
784	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson H	Agriculture	240	Medium	32888S, 52831S
			TC		1/2					
445	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson H	Agriculture	1000	Medium	41251S, 46343S, 52806S, 52836S, 52864S
			TC		1/2					
434	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson H	Agriculture	300	Medium	52805S, 59765S
			TC		1/2					
444	██████████ ██████████ ██████████	██████████ ██████████ ██████████	TC		1/3	Dawson H	Any	9	Medium	52852S
			TC		1/3					
			TC		1/3					
465	THEODORE COAL (ASSETS) PTY LTD ACN 008713791		TC		1/2	Dawson H	Agriculture	400	Medium	46376S
	MITSUI MOURA INVESTMENT PTY LIMITED ACN 088091356		TC		1/2					
457	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson H	Agriculture	200	Medium	52830S
			TC		1/2					
506	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson I	Agriculture	212	Medium-A	600397S
			TC		1/2					
505	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson I	Agriculture	671	Medium-A	600396S
			TC		1/2					
542	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson I	Agriculture	427	Medium-A	600624S
			TC		1/2					
526	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson I	Agriculture	225	Medium-A	600428S
			TC		1/2					
918	██████████ ██████████	██████████ ██████████	TC		1/2	Dawson I	Any	1	High	600428S
			TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
544	[REDACTED]	[REDACTED]	TC		1/3	Dawson I	Agriculture	1467	Medium-A	600721S
	[REDACTED]	[REDACTED]	TC		1/3					
	[REDACTED]	[REDACTED]	TC		1/3					
532	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	1253	Medium-A	600436S
	[REDACTED]	[REDACTED]	TC		1/2					
523	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	1102	Medium-A	600423S
	[REDACTED]	[REDACTED]	TC		1/2					
531	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	871	Medium-A	600437S
	[REDACTED]	[REDACTED]	TC		1/2					
535	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	121	Medium-A	600450S
	[REDACTED]	[REDACTED]	TC		1/2					
514	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	560	Medium-A	600413S
	[REDACTED]	[REDACTED]	TC		1/2					
447	BANANA SHIRE COUNCIL		SP		1	Dawson I	Any	250	High	102925
512	BANANA SHIRE COUNCIL		SP		1	Dawson I	Any	2	High	T007/AS
533	BANANA SHIRE COUNCIL		SP		1	Dawson I	Agriculture	64	Medium-A	600438S
507	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	79	Medium-A	600403S
	[REDACTED]	[REDACTED]	TC		1/2					
508	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	17	Medium-A	600404S
	[REDACTED]	[REDACTED]	TC		1/2					
488	[REDACTED]	[REDACTED]	TC		1/4	Dawson I	Any	3	Medium	52862S
	[REDACTED] E	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/4					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
509	██████	██████████	TC		1/5	Dawson I	Agriculture	28	Medium-A	600408S
	██████	██████████	TC		1/5					
	██████████	██████████ L	TC		1/5					
	██████	██████████	TC		1/5					
	██████	██████████	TC		1/5					
529	██████	██████████	TC		1/2	Dawson I	Agriculture	12	Medium-A	600431S
	██████	██████████	TC		1/2					
922	██████	██████████	TC		1/2	Dawson I	Any	1	High	600431S
	██████	██████████	TC		1/2					
496	██████	██████████	SP		1	Dawson I	Agriculture	200	Medium	48455S
873	██████████	██████	SP		1	Dawson I	Agriculture	600	Medium	46311S
510	██████████	██████████	SP		1	Dawson I	Agriculture	949	Medium-A	600409S
511	██████████	██████████	TC		1/2	Dawson I	Agriculture	16	Medium-A	600411S
	██████████	██████████	TC		1/2					
536	██████████	██████████	TC		4/5	Dawson I	Agriculture	1231	Medium-A	600726S
	██████████	██████████	TC		1/5					
914	██████████	██████████	SP		1	Dawson I	Any	1	High	600409S
915	██████████	██████████	TC		1/2	Dawson I	Any	1	High	600411S
	██████████	██████████	TC		1/2					
916	██████████	██████████	TC		4/5	Dawson I	Any	1	High	600726S
	██████████	██████████	TC		1/5					
513	██████████	██████████	SP		1	Dawson I	Agriculture	16	Medium-A	600412S
519	██████	██████████	TC		1/2	Dawson I	Agriculture	37	Medium-A	600419S
	██████	██████████	TC		1/2					
473	██████	██████████	SP		1	Dawson I	Agriculture	36	Medium	46333S
515	██████████	██████████	TC		1/2	Dawson I	Agriculture	347	Medium-A	600414S
	██████████	██████████	TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
516	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	151	Medium-A	600415S
			TC		1/2					
540	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	109	Medium-A	600451S
			TC		1/2					
549	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	1739	Medium-A	600722S
			TC		1/2					
517	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	17	Medium-A	600417S
			TC		1/2					
518	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	434	Medium-A	600418S
			TC		1/2					
527	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	193	Medium-A	600429S
			TC		1/2					
539	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	256	Medium-A	600777S
			TC		1/2					
919	██████ ██████	██████ ██████	TC		1/2	Dawson I	Any	1	High	600429S
			TC		1/2					
920	██████ ██████	██████ ██████	TC		1/2	Dawson I	Any	1	High	600777S
			TC		1/2					
921	██████ ██████	██████ ██████	TC		1/2	Dawson I	Any	1	High	600418S
			TC		1/2					
491	██████	██████	SP		1	Dawson I	Agriculture	55	Medium	05186S
484	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	30	Medium	46342S
			TC		1/2					
524	██████ ██████	██████ ██████	TC		1/2	Dawson I	Agriculture	1050	Medium-A	600424S
			TC		1/2					
917	██████ ██████	██████ ██████	TC		1/2	Dawson I	Any	1	High	600424S
			TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
503	██████	██████████	TC		1/2	Dawson I	Agriculture	16	Medium-A	600393S
			TC		1/2					
530	██████	██████████	TC		1/2	Dawson I	Agriculture	13	Medium-A	600433S
			TC		1/2					
479	██████	██████████	SP		1	Dawson I	Agriculture	30	Medium	46181S
534	██████	██████████	TC		1/2	Dawson I	Agriculture	179	Medium-A	600440S
			TC		1/2					
493	██████	██████████	TC		1/2	Dawson I	Agriculture	200	Medium	46336S
			TC		1/2					
545	██████	██████████	TC		1/4	Dawson I	Agriculture	496	Medium-A	600683S
			TC		1/4					
			TC		1/4					
			TC		1/4					
546	██████	██████████	TC		1/3	Dawson I	Agriculture	228	Medium-A	600448S
			TC		1/3					
			TC		1/3					
548	██████	██████████	TC		1/2	Dawson I	Agriculture	79	Medium-A	600621S
			TC		1/2					
489	██████	██████████	SP		1	Dawson I	Agriculture	700	Medium	48456S
520	██████	██████████	SP		1	Dawson I	Agriculture	24	Medium-A	600420S
476	MINISTER FOR EDUCATION		SP		1	Dawson I	Agriculture	3	Medium	52848S (THEODORE STATE SCHOOL)
525	██████	██████	TC		1/2	Dawson I	Agriculture	91	Medium-A	600425S
			TC		1/2					
421	██████	██████████	TC		1/2	Dawson I	Agriculture	57	Medium-A	600390S
			TC		1/2					
482	██████	██████████	TC		1/2	Dawson I	Agriculture	50	Medium	52832S
			TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
420	[REDACTED]	[REDACTED]	SP		1	Dawson I	Agriculture	16	Medium-A	600391S
537	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	54	Medium-A	600453S
	[REDACTED]	[REDACTED]	TC		1/2					
471	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	156	Medium	48324S
	[REDACTED]	[REDACTED]	TC		1/2					
528	QUEENSLAND COTTON CORPORATION LIMITED ACN 010944511		SP		1	Dawson I	Agriculture	18	Medium-A	600430S
522	[REDACTED]	[REDACTED]	TC		1/4	Dawson I	Agriculture	252	Medium-A	600422S
	[REDACTED]	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/4					
521	RONNFELDT PTY LTD		SP		1	Dawson I	Agriculture	360	Medium-A	600421S
547	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	92	Medium-A	600442S
	[REDACTED]	[REDACTED]	TC		1/2					
486	[REDACTED]	[REDACTED]	TC		1/3	Dawson I	Agriculture	8	Medium	52825S
	[REDACTED]	[REDACTED]	TC		1/3					
	[REDACTED]	[REDACTED]	TC		1/3					
448	SUNWATER		SP		1	Dawson I	Agriculture	63	Medium-A	102926
925	SUNWATER		SP		1	Dawson I	Distribution Loss	3405	Medium-A	102928
926	SUNWATER		SP		1	Dawson I	Distribution Loss	600	High	102927
543	[REDACTED]	[REDACTED]	SP		1	Dawson I	Agriculture	43	Medium-A	600445S
478	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Any	1	High	46180S
	[REDACTED]	[REDACTED]	TC		1/2					
475	THEODORE BOWLS CLUB INCORPORATED		SP		1	Dawson I	Agriculture	2	Medium	05897S
504	THEODORE GOLF CLUB INC.		SP		1	Dawson I	Agriculture	60	Medium-A	600394S
538	[REDACTED]	[REDACTED]	SP		1	Dawson I	Agriculture	16	Medium-A	600873S

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
502	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Agriculture	152	Medium-A	600392S
			TC		1/2					
481	[REDACTED]	[REDACTED]	TC		1/2	Dawson I	Any	1	Medium	48528S
			TC		1/2					
397	[REDACTED]	[REDACTED]	SP		1	Dawson I	Agriculture	1	Medium-A	59729S
541	[REDACTED]	[REDACTED]	SP		1	Dawson I	Agriculture	87	Medium-A	600447S
717	[REDACTED]	[REDACTED]	SP		1	Dawson J	Agriculture	500	Medium	46363S, 52821S, 52895S
719	[REDACTED]	[REDACTED]	TC		1/2	Dawson J	Agriculture	550	Medium	46366S
			TC		1/2					
497	[REDACTED]	[REDACTED]	SP		1	Dawson J	Agriculture	1200	Medium	41157S, 51450S, 51451S, 51452S, 59738S
720	[REDACTED]	[REDACTED]	TC		1/2	Dawson J	Agriculture	2000	Medium	40147S, 41185S, 48325S
			TC		1/2					
718	[REDACTED]	[REDACTED]	TC		1/2	Dawson J	Agriculture	1600	Medium	46344S
			TC		1/2					
728	BANANA SHIRE COUNCIL		SP		1	Dawson K	Any	25	High	104739
722	GYRANDA NOMINEES PTY LTD ACN 009998172		SP		1	Dawson K	Agriculture	1700	Medium	51445S, 51446S, 51447S, 51448S, 51469S
485	[REDACTED]	[REDACTED]	TC		1/2	Dawson K	Agriculture	300	Medium	51449S
			TC		1/2					
725	SEDIMENTARY HOLDINGS LIMITED		SP		1	Dawson K	Any	375	High	45322S
726	[REDACTED]	[REDACTED]	TC		1/2	Dawson K	Agriculture	500	Medium	48305S
			TC		1/2					
735	[REDACTED]	[REDACTED]	TC		1/2	Dawson M	Agriculture	360	Medium	46334S, 46335S
			TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
736	██████	██████ ██████	TC		1/2	Dawson M	Agriculture	400	Medium	46321S
	██████	██████	TC		1/2					
729	██████	██████████	SP		1	Dawson M	Agriculture	400	Medium	46350S

SP: Sole Proprietor

TC: Tenants in Common

TTE: Trustee

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Attachment 4.1B

Dawson Valley Water Supply Scheme

Rules for conversion to water allocations

1 Locations where existing authorisations are being converted to water allocations

Existing authorisations for supplemented water are being converted to water allocations on:

- The Dawson River from the upstream limit of Glebe Weir to the downstream limit of the Boolburra waterhole; and
- Sections of tributaries of the Dawson River that contain water ponded from natural waterholes or infrastructure within the above section of the Dawson River.

2 Rules for conversion of existing authorisations to water allocations

The following rules apply for the conversion of existing authorisations to water allocations to establish the details required for the registration of supplemented water allocations.

2.1 Location

The location from which water may be supplied under a water allocation is specified as a zone according to the position of the existing authorisation. Descriptions of the zones for the Dawson River are given in Attachment 2.1.

2.2 Purpose

The purpose for which water may be taken under a water allocation is specified as 'agriculture', 'distribution loss' or 'any'. 'Agriculture' is the nominated purpose for those existing authorisations that are primarily used for agricultural purposes. 'Distribution loss' is the nominated purpose for water allocations for distribution losses for the Theodore and Gibber Gonyah channel systems. 'Any' is the nominated purpose for all other uses of water.

2.3 Volume

The nominal volume for a water allocation will be the volume stated on existing authorisations subject to the following arrangements for entitlements associated with watering stock normally depastured on the land and domestic purposes.

Under the Water Act, an owner of land adjoining a watercourse, lake or spring may take water for domestic purposes and watering stock that would be normally depastured on the land without a water entitlement. Therefore any existing authorisation that provides for the taking of water for stock and domestic purposes on land adjoining a watercourse will not be converted to a water allocation.

2.3.1 Arrangements for authorisations for irrigation and stock and domestic purposes

- a) For an authorisation for irrigation, stock and domestic purposes, where all the land supplied adjoins a watercourse:
- If the authorisation states an irrigation volume and a stock and domestic volume, the irrigation volume is the volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- b) For an authorisation for irrigation, stock and domestic purposes, where all the land supplied does not adjoin a watercourse:
- If the authorisation states an irrigation volume and a stock and domestic volume, the combined irrigation volume and stock and domestic volume is the total volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- c) For an authorisation for irrigation, stock and domestic purposes, where part of the land supplied is not contiguous with the land that adjoins a watercourse:
- If the authorisation states an irrigation volume and a stock and domestic volume, the combined irrigation volume and the calculated volume for stock and domestic purposes on the non-adjointing land is the volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- d) For an authorisation for stock and domestic purposes only, where all the land supplied does not adjoin a watercourse:
- If the authorisation states a stock and domestic volume, the stock and domestic volume is the volume for the water allocation; or
 - If the authorisation does not state a stock and domestic volume, the annual volume calculated for stock and domestic purposes is the volume for the water allocation.
- e) For Section 2.3.1c) and Section 2.3.1d), the annual volume calculated for domestic purposes is:
- i) 1 ML; or
 - ii) An alternative volume determined by the chief executive based on consideration of a submission received on this matter on the draft Resource Operations Plan (ROP).
- f) For Section 2.3.1c) and Section 2.3.1d), the annual volume calculated for stock watering is:
- i) A volume equivalent to 1 ML per 250 ha of land; or
 - ii) An alternative volume determined by the chief executive based on consideration of a submission received on this matter on the draft ROP.

Where an existing authorisation does not state a stock and domestic volume, the annual volume specified for the water allocation is the combined volume calculated using Section 2.3.1e)i) and Section 2.3.1f)i).

2.4 Priority group

2.4.1 Water allocations that take water from the Dawson River

The priority group for a water allocation converted from an existing authorisation to take supplemented water from the Dawson River is medium priority, except where a product specification or other undertaking associated with the authorisation identifies the authorisation's water supply as being high priority water allocation.

2.4.2 Water allocations that take water from the channel system

The priority group for a water allocation converted from an existing authorisation to take supplemented water from the SunWater channel system is medium A priority, except where a product specification or other undertaking associated with the authorisation identifies the authorisation's water supply as being high priority water allocation.

2.5 Conversion of medium or medium A priority to high priority

For the Dawson Valley Water Supply Scheme, the announced allocations for medium and medium A priority water allocations may be zero in the early part of the water year.

The intent of this section is to cover a period of up to 3 months from the start of the water year for occasions when the announced allocation for both medium and medium A priority water allocations could be zero.

The chief executive will consider submissions lodged during the draft ROP submission period that request a conversion of medium or medium A priority water allocation to high priority water allocation to provide for essential supplies for stock and domestic purposes to land which does not have a riparian entitlement for these purposes (see Section 2.3) or for public safety.

If the chief executive is satisfied, based on a submission, that a high priority water allocation is necessary due to a dependency on supply for essential purposes, the chief executive will reduce the medium or medium A priority water allocation volume determined under Section 2.3 by the volume determined under this section, and establish an additional high priority water allocation for the volume determined under this section.

Attachment 4.1C

Dawson Valley Water Supply Scheme

Total volume of supplemented water allocations

Table 1: Total volume of supplemented water allocations at Resource Operations Plan approval

Zone	Medium priority water allocation (ML)	Medium A priority water allocation (ML)	High priority water allocation (ML)
Dawson M	1,160	0	0
Dawson L	0	0	0
Dawson K	2,500	0	400
Dawson J	5,850	0	0
Dawson I	2,074	19,456	862
Dawson H	6,524	0	0
Dawson G	9,131	0	3,319
Dawson F	0	0	0
Dawson E	2,720	0	0
Dawson D	4,263	0	648
Dawson C	1,892	0	0
Dawson B	683	0	350
Total	36,797	19,456	5,579

Table 2: Total volume of supplemented interim water allocations at Resource Operations Plan approval

Zone	Medium priority interim water allocation (ML)	Medium A priority interim water allocation (ML)	High priority interim water allocation (ML)
Dawson G	105	0	0
Total	105	0	0

Attachment 4.1D

Dawson Valley Water Supply Scheme Infrastructure details

Storage: Glebe Weir – Dawson River AMTD 326.2 km

Description of water infrastructure	
Main embankment	Mass concrete and steel sheet piling weir
Full supply level	EL 170.54 m AHD
Fixed crest level	EL 170.54 m AHD
Saddle dam(s)	Nil
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	17,700 ML
Dead storage volume	430 ML
Surface area/elevation and storage volume/elevation relationship	Irrigation and Water Supply Commission Drawing No. S 36445A (28/09/73)
Spillway arrangement	
Description of works	Central ogee crest with cribbed sheet piling to each bank
Spillway level	EL 170.54 m AHD
Spillway width	58.54 metres
Discharge characteristics	Queensland Water Resources Commission Drawing No. A3-55197 (15/03/79)
River inlet/outlet works	
Description of works	An inlet tower equipped with dropboards discharging through a 1200 mm pipe bifurcating to two 675 mm diameter release valves
Multi-level inlet	Dropboards
Cease to flow level	Invert EL 160.44 m AHD
Discharge characteristics	Estimated maximum outlet discharge at FSL is 625 ML/day
Fish transfer system	
Description of works	Nil

Storage: Gyranda Weir – Dawson River AMTD 284.5 km

Description of water infrastructure	
Main embankment	Steel sheet piling weir
Full supply level	EL 157.25 m AHD
Fixed crest level	EL 157.25 m AHD
Saddle dam(s)	Anabranch Weir
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	16,500 ML
Dead storage volume	2,120 ML
Surface area/elevation and storage volume/elevation relationship	Queensland Water Resources Commission Drawing No. A3-64635 (16/3/87)
Spillway arrangement	
Description of works	Water flows over full width of weir
Spillway level	EL 157.25 m AHD
Spillway width	148.3 metres
Discharge characteristics	Queensland Water Resources Commission Drawing No. A4-64655 (26/2/92)
River inlet/outlet works	
Description of works	Main embankment: Multi level inlet discharging through 1600 mm by 1600 mm box culvert to a 'vee' notch weir approximately 50 metres downstream of embankment. Anabranch structure: 750 mm diameter pipe
Multi-level inlet	Multi level inlet equipped with: 900 mm by 900 mm sluice gate opening at EL 156.32 m AHD 1060 mm by 1060 mm sluice gate opening at EL 153.14 m AHD 1500 mm by 1500 mm sluice gate opening at EL 150.08 m AHD
Cease to flow level	Invert vee notch EL 149.75 m AHD Invert anabranch pipe approximately EL 153.64 m AHD
Discharge characteristics	Estimated maximum outlet discharge at FSL is 1000 ML/day
Fish transfer system	
Description of works	Nil

Storage: Orange Creek Weir – Dawson River AMTD 270.7 km

Description of water infrastructure	
Main embankment	Timber piled weir, with concrete work following maintenance/flood repairs
Full supply level	EL 150.29 m AHD
Fixed crest level	EL 150.29 m AHD
Saddle dam(s)	Anabranch weir
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	6,140 ML
Dead storage volume	2,320 ML
Surface area/elevation and storage volume/elevation relationship	Water Resources Commission (DPI) Drawing No. A3-101017 and 101018 (14/10/92)
Spillway arrangement	
Description of works	No separate spillway. Flows overtop full weir
Spillway level	EL 150.29 m AHD
Spillway width	48.82 metres
Discharge characteristics	Queensland Water Resources Commission Drawing No. A3-55199, submitted to NR&M 12/7/01
River inlet/outlet works	
Description of works	Main embankment: Outlet works consists of a high and low level outlet. Low level outlet is a 600 mm nominal diameter pipe controlled on the upstream end by a gate valve. The high level outlet is a 900 mm nominal diameter, two-barrel dropboard structure for crest releases. Anabranch structure: Outlet works consist of a 300 mm nominal diameter pipe controlled on the upstream end by a gate valve.
Multi-level inlet	High and low level outlets
Cease to flow level	Low level outlet invert EL 145.82 m AHD High level outlet invert EL 148.25 m AHD Anabranch outlet invert EL 147.42 m AHD
Discharge characteristics	Estimated maximum outlet discharge at FSL is 360 ML/day
Fish transfer system	
Description of works	Nil

Storage: Theodore Weir – Dawson River AMTD 228.5 km

Description of water infrastructure	
Main embankment	The main weir was originally of timber pile construction, with concrete abutment and apron slabs additions.
Full supply level	EL 133.63 m AHD
Fixed crest level	EL 133.63 m AHD
Saddle dam(s)	Timber piled anabranch weir
Fabridams	Nil
Gates	Nil, but note river inlet/outlet
Storage volume and surface area	
Full supply volume	4,760 ML
Dead storage volume	750 ML
Surface area/elevation and storage volume/elevation relationship	Queensland Water Resources Commission Drawing No. A3-36527B (10/1/84)
Spillway arrangement	
Description of works	Flows overtop full width of weir
Spillway level	EL 133.63 m AHD
Spillway width	60.63 metres
Discharge characteristics	Queensland Water Resources Commission Drawing No. A3-55200 (21/3/79)
River inlet/outlet works	
Description of works	Two 1000 mm by 750 mm gates
Multi-level inlet	Single level outlet with no inlet structure
Cease to flow level	Invert EL 131.75 m AHD
Discharge characteristics	Estimated maximum outlet discharge at FSL is 275 ML/day
Fish transfer system	
Description of works	Nil

Storage: Moura Offstream Storage – Dawson River Diversion AMTD 156.9 km

Description of water infrastructure	
Main embankment	Compacted earth
Full supply level	EL 125.29 m AHD
Fixed crest level	EL 125.29 m AHD
Saddle dam(s)	Not applicable
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	2,820 ML
Dead storage volume	140 ML
Surface area/elevation and storage volume/elevation relationship	Natural Resources (State Water Projects) Drawing No. A3-213163 (10/3/00)
Diversion works	
Description of works	Extracts from the Dawson River at AMTD 156.9 km. Reinforced concrete pump station with two by one cumec submersible pumps. Rising main comprising two by 660 mm OD steel pipes joining to a 960 mm OD steel pipe.
River inlet/outlet works	
Description of works	Floating intake arrangement installed in the offstream storage. Concrete base slab EL 118.30 m AHD Steel pipe through embankment invert level EL118.50 m AHD. River releases are made via: <ul style="list-style-type: none"> a) Rising main direct into the river; b) Rising main, then into the 200 mm diameter return line; or c) Combination of both the above.
Multi-level inlet	Floating intake arrangement
Cease to flow level	EL 118.6 m AHD
Discharge characteristics	Maximum 18 ML/day at FSL through return line Maximum 120 ML/day with pumps removed

Storage: Moura Weir – Dawson River AMTD 150.2 km

Description of water infrastructure	
Main embankment	Timber piled weir, which has been renovated to include steel and concrete
Full supply level	EL 104.75 m AHD
Fixed crest level	EL 104.75 m AHD
Saddle dam(s)	Nil
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	7,700 ML
Dead storage volume	600 ML
Surface area/elevation and storage volume/elevation relationship	Natural Resources (State Water Projects) Drawing No. A3-214477 (5/9/00)
Spillway arrangement	
Description of works	Flow overtops full width of weir
Spillway level	High level crest EL 105.05 m AHD Low level crest EL 104.75 m AHD
Spillway width	High level crest 135.67 metres Low level crest 55.70 metres
Discharge characteristics	Not available
River inlet/outlet works	
Description of works	River: 1440 mm diameter outlet pipe with a 1200 mm diameter butterfly valve. Back Creek: 900 mm diameter pipe
Multi-level inlet	Single level outlet only
Cease to flow level	River: invert EL 99.47 m AHD Back Creek: EL 101.25 m AHD
Discharge characteristics	Estimated outlet discharge at FSL is 850 ML/day
Fish transfer system	
Description of works	Vertical slot fishway

Storage: Neville Hewitt Weir – Dawson River AMTD 82.7 km

Description of water infrastructure	
Main embankment	Mass concrete weir
Full supply level	EL 80.30 m AHD
Fixed crest level	EL 80.30 m AHD
Saddle dam(s)	Anabranch weir
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	11,300 ML
Dead storage volume	2,120 ML
Surface area/elevation and storage volume/elevation relationship	Irrigation and Water Supply Commission Drawing No. S 43910 (21/5/75)
Spillway arrangement	
Description of works	Central ogee crest with cribbed sheet piling on both sides
Spillway level	EL 80.30 m AHD
Spillway width	76.20 metres
Discharge characteristics	Tabulated discharge relationship submitted to NR&M on 30/3/01
River inlet/outlet works	
Description of works	Main embankment: inlet structure with dropboards discharging through 750 mm nominal diameter pipe with 750 mm nominal diameter butterfly valve and a 300 mm nominal diameter gate valve. Anabranch structure: inlet structure with dropboards discharging through 600 mm nominal diameter outlet pipe with 375 mm gate valve.
Multi-level inlet	Dropboards
Cease to flow level	Main embankment: outlet pipe invert EL 72.53 m AHD Anabranch structure: outlet sill invert EL 74.80 m AHD Main embankment: inlet pipe invert EL 72.45 m AHD Anabranch structure: inlet sill invert EL 74.74 m AHD
Discharge characteristics	Outlet rating curve submitted to NR&M on 30/3/01 Estimated maximum outlet discharge at FSL is 300 ML/day
Fish transfer system	
Description of works	Fish lock

Attachment 4.1E

Dawson Valley Water Supply Scheme Rules for infrastructure operation and environmental management

1 Operating levels of storages and waterholes

1.1 Nominal operating levels of storages

The nominal operating level for each storage in the scheme is given in Table 1.

Releases must be made from the relevant upstream storage given in Table 1 to maintain the water level in a storage at its nominal operating level, unless the water level in the upstream storage is below its local supply level.

Storage levels may vary above and below the nominal operating level due to practical limitations of estimating and making releases and for unforeseen circumstances.

Table 1: Nominal operating levels of storages

Storage	Upstream storage	Nominal operating level
Glebe Weir	Not applicable	Not applicable
Gyranda Weir	Glebe Weir	EL 152.12 m AHD (4,100 ML)
Orange Creek Weir	Gyranda Weir	No level specified
Theodore Weir	Gyranda Weir	EL 132.73 m AHD (3,930 ML)
Moura Offstream Storage	Not Applicable	Not applicable
Moura Weir	Moura Offstream Storage and Theodore Weir	EL 102.55 m AHD (4,200 ML)
Neville Hewitt Weir	Not applicable	Not applicable

1.2 Local supply levels of storages

The local supply level and local supply area for each storage in the scheme is given in Table 2.

Releases must not be made from a storage that is below its local supply level for the purpose of maintaining nominal operating levels in downstream storages.

Releases may be made from a storage that is below its local supply level in order to supply water in its local supply area. The local supply area for a storage at a particular time extends to the pond of the next downstream storage at that particular time.

1.3 Minimum operating level of storages

The minimum operating level for each storage in the scheme are given in Table 2.

Table 2: Local supply levels, local supply areas and minimum operating levels of storages

Storage	Local supply level	Local supply area	Minimum operating levels
Glebe Weir	EL 163.6 m AHD (800 ML)	Glebe Weir pond and downstream to, but excluding, Gylanda Weir pond	EL 160.66 m AHD
Gylanda Weir	EL 151.80 m AHD (3,700 ML)	Gylanda Weir pond and downstream to, but excluding, Theodore Weir pond	EL 150.08 m AHD
Orange Creek Weir	Not applicable	Not applicable	EL 145.82 m AHD
Theodore Weir	EL 131.75 m AHD (3,140 ML)	Theodore Weir pond and downstream to, but excluding, Moura Weir pond	EL 126.95 m AHD
Moura offstream storage	Not applicable	Not applicable	No minimum level specified
Moura Weir	Not applicable	Moura Weir pond and downstream to, but excluding, Neville Hewitt Weir pond	EL 97.0 m AHD
Neville Hewitt Weir	EL 77.0 m AHD (4,000 ML)	Neville Hewitt Weir pond and downstream to downstream limit of Dawson Valley Water Supply Scheme	EL 72.53 m AHD

Water must not be released or supplied from a storage if the water level in that storage is below its minimum operating level, unless otherwise authorised by the chief executive.

Gylanda Weir may be drawn down to its minimum operating level only if Glebe Weir is below its local supply level.

Theodore Weir may be drawn down to its minimum operating level only if Gylanda Weir is below its local supply level.

Moura Weir may be drawn down to its minimum operating level only if Theodore Weir is below its local supply level and Moura Offstream Storage is below its dead storage volume. The dead storage volume for the Moura Offstream Storage is given in Attachment 4.1D.

1.4 Minimum levels in waterholes

For the waterhole known locally as Boolburra waterhole (nominally AMTD 18.37 km on the Dawson River):

- If the water level in Neville Hewitt Weir is above its local supply level, supplemented water should not be taken from the Boolburra waterhole if the water level in that waterhole is more than 0.5 metres below its cease to flow level; and
- If the water level in Neville Hewitt Weir is below its local supply level, supplemented water must not be taken from the Boolburra waterhole if the water level in that waterhole is more than 1.2 metres below its cease to flow level, unless otherwise authorised by the chief executive

For a waterhole within the extent of the Dawson Valley Water Supply Scheme other than the Boolburra waterhole:

- Supplemented water should not be taken from a waterhole that is more than 0.5 metres below its cease to flow level; and
- The chief executive may authorise supplemented water to be supplied from a waterhole when the level is more than 0.5 metres below its cease to flow level.

2 Diversions to Moura Offstream Storage

Water may be diverted to the Moura Offstream Storage at a rate not exceeding 173 ML/day, subject to the following:

- For the duration of the Moura Offstream Storage first post-winter flow management strategy, water may be diverted to the Moura Offstream Storage if the flow passing Moura Weir is more than 30 cumec; and
- At other times water may be diverted to the Moura Offstream Storage if the flow passing Moura Weir is more than 5 cumec.

The Moura Offstream storage first post-winter flow management strategy applies for the same period as the first post-winter flow management strategy for waterharvesting upstream of the Mimosa Creek junction, given in Section 5.1 of Attachment 5.1B.

The chief executive will notify the Resource Operations Licence (ROL) holder if the first post-winter flow management strategy for waterharvesting upstream of the Mimosa Creek junction is activated before 1 October, otherwise the strategy is activated on 1 October.

The chief executive will notify the ROL holder when the first post-winter flow management strategy for waterharvesting upstream of the Mimosa Creek junction ends.

The ROL holder must implement the Moura Offstream Storage first post-winter flow management strategy at the earlier of:

- Within 24 hours of notification of activation of the first post-winter flow management strategy for waterharvesting upstream of the Mimosa Creek junction; or
- 1 October.

3 Releases of water from storages

3.1 General rules

When determining releases from a storage, the ROL holder must have regard to the following:

- The total volume of water ordered, and its distribution;
- The likely contribution of inflows from tributaries that could assist the supply of orders;
- The likely transmission and operating losses;
- The travel time for water delivery;
- The volume of releases required to maintain nominal operating levels in downstream storages, and to maintain levels in waterholes;
- Releases must not be made from storages in the upper Dawson sub-scheme to:
 - Supply orders for water allocations located within the Neville Hewitt Weir pond;
 - Supply orders for water allocations located in zones Dawson B or Dawson C; or
 - Maintain storage levels in the lower Dawson sub-scheme;

- The local supply level in the supplying storage;
- The first post-winter flow management strategy;
- The seasonal base flow management strategy;
- The fishway management strategy; and
- The quality of water released from storages.

The ROL holder may incorporate provisions in supply contracts for circumstances when the release capacity of a storage is insufficient to meet downstream demand.

3.2 Release rate rules

Water may be released from a storage at a rate up to the maximum discharge capacity of its outlet works.

The maximum discharge capacity of the outlet works is to be used for meeting downstream demand or passing environmental flows as required.

A change to the rate of a release through the outlet works of a storage must have regard to the limits described in Table 3.

Table 3: Limits on changes to rate of release through the outlet works of storages

Storage	Limits on changes to rate of release through outlet works
Glebe, Gylanda, Orange Creek, Theodore, Moura and Neville Hewitt Weirs	<ul style="list-style-type: none"> • Reductions of release rate must occur incrementally, such that the risk of fish stranding and bank slumping is minimised. • Maximum rate of increase in release rate are not specified.
Moura Offstream Storage	<ul style="list-style-type: none"> • None specified

4 First post-winter flow management strategy

4.1 Upper Dawson sub-scheme first post-winter flow management strategy

4.1.1 Notification of activation of strategy

The upper Dawson sub-scheme first post-winter flow management strategy is activated when the chief executive notifies the Dawson Valley Water Supply Scheme ROL holder that the strategy is activated.

The chief executive will activate the first post-winter flow management strategy for the first flow event with the following attributes:

- General stream flow level rises of at least 1.5 metres in the Dawson River between Glebe Weir and the effective upstream limit of Gylanda Weir between 1 October and 10 April, to indicate circumstances that would potentially trigger ecological processes associated with the first post-winter flow; or
- General stream flow level rises of at least 1.5 metres in the Dawson River between Glebe Weir and the effective upstream limit of Gylanda Weir after 14 September, to indicate circumstances that would potentially trigger ecological processes associated with the first post-winter flow, provided that the water temperature is expected to be above the critical level for these processes; and
- Flow characteristics that would typically indicate an event resulting in flows between

Glebe Weir and the effective upstream limit of Gyranda Weir with a duration greater than base flow of at least 15 days, to support ecological processes associated with the intent of the first post-winter flow.

The following guidelines will apply to evaluation of these flow attributes and in making a decision to activate the first post-winter flow management strategy:

- The ecological processes trigger will generally be identified by a rise in stream flow of at least 2,000 ML/day in the Dawson River immediately downstream of Glebe Weir.
- For an event with the ecological processes trigger occurring in September, the water temperature should be at least 23°C; and
- The characteristics of the flow event will be evaluated to decide whether the event would typically result in extended periods of flow immediately downstream of Glebe Weir above the base flow (the Water Resource Plan (WRP) specifies a base flow of 46 ML/day at Glebe Weir). This evaluation will be based on stream flow as well as Bureau of Meteorology weather and rainfall information.

The decision to activate the first post-winter flow management strategy will typically be made within 3 days of the occurrence of the ecological process trigger flow. However, the decision may occur later if subsequent weather, rainfall and runoff conditions indicate that the flow duration attributes could be achieved.

The department will prepare work practices that further guide evaluations associated with the activation of the first post-winter flow management strategies. These guidelines will be regularly reviewed to adapt to technological advances and operational experience.

4.1.2 Strategy details

Releases to pass flows under the upper Dawson sub-scheme first post-winter flow management strategy are in addition to releases required for water supply or for maintaining operating levels in downstream weirs.

(a) Gyranda Weir

The ROL holder must implement the upper Dawson sub-scheme first post-winter flow management strategy at Gyranda Weir within 1 day of the activation of the strategy by the chief executive.

For 21 days from the date that implementation of the strategy begins at Gyranda Weir, inflows to Gyranda Weir must be passed as they occur, except:

- Releases must not be made if the water level in Gyranda Weir is below EL 154.9 m AHD (9,000 ML);
- Releases are not required when Gyranda Weir overflow is more than 100 ML/day; and
- Releases are not required when Gyranda Weir inflow is less than 30 ML/day.

For the purpose of implementing the strategy:

- The passing flow may vary above and below that required under this strategy due to practical limitations of estimating and making releases, the maximum discharge capacity of the outlet works, and for unforeseen circumstances;
- The shape of the passing flow hydrograph should follow as far as practicable the shape of the inflow hydrograph; and

- At those times when the maximum discharge capacity of the outlet works limits the ability to pass inflows, the excess inflow volume will be retained in storage.

(b) Moura Weir

The ROL holder must implement the upper Dawson sub-scheme first post-winter flow management strategy at Moura Weir within 1 day of the activation of the strategy by the chief executive.

For 21 days from the date that implementation of the strategy begins at Moura Weir, inflows to Moura Weir must be passed as they occur, except:

- Releases must not be made if the water level in Moura Weir is below EL 103.15 m AHD (4,900 ML);
- Releases are not required when Moura Weir overflow is more than 110 ML/day; and
- Releases are not required when Moura Weir inflow is less than 35 ML/day.

For the purpose of implementing the strategy:

- The passing flow may vary above and below that required under this strategy due to practical limitations of estimating and making releases, the maximum discharge capacity of the outlet works, and for unforeseen circumstances;
- The shape of the passing flow hydrograph should follow as far as practicable the shape of the inflow hydrograph; and
- At those times when the maximum discharge capacity of the outlet works limits the ability to pass inflows, the excess inflow volume will be retained in storage.

4.2 Lower Dawson sub-scheme first post-winter flow management strategy

4.2.1 Notification of activation of strategy

The lower Dawson sub-scheme first post-winter flow management strategy is activated when the chief executive notifies the Dawson Valley Water Supply Scheme ROL holder that the strategy is activated.

The chief executive will activate the first post-winter flow management strategy for the first flow event with the following attributes:

- General stream flow level rises of at least 1.5 metres in the Dawson River downstream of Neville Hewitt Weir between 1 October and 10 April, to indicate circumstances that would potentially trigger ecological processes associated with the first post-winter flow; or
- General stream flow level rises of at least 1.5 metres in the Dawson River downstream of Neville Hewitt Weir after 14 September, to indicate circumstances that would potentially trigger ecological processes associated with the first post-winter flow, provided that the water temperature is expected to be above the critical level for these processes; and
- Flow characteristics that would typically indicate an event resulting in flows downstream of Neville Hewitt Weir with a duration greater than base flow of at least 15 days, to support ecological processes associated with the intent of the first post-winter flow.

The following guidelines will apply to evaluation of these flow attributes and in making a decision to activate the first post-winter flow management strategy:

- The ecological processes trigger will generally be identified by a rise in stream flow of at least 2,000 ML/day in the Dawson River immediately downstream of Neville Hewitt Weir or at the Don River junction;
- For an event with the ecological processes trigger occurring in September, the water temperature should be at least 23°C; and
- The characteristics of the flow event will be evaluated to decide whether the event would typically result in extended periods of flow immediately downstream of Neville Hewitt Weir above the base flow (the WRP specifies a base flow of 78 ML/day at Neville Hewitt Weir). This evaluation will be based on stream flow as well as Bureau of Meteorology weather and rainfall information.

The decision to activate the first post-winter flow management strategy will typically be made within 3 days of the occurrence of the ecological process trigger flow. However the decision may occur later if subsequent weather, rainfall and runoff conditions indicate that the flow duration attributes could be achieved.

The department will prepare work practices that further guide evaluations associated with the activation of the first post-winter flow management strategies. These guidelines will be regularly reviewed to adapt to technological advances and operational experience.

4.2.2 Strategy details

Releases to pass flows under the lower Dawson sub-scheme first post winter flow management strategy are in addition to any releases required for water supply.

The ROL holder must implement the lower Dawson sub-scheme first post-winter flow management strategy at Neville Hewitt Weir within 1 day of the activation of the strategy by the chief executive.

For 21 days from the date that implementation of the strategy begins at Neville Hewitt Weir, inflows to Neville Hewitt Weir must be passed as they occur, except:

- Releases must not be made if the water level in Neville Hewitt Weir is below EL 77.0 m AHD (4,000 ML);
- Releases are not required when Neville Hewitt Weir overflow is more than 110 ML/day; and
- Releases are not required when Neville Hewitt Weir inflow is less than 35 ML/day.

For the purpose of implementing the strategy:

- The passing flow may vary above and below that required under this strategy due to practical limitations of estimating and making releases, the maximum discharge capacity of the outlet works, and for unforeseen circumstances;
- The shape of the passing flow hydrograph should follow as far as practicable the shape of the inflow hydrograph; and
- At those times when the maximum discharge capacity of the outlet works limits the ability to pass inflows, the excess inflow volume will be retained in storage.

5 Seasonal base flow management strategy

5.1 Theodore Weir seasonal base flow management strategy

A seasonal base flow equal to the inflow to Theodore Weir must pass Theodore Weir if:

- Inflows to the weir are between 60 ML/day and 100 ML/day;
- The water level in the weir is above EL 133.0 m AHD (4,200 ML); and
- The upper Dawson sub-scheme first post-winter flow management strategy is not in effect.

A seasonal base flow of 100 ML/day must pass Theodore Weir if:

- Inflows to the weir are greater than 100 ML/day;
- The water level in the weir is above EL 133.0 m AHD (4,200 ML); and
- The upper Dawson sub-scheme first post-winter flow management strategy is not in effect.

Seasonal base flow passed through Theodore Weir is in addition to any release required for supply between Theodore Weir and the Moura Weir pond.

For the purpose of implementing this strategy:

- The volume passed over a 48-hour period must be within plus 20% and minus 20% of the volume required to be passed under the strategy;
- The commencement and cessation of any release required under this strategy may be delayed by up to 48 hours; and
- Inflows to the weir do not include any water which was released from Gylanda Weir intended to maintain the level in Theodore Weir at its nominal operating level or to supply users between Gylanda Weir and the Theodore Weir pond.

5.2 Moura Weir seasonal base flow management strategy

A seasonal base flow equal to the inflow to Moura Weir must pass Moura Weir if:

- Inflows to the weir are between 70 ML/day and 110 ML/day;
- The water level in the weir is above EL 102.8 m AHD (4,500 ML); and
- The upper Dawson sub-scheme first post-winter flow management strategy is not in effect.

A seasonal base flow of 110 ML/day must pass Moura Weir if:

- Inflows to the weir are greater than 110 ML/day;
- The water level in the weir is above EL 102.8 m AHD (4,500 ML); and
- The upper Dawson sub-scheme first post-winter flow management strategy is not in effect.

Seasonal base flow passed through Moura Weir is in addition to any release required for supply in the reach between Moura Weir and the Neville Hewitt Weir pond.

For the purpose of implementing this strategy:

- The volume passed over a 48-hour period must be within plus 20% and minus 20% of the volume required to be passed under the strategy;

- The commencement and cessation of any release required under this strategy may be delayed by up to 48 hours; and
- Inflows to the weir do not include any water which was released from Theodore Weir intended to maintain the level in Moura Weir at its nominal operating level or to supply users between Theodore Weir and the Moura Weir pond.

5.3 Neville Hewitt Weir seasonal base flow management strategy

A seasonal base flow equal to the inflow to Neville Hewitt Weir must pass Neville Hewitt Weir if:

- Inflows to the weir are between 70 ML/day and 110 ML/day;
- The water level in the weir is above EL 77.0 m AHD (4,000 ML); and
- The lower Dawson sub-scheme first post-winter flow management strategy is not in effect.

A seasonal base flow of 110 ML/day must pass Neville Hewitt Weir if:

- Inflows to the weir are greater than 110 ML/day;
- The water level in the weir is above EL 77.0 m AHD (4,000 ML); and
- The lower Dawson sub-scheme first post-winter flow management strategy is not in effect.

Seasonal base flow passed through Neville Hewitt Weir is in addition to any release required for supply between Neville Hewitt Weir and the downstream limit of the Boolburra waterhole.

For the purpose of implementing this strategy:

- The volume passed over a 48-hour period must be within plus 20% and minus 20% of the volume required to be passed under the strategy;
- The commencement and cessation of any release required under this strategy may be delayed by up to 48 hours; and
- Inflows to the weir do not include any water which was released from Moura Weir intended to supply users between Moura Weir and the Neville Hewitt Weir pond.

6 Fishway management strategy

6.1 Moura Weir

The ROL holder is authorised to operate the Moura Weir fishway when:

- Flows passing the weir are greater than 80 ML/day; and
- The weir storage level is between EL 102.75 m AHD and 105.47 m AHD.

The ROL holder may operate the fishway at other times, provided the releases from the weir are not more than that required to:

- Supply water;
- Meet the requirements of the upper Dawson sub-scheme first post-winter flow management strategy; and
- Meet the requirements of the seasonal base flow management rules.

6.2 Neville Hewitt Weir

The ROL holder is authorised to operate the Neville Hewitt Weir fishlock when:

- Flows passing the weir are greater than 80 ML/day; and
- The weir storage level is between EL 78.3 m AHD and 81.1 m AHD.

The ROL holder may operate the fishlock at other times, provided the releases from the weir are not more than that required to:

- Supply water;
- Meet the requirements of the lower Dawson sub-scheme first post-winter flow management strategy; and
- Meet the requirements of the seasonal base flow management strategy.

7 Quality of water released from storages

Where a storage incorporates a multi-level outlet, the ROL holder must draw water from the level that optimises the quality of the water released (for example, dissolved oxygen concentration and the temperature in the release water optimised), to minimise the impact on the downstream water quality. If this level does not provide enough capacity for the required release, other levels must be used to give the required discharge.

8 Use of watercourses for distribution of water

The ROL holder may use the following watercourses for the purposes of distribution of water:

- The Dawson River from the upstream limit of Glebe Weir to the downstream limit of the Boolburra waterhole; and
- Sections of tributaries of the Dawson River that contain water from natural waterholes and infrastructure within the above section of the Dawson River.

The ROL holder must not divert water to any watercourse other than those given above for distribution of water.

9 Riparian stock and domestic use

Under Section 20(3) of the Water Act, an owner of land adjoining a watercourse, lake or spring may take water for domestic purposes and watering stock that would be normally depastured on the land without a water entitlement. In this section this is referred to as 'riparian entitlement water'.

This means that riparian entitlement water might also be taken through the same metered water facilities as supplemented water and some users might desire appropriate allowances be made for their riparian entitlement water use. The historical arrangements for accounting for individual riparian use taken through metered facilities will not apply following commencement of the ROP.

9.1 Rules for adjusting metered use for riparian entitlement water use

This section provides arrangements to allow adjustments for riparian entitlement water metered use.

The ROL holder must enter into an arrangement with any water user who requests metered

use adjustments for riparian entitlement water use taken through a metered facility. The ROL holder must supply details of the arrangements with each individual user to the chief executive within 5 business days of an agreement.

An arrangement must comply with the departmental guidelines for this purpose.

If the ROL holder and a water user are unable to reach agreement on an arrangement, the chief executive will decide the arrangement that will apply in that particular instance.

Attachment 4.1F

Dawson Valley Water Supply Scheme

Water sharing rules

This attachment provides water sharing rules for:

- Announced allocations;
- Critical water supply;
- Transfer of water between water years; and
- Seasonal water assignments.

There are three types of water allocation supplied to water users in the Dawson Valley Water Supply Scheme, namely medium, medium A and high priority water allocations. The water sharing rules specify the way the water resources of the Dawson Valley Water Supply Scheme will be shared between each of the water allocation priority groups.

For the purposes of this attachment, an interim water allocation must be managed as if it is a water allocation.

1 Announced allocation rules

The announced allocation percentage is the percentage of the water allocation nominal volume that may be supplied during the water year.

The Resource Operations Licence (ROL) holder is required to calculate announced allocation percentages for each priority group through the use of formulas and associated parameters. Details for each parameter used are specified in Section 5.

The amount of water that can be apportioned to each of the priority groups at any given time is determined by taking into account a number of factors, including:

- The time of year an assessment is made;
- The amount of water used in the current water year up to the date of the assessment;
- The amount of water stored in the storages;
- Allowance for evaporative and seepage losses from storages;
- Allowance for future inflows and the probability of those inflows occurring at particular times in the water year;
- Allowance for the requirements of high priority water allocation for the first four months of the next water year;
- Allowance for transmission and operational losses along the river; and
- The net amount of the water allocation volume moved into the current water year from the previous water year.

The values for these factors applied in the announced allocation formula seek to maximise the availability of medium and medium A priority water allocation and secure the reliability for high priority water allocations as determined by testing in the department's hydrologic model (IQQM) over the long-term historical period. Importantly the values given for these factors should not be taken out of the context of their purpose as part of the overall package used to

determine the announced allocation. For example, the values for some of the factors vary depending on the probability of natural inflows which in effect reduce the need for future provisions associated with losses at certain times of the year.

The announced allocation formula provides for announced allocation differential of up to 20% for medium A priority water allocations over medium priority water allocations in the upper Dawson sub-scheme. This is consistent with arrangements previously in place for supplies from the channel systems in the Dawson scheme.

1.1 General rules for announced allocations

The water year for the Dawson Valley Water Supply Scheme is from 1 October to 30 September in the following year.

Separate assessment of announced allocation percentage must be made for each priority group in each sub-scheme.

The initial announced allocation percentage for a water year must be announced within 2 weeks after the start of that water year.

The ROL holder may announce an interim announced allocation at any time during a water year. An interim announced allocation percentage must not be greater than the percentage that would be calculated using the formulas in Section 1.2. An interim announced allocation has effect as if it was an announced allocation calculated using the formulas in Section 1.2.

The ROL holder must announce an interim announced allocation immediately prior to the commencement of a water year. The basis/criteria for the determination of the interim announced allocation for the start of the water year must take into account water user requirements, and be made available to water users.

Announced allocation percentages must not be reduced during a water year.

Announced allocation percentages must not be greater than 100%.

Announced allocation percentages must be rounded to the nearest 1%.

Announced allocation percentages must be reviewed, and revised percentages announced within 2 weeks after a major inflow occurs. A major inflow is defined as one that would result in:

- For times when the announced allocation is less than 10% prior to the inflow:
 - The announced allocation percentage increasing by 2% or more;
- For times when the announced allocation is more than 10% prior to the inflow:
 - The announced allocation percentage increasing to 100%; or
 - The announced allocation percentage increasing by 5% or more.

If the announced allocation percentage is less than 100%, the announced allocation percentage should be reviewed at intervals not greater than 3 months.

The ROL holder should advise water users of forecast announced allocations, including details of the parameters used in determining the forecast values. The criteria for forecasting announced allocations, including the timing, frequency and level of accuracy must take into

account water user requirements, and be made available to water users.

1.2 Calculation of announced allocation percentages

1.2.1 Medium and medium A priority water allocations

1.2.1(a) Upper sub-scheme

The initial announced allocation and any revised announced allocations for medium priority water allocations (AAm) and for medium A priority water allocations (AAma) must be determined from the following relationships.

$$(AAm * MPA) + (AAma * MAPA) = (UV + IN \quad HPA \quad RE \quad TOL + USE \quad VIWY) * 100$$

Where:

If AAma ≤ 20%, AAm = 0%

If AAma > 20%, AAm = AAma-20%

If AAm > 80%, AAma = 100%

The parameters used in these relationships are defined in Section 5.

1.2.1(b) Lower sub-scheme

The announced allocation percentage for medium priority water allocations in the lower sub-scheme must be determined from the following relationship.

$$AAm * MPA = (UV + IN \quad HPA \quad RE \quad TOL + USE \quad VIWY) * 100$$

The parameters used in this relationship are defined in Section 5.

1.2.2 High priority water allocations

The announced allocation percentage for high priority water allocations in a sub-scheme (AAh) must be 100% if the announced allocation percentage determined for both medium and medium A priority water allocations in that sub-scheme is greater than zero.

If the announced allocation percentage for medium and medium A priority water allocations in a sub-scheme is zero, the amount of water that may be taken by high priority water allocations in that sub-scheme may be subject to the critical water supply water sharing rules in Section 2.2.

2 Critical water supply water sharing rules

2.1 Critical water supply water sharing rules for 1 July to 30 September

The announced allocation arrangements preferred by irrigators and adopted for this ROP is an aggressive approach whereby the amount of water allocated in the early part of the water year is more than the amount available in storage at that time to assure supply of all allocated water throughout the water year. Essentially this means that there is an inherent dependence on wet season inflows to satisfy these allocations established prior to the wet season.

To account for the risks associated with the aggressive announced allocation approach, these critical water supply rules aim to provide a safety net for supplies for essential needs in the event that all the allocated water cannot be supplied. Circumstances when these rules might need to be applied include for example, the failure of a wet season to significantly replenish storages or due to a marked overall shift in the current irrigation demand pattern towards the latter part of the water year.

Under these rules, the available supplies are shared between water users proportionally to the volume of unused entitlement, after high priority water needs for the start of the next water year, and essential water needs for the current water year, such as drinking water, are addressed.

2.1.1 Activation of the rules

For each sub-scheme, activation of these critical water supply water sharing rules must be decided by the ROL holder as soon as practicable after 1 July on the basis of the third quarter meter readings and usage assessments as follows:

- The ROL holder must assess the amount of available supply for the remainder of the water year after making the normal provisions under the announced allocation rules for high priority supply into the next water year and losses.
- The ROL holder must assess the amount of unused entitlement.
- If the unused entitlement is more than 5% greater than the available supply, the ROL holder must activate the rules given in Section 2.1.3.

2.1.2 End of the rules

The ROL holder must end the critical water sharing rules activated under Section 2.1.1 in a sub-scheme and resume normal announced allocation procedures:

- If the announced allocation for medium and Medium A priority allocation increases; or
- At the end of the water year.

An announced allocation increase confirms that the supply availability has been restored to a safe condition for the remainder of the water year.

2.1.3 Critical water sharing rules for 1 July to 30 September

If these rules are activated under Section 2.1.1, the ROL holder must discontinue supply under the announced allocation arrangements and re-allocate the available supplies in the sub-scheme as follows:

- (a) Determine the essential water needs (refer to Section 2.1.4) for the remainder of the water year and allocate water in proportion to those needs up to the lesser of:
 - The total amount of available supply; or
 - 10% of the nominal high priority allocation in the sub-scheme; and
- (b) Allocate the remainder of the available supply in proportion to the unused individual entitlements as adjusted for any allocation made under (a) above.

While these rules are active, the ROL holder must regularly review the available supply and the unused entitlement.

If a review results in more than 10% additional water being available for supply than currently allocated under these rules, the ROL holder must proportionally allocate the additional water to the holders of unused entitlements when these rules were activated. Additional allocation should first address any allocation shortfall under (a) above.

An allocation under this section must not exceed an individual's entitlement at the time.

2.1.4 Essential water needs

For the purpose of this critical water supply water sharing rule, essential water needs must include that part of a town water supply required for essential services including drinking water and sanitation but excluding lawns and gardens. The ROL holder in conjunction with water allocation holders may establish additional essential purposes.

2.2 Critical water supply water sharing rules for high priority water allocations when announced allocation for medium and medium A priority water allocations are zero

The ROL holder may implement restrictions on the supply of high priority water in a sub-scheme provided:

- The announced allocation for both medium and medium A water allocations in the sub-scheme is zero;
- The restrictions are decided by the ROL holder in conjunction with high priority water allocation holders; and
- The objectives of the Water Resource Plan (WRP) are not compromised.

Factors that should be taken into account when deciding whether to implement restrictions, and the nature of those restrictions, include:

- The amount of water available in the system, and its distribution between each of the storages in each sub-scheme;
- The rules for releases of water from storages;
- The amount of high priority water allocation demand and its distribution, both spatially and temporally;
- The likely evaporative, transmission and other operational losses that may be incurred in delivering the water to water allocation holders;
- The circumstances and needs of individual high priority water allocation holders;

- The ability of individual high priority water allocation holders to modify their water demands; and
- The likelihood of further inflows in the short and medium term.

Restrictions that may be imposed may include, but are not limited to:

- An announced allocation, limiting the amount of water that may be supplied to high priority water allocation holders; and
- Limitations on the amount of high priority water allocation that may be supplied to an individual in a specific period (for example, maximum daily diversion rate, maximum weekly diversion rate in a particular month, maximum diversion to a particular date).

3 Transfer of water between water years

The ROL holder may develop and apply scheme practices for carry over and forward draw of water entitlements in accordance with the principles and rules in this section.

3.1 Principles for transfer of water between water years

The ROL holder must have regard to the following principles in developing and applying scheme practices for carry over and forward draw of water entitlements.

Carry over and forward draw practices must not have an adverse impact on the objectives of the WRP.

Entitlements must not be:

- Carried over from the current water year to any future year other than the next water year; or
- Brought forward from a future water year to the current water year, other than from the next water year.

The volume of an individual water entitlement carried over to the next water year must not exceed the unused portion of the entitlement at the end of the water year. The unused portion of an entitlement must not exceed the amount determined under section 2.1.3, if the critical water supply water sharing rules for 1 July to 30 September applied to the entitlement at the end of the water year.

The volume of individual water allocation brought forward to the current water year must not exceed the announced allocation volume for the allocation at the start of the next water year.

The ROL holder must apply such loss factors to carry over water as necessary to avoid:

- Adverse impacts on other water entitlement holders; and
- Adverse impacts on the objectives of the WRP.

The ROL holder must consider the effects of storage overflow on the volume of carry over.

3.2 Rules for transfer of water between water years

The following rules apply for the transfer of water between water years.

The total volume permitted to be brought forward to a water year for a sub-scheme must not exceed 10% of the total nominal allocation for that sub-scheme.

Forward draw to a water year must not be permitted prior to finalisation of the assessments for the activation of critical water supply water sharing rules for 1 July to 30 September given in Section 2.

The total volume permitted to be carried over to a water year for a sub-scheme must not exceed 10% of the total nominal allocation for that sub-scheme.

Carry over from the current water year to the next water year must not be permitted prior to finalisation of the assessments for the activation of critical water supply water sharing rules for 1 July to 30 September given in Section 2.

The ROL holder must not supply water carried over from the previous water year that was unused:

- At 1 November; or
- For the upper sub-scheme, at the time an overflow of Moura Weir commences; or
- For the lower sub-scheme, at the time an overflow of Neville Hewitt Weir commences.

3.3 End of water year minor adjustments

As an administrative arrangement to account for the timing of the end of water year metered use reading and for the operational convenience of water users, the ROL holder may, in addition to any carry over or forward draw permitted under Section 3.1 and Section 3.2, make minor carry over and forward draw adjustments to entitlements. For an individual, the adjustments must not exceed 2% of the individual entitlement at the end of the water year for which the meter reading applies, or 10 ML whichever is the lesser.

4 Seasonal water assignment rules

Under Section 146B of the Water Act the holder of a water allocation may enter into an arrangement for a seasonal assignment in relation to the allocation. However, the allocation holder may enter into the arrangement only with the consent of the ROL holder. The ROL holder may give consent only if the assignment is allowed under the seasonal water assignment rules in the ROP.

For the Dawson Valley Water Supply scheme, there are few specific rules given in the ROP. For example, volume limits for seasonal assignments within each sub-scheme are not specified. This approach allows the ROL holder greater flexibility to develop scheme practices for seasonal assignment in conjunction with the water users that suit the wide range of difficult supply circumstances specific to this system.

The ROL holder is required to report (refer Section 4.1.1 of Attachment 4.1G) on trends in seasonal assignment and evaluate whether seasonal assignment practices are impacting on supply for individual water users or groups of water users or impacting on the objectives of the WRP.

Chapter 8 of the ROP allows the chief executive to initiate changes to the seasonal assignment rules if considered necessary to protect the objectives of the WRP.

4.1 Principles for seasonal water assignment

The ROL holder must have regard to the following principles in developing scheme practices and for making decisions for consent of seasonal water assignment arrangements.

The effects of an individual seasonal assignment and the cumulative effects of successive or repeated seasonal assignments must not:

- Impact adversely on the WRP objectives;
- Impact adversely on the availability of water to other water users in any part of the scheme; or
- Subject waterholes to an increased potential for environmental harm.

The water under seasonal assignment may only be supplied from within the Dawson Valley Water Supply Scheme area.

4.2 Rules for seasonal water assignment

The following rules apply in developing scheme practices and for making decisions for consent of seasonal water assignment arrangements.

Water supplied under a seasonal water assignment may be used for any purpose.

Seasonal assignment of a water allocation with a specified purpose of ‘distribution loss’ is not permitted.

The net amount of seasonal water assignment between the upper Dawson sub-scheme and the lower Dawson sub-scheme must not exceed the limits given in Table 1.

Table 1: Permitted net amount of seasonal water assignment between sub-schemes

Upper Dawson sub scheme to lower Dawson sub-scheme (ML)	Lower Dawson sub-scheme to upper Dawson sub-scheme (ML)
200	0

5 Definition of parameters

AAM = Announced allocation percentage medium priority

The percentage of the nominal volume for a medium priority water allocation that may be supplied for the current water year in a sub-scheme.

AAMA = Announced allocation percentage medium A priority

The percentage of the nominal volume for a medium A priority water allocation that may be supplied for the current water year in a sub-scheme.

MPA = Medium priority water allocations

The volume of medium priority water allocations in a sub-scheme.

MAPA = Medium A priority water allocations

The volume of medium A priority water allocations in a sub-scheme.

HPA = High priority allocations

The volume of high priority water allocations in a sub-scheme.

USE = Total volume of water taken

The volume of water taken in a sub-scheme in the current water year up to the time of the assessment of the announced allocation (excluding any water taken in the current water year that had been carried over).

UV = Useable volume

UV is determined by summing the useable volume of each of the storages included in the assessment of the announced allocation, as per the following equations:

$$UV = \text{sum}(UV_{\text{storage}})$$

$$UV_{\text{storage}} = CV - DSV - SL$$

$$UV_{\text{storage}} = 0 \text{ if } CV - DSV - SL \text{ is less than zero}$$

Where:

UV_{storage} is the useable volume of each storage.

CV is the current volume of the storage.

DSV is the dead storage volume of the storage.

SL is the storage losses.

For the purpose of assessment of the announced allocations, the volumes of Glebe Weir, Gylanda Weir, Theodore Weir, Moura offstream storage, and Moura Weir are included in the calculation for the upper sub-scheme, while the volume of Neville Hewitt Weir is included in the calculation for the lower sub-scheme. The volume of Orange Creek Weir is ignored in the calculation.

SL = Storage losses

SL is the projected storage losses from the storages for the remainder of the water year.

The storage loss depths to be used for each storage are given in Table 2. The value next to the current month is multiplied by the current surface area of the storage. The storage loss for each storage is determined and then summed to give the total storage loss.

Table 2: Projected storage losses for each storage

Month in which announced allocation is calculated	Upper sub-scheme storage loss (mm)	Lower sub-scheme storage loss (mm)
October	990	990
November	990	990
December	990	990
January	990	990
February	990	990
March	815	815
April	645	645
May	515	515
June	420	420
July	340	340
August	255	255
September	145	145

IN = Inflow

IN is the allowance for inflows used in the calculation of the announced allocation. The inflows to be used are given in Table 3. The value which must be used for inflows is the value in the table for the month in which the calculation is undertaken.

Table 3: Inflow allowances

Month in which announced allocation is calculated	Upper sub-scheme inflows (ML)	Lower sub-scheme inflows (ML)
October	2,500	700
November	1,555	432
December	1,447	432
January	1,379	47
February	0	0
March	0	0
April	0	0
May	0	0
June	0	0
July	0	0
August	0	0
September	0	0

RE = Reserve

RE is the storage volume set aside for supply and associated losses in future water years. The reserve volumes for calculating the announced allocations are given in Table 4. The value for the current month at the time of the calculation is the value used.

Table 4: Reserve volumes

Month in which announced allocation is calculated	Upper sub-scheme reserve (ML)	Lower sub-scheme reserve (ML)
October	2,500	700
November	1,555	432
December	1,447	432
January	1,379	47
February	4,000	1,500
March	4,000	1,500
April	4,000	1,500
May	4,000	1,500
June	4,000	1,500
July	4,000	1,500
August	4,000	1,500
September	4,000	1,500

TOL = Transmission and operational losses

TOL is an allowance for river transmission and operational losses expected to occur in running the system from the date of the announced allocation assessment to the end of the current water year. TOL varies with the announced allocation for medium priority water allocations.

TOL are calculated using the formula below. Values for TOL1 and TOL2 are given in Tables 5 and 6. TOL1 and TOL2 are to be linearly interpolated for intermediate values of medium priority announced allocation.

Upper sub-scheme

$$\text{TOL} = \text{TOL1} * \frac{[\text{MPA} + \text{MAPA} + \text{HPA} - \text{USE}]}{\text{MPA} + \text{MAPA} + \text{HPA}}$$

Lower sub-scheme

$$\text{TOL} = \text{TOL2} * \frac{[\text{MPA} + \text{HPA} - \text{USE}]}{(\text{MPA} + \text{HPA})}$$

Table 5: TOL1 for upper sub-scheme

Upper sub-scheme transmission and operational loss (ML)				
At 0% AAm	At 10% AAm	At 50% AAm	At 80% AAm	At 100% AAm
250	550	1300	1700	1850

Table 6: TOL2 for lower sub-scheme

Lower sub-scheme transmission and operational loss allowance (ML)		
At 0% AAm	At 60% AAm	At 100% AAm
100	400	550

VIWY = Net total volume of unused water allocation transferred into the current water year from the previous water year

VIWY is the net total volume of unused water allocation that is transferred into a water year from the previous water year, taking into account:

- The volume of water carried over to the current water year from the previous water year;
- The volume of water brought forward from the current water year to the previous water year; and
- The volume of water carried over to the current water year that had been supplied in the current water year as at the date of the assessment of the announced allocation.

Attachment 4.1G

Dawson Valley Water Supply Scheme Monitoring program

1 Water quantity

1.1 Height and stream flow

The Resource Operations Licence (ROL) holder must record height and flow data in accordance with Table 1.

Table 1: Locations in the Dawson River where height and flow data is required

Location	Height data	Flow data
Glebe Weir inflow		✓
Glebe Weir storage	✓	
Glebe Weir outflow		✓
Gyranda Weir inflow		✓
Gyranda Weir storage	✓	
Gyranda Weir outflow		✓
Theodore Weir inflow		✓
Theodore Weir storage	✓	
Theodore Weir outflow		✓
Moura Weir inflow		✓
Moura Weir storage	✓	
Moura Weir outflow		✓
Neville Hewitt Weir inflow		✓
Neville Hewitt Weir storage	✓	
Neville Hewitt Weir outflow		✓

It is preferred that continuous time series data be collected. However, the chief executive may approve the collection of data in a format and standard other than for continuous time series data.

The methodology for determining height and flow data, including data format and standard, must be approved by the chief executive.

1.1a Operating level of storages

The ROL holder must record for Glebe Weir, Gyranda Weir, Theodore Weir, Moura Weir and Neville Hewitt Weir:

- The daily storage height; and
- The daily storage outflow.

For the purposes of this section:

- The methodology for determining the daily storage height and daily storage outflow must be approved by the chief executive; and
- The data must be real time information upon which operational decisions were based not data that has subsequently changed for example through a verification process.

1.1b Stream flow for the purpose of first post-winter flow management strategies

The ROL holder must record for each storage where a first post-winter flow management strategy applies under Section 4 of Attachment 4.1E:

- The storage inflow;
- The storage height; and
- The storage outflow.

For the purposes of this section:

- The methodology for determining the storage inflow, storage height and storage outflow must be approved by the chief executive;
- The storage inflow, storage height and storage outflow are only required to be recorded for the duration of the implementation of the first post-winter flow management strategy; and
- The data must be real time information upon which operational decisions for the implementation of the strategy were based not data that has subsequently changed for example through a verification process.

1.1c Stream flow for the purpose of seasonal base flow management strategies

The ROL holder must record for each storage where a seasonal base flow management strategy applies under Section 5 of Attachment 4.1E:

- The daily storage inflow volume;
- The daily storage inflow volume adopted for the purpose of determining passing flow requirements under the rules for the seasonal base flow management strategy. That is, the inflow volume after any adjustment to account for water released from an upstream storage for maintaining storage heights or to supply water users, in accordance with the seasonal base flow rules;
- The daily storage height; and
- The daily storage outflow.

For the purposes of this section:

- The methodology for determining the daily storage inflow volume, daily storage inflow volume adopted for the purpose of determining passing flow requirements, daily storage height and daily storage outflow must be approved by the chief executive; and
- The data must be real time information upon which operational decisions for the implementation of the strategy were based not data that has subsequently changed for example through a verification process.

1.2 Releases from storages

The ROL holder must record details of the basis for each release decision for each storage under the rules for releases of water from storages given in Section 3 of Attachment 4.1E, including:

- The general rules for releases;
- The release rate rules;
- The first post-winter flow, seasonal base flow and fishway management strategies; and
- The quality of water released from storages.

The ROL holder must record the time, date and release rate each time a release rate is changed for each storage. In addition, for storages with a multi-level inlet, the ROL holder must record the level from which the release is made and the basis of the decision for determining that level.

The ROL holder must record the daily volume released (through the outlet/s and fishway) from each storage.

1.3 Announced allocations

The ROL holder must record details of announced allocation determinations, referred to in Section 1 of Attachment 4.1F, including:

- The date and value for announced allocations, including the initial and any interim announced allocations; and
- The parameters applied for each announced allocation determination, including the initial and any interim announced allocations.

1.4 Critical water supply water sharing rules for 1 July to 30 September

The ROL holder must record details of any limitations on the supply of water between 1 July and 30 September under the critical water supply water sharing rules in Section 2.1 of Attachment 4.1F, including:

- The date and extent of any volume limitations; and
- The parameters applied for the determination of any volume limitation.

1.5 Critical water supply water sharing rules for the supply of high priority water when medium A announced allocations are zero

The ROL holder must record details of any restrictions on the supply of high priority water referred to in Section 2.2 of Attachment 4.1F, including:

- The date of the restriction;
- The nature of the restriction; and
- The basis for the determination of the restriction.

1.6 Transfer of water between water years

The ROL holder must record details of the transfer of water between water years referred to in Section 3 of Attachment 4.1F, including:

- Scheme practices applied for carry over and forward draw of water entitlements;
- The basis of each decision to adjust the amount of water an individual may be supplied in a water year and the volume of the adjustment;
- The basis of each decision to approve a carry over or forward draw for each individual water user;
- The volume of water carried over from a water year to the next water year by sub-scheme; and
- The volume of water brought forward from the next water year to a water year by priority group and sub-scheme.

1.7 Seasonal water assignment

The ROL holder must record details of individual seasonal water assignment arrangements.

1.8 Water taken by water users

The ROL holder must record the volume of water taken by water users as follows:

- For each individual water user specified for each zone:
 - The total volume of supplemented water taken each quarter;
 - The total volume of supplemented water entitled to be taken at any time;
 - The basis for determining the total volume of supplemented water entitled to be taken at any time, including any adjustments for approved seasonal water assignments and transfers into or out of the water years;
 - The total volume of metered water taken as ‘riparian entitlement water’; and
 - The zone.

Water taken under a water allocation with purpose ‘distribution loss’ should be recorded as an individual water user.

1.9 Water diversions

The ROL holder must record the daily volume of water diverted to:

- Gibber Gunyah channel system;
- Theodore channel system; and
- Moura Offstream Storage.

The methodology for determining the volume must be approved by the chief executive.

The ROL holder must record the start and end of each period of diversion to Moura Offstream Storage.

1.10 Waterholes

The ROL holder must:

- Establish a unique identifier for any waterhole from which supplemented water is taken that is drawn down more than 0.6 metres below cease to flow level; and
- Record the water level in the waterhole each day that supplemented water is taken from the waterhole and the water level is more than 0.6 metres below the cease to flow level.

2 Impact of storage operation on aquatic ecosystems

The ROL holder must undertake the following to establish any impacts on aquatic ecosystems that are potentially related to the operation of storages.

Section 2.1 Bank condition

The ROL holder must inspect banks for evidence of collapse and/or erosion within the ponded area and downstream of storages following instances of rapid water level changes or large flows through storages, or other occasions when collapse and/or erosion of banks may be likely. The distance downstream is the distance of influence of storage operations.

Any instances of bank slumping or erosion observed must be investigated to determine if the instability was associated with the nature or operation of the infrastructure.

2.2 Water Quality

The ROL holder must monitor water quality in relation to relevant infrastructure in accordance with the department's Water Monitoring Data Collection Standard.

2.3 This section not required

2.4 Fish stranding

The ROL holder must investigate instances of fish stranding downstream of storages to determine if the fish stranding is associated with operation of infrastructure. The distance downstream of storages is the distance of influence of storage operations.

3 Reporting

There are four levels of reporting for ROL holders:

- Quarterly report for the previous quarter;
- Annual report for the previous water year;
- Operational reports; and
- Emergency reports.

3.1 Quarterly report

The ROL holder must transfer the following data to the chief executive:

- Water quantity all records referred to in Sections 1.1a and 1.1c;
- Release from storages where applicable, the level from which releases were made referred to in Section 1.2;
- Water diversions daily volume of water diverted to Moura Offstream storage and the start and end of each period of diversion to Moura Offstream storage referred to in Section 1.9;
- Waterholes all records referred to in Section 1.10;
- A summary of bank condition monitoring and incidences of slumping referred to in Section 2.1;
- Water quality all records referred to in Section 2.2; and
- Seasonal water assignments all records referred to in section 1.7.

3.2 Annual report

The annual report must include, but not be limited to, discussion and recommendations with regard to monitoring and assessment for the previous water year as follows.

3.2.1 Water monitoring

A summary of the implementation of the rules for releases from storages, other than for first post-winter flow, seasonal base flow, fishway management and quality of water released.

A summary of the implementation of the first post-winter flow and seasonal base flow management strategies for each applicable storage, including:

- Overview of strategy implementation, including the basis of decisions; and
- An evaluation of the first post-winter flow and seasonal base flow management arrangements and outcomes.

A summary of the implementation of the fishway management strategy for each applicable storage, including:

- Overview of strategy implementation;
- Periods of operation of the fishway; and
- Total period of operation of the fishway.

A summary of the implementation of the quality of water released from storages rules for each applicable storage, including:

- Overview of rule implementation;
- Basis of the decisions on the level from which to make releases; and
- Periods of release from each offtake level.

A summary of waterhole management including:

- Overview of waterhole management implementation; and
- Periods when the water level in a waterhole was more than 0.6 metres below its cease to flow level for more than 2 consecutive days and supplemented water was being taken.

A summary of announced allocation determinations, including:

- An evaluation of the announced allocation procedures and outcomes; and
- The date and value for each announced allocation.

A summary of the critical water supply water sharing rules, including:

- An evaluation of the rules and outcomes; and
- The date and nature of any limitations or restrictions on the volumes that may be supplied.

A summary of the transfer of water between water years specified by sub-scheme, including:

- An evaluation of rules and outcomes;
- The total volume of water carried over to the water year from the previous water year;
- The total volume of water carried over from the water year to the next water year;
- The total volume of water brought forward by priority group to the water year from the next water year; and
- The total volume of water brought forward by priority group from the water year to the previous water year.

A summary of the volumes of water taken by water users, specified by zone, including:

- The total volume of supplemented water taken;
- The total volume of supplemented water entitled to be taken;
- The basis for determining the total volume of supplemented water entitled to be taken, including any adjustments for approved seasonal water assignments and transfers into or out of the water years;
- The announced allocation volume at the end of the water year;
- The total volume of supplemented water taken between 1 July to 30 September; and

- The total volume of metered water taken as ‘riparian entitlement water’.

A summary of seasonal water assignment arrangements, including:

- An evaluation of the seasonal water assignment rules and outcomes, including:
 - An evaluation of any circumstances of supply difficulties when the supply difficulties were linked to seasonal water assignment practices; and
 - Identification of and reporting on any trends in seasonal assignment;
- The total number of seasonal water assignment arrangements; and
- The total volume of water seasonally assigned.

Details of changes to storages or their operation that may have an impact on the implementation of the ROP.

Details of new monitoring devices such as equipment to measure stream flow.

3.2.2 Impact of storage operation on aquatic ecosystems

Bank condition and fish stranding

A summary of bank condition and fish stranding monitoring including:

- Results of investigations of bank slumping or erosion identified in ponded areas and downstream of storages;
- Results of any investigations of fish stranding downstream of storages; and
- Changes to operation of storages to reduce instances of bank slumping, erosion or fish stranding.

Water quality

Discussion and assessment of the following water quality issues:

- Thermal and chemical stratification in each storage;
- Water quality in each storage;
- Contribution of the storage and its management to the quality of water released;
- Cumulative effect of successive storages on water quality; and
- Cyanobacteria population changes in response to stratification in each storage.

3.3 Operational reports

The ROL holder must notify the chief executive within 1 business day of becoming aware of the following operational incidents:

- Noncompliance by the ROL holder with the rules given in the ROP;
- A decision relating to each announced allocation;
- A decision to limit the supply of water between 1 July and 30 September;
- A decision relating to any restrictions on the taking of high priority water; and
- Instances of fish stranding downstream of a storage.

The ROL holder must provide an operational report to the chief executive for the following operational incidents:

- Noncompliance with the rules in the ROP; and
- Instances of fish stranding downstream of a storage.

The report must provide details of the incident, conditions under which the incident occurred and any responses or activities carried out as a result of the incident.

The ROL holder must provide an operational report to the chief executive within 5 business days after a decision relating to each announced allocation. The report should include the parameters applied referred to in Section 1.3.

The ROL holder must provide an operational report to the chief executive within 5 business days after a decision to limit the supply of water between 1 July and 30 September. The report should include the parameters applied referred to in Section 1.4.

The ROL holder must provide a report to the chief executive within 5 business days after implementation of a first post-winter flow management strategy ends. The report should include:

- Storage inflow, storage height and storage outflow records referred to in Section 1.1b.

3.4 Emergency report

An emergency for the purpose of this ROP includes an occurrence, which by the nature of its severity, extent or timing might be regarded as an emergency (for example, contamination of water supply, structural damage to infrastructure or a danger to human health).

For any emergency, the ROL holder must:

- Notify the chief executive immediately; and
- Provide a report to the chief executive on the emergency including details of the emergency, conditions under which the emergency occurred, any responses or activities carried out as a result of the emergency and any impacts on the ROP.

Attachment 4.1H

Dawson Valley Water Supply Scheme

Water allocation change rules

1 Permitted changes

The permitted changes apply only to water allocations with purpose ‘agriculture’ or ‘any’.

Application for the following changes to a water allocation will be approved. On approval, a change certificate will be issued by the chief executive, which may be lodged with the registrar of water allocations.

1.1 Location

Subject to Section 1.1.1, a change to the location of a water allocation from one of the following zones to any other of those zones:

- Dawson B;
- Dawson C;
- Dawson D.
- Dawson E;
- Dawson F;
- Dawson G;
- Dawson H;
- Dawson I;
- Dawson J;
- Dawson K;
- Dawson L; or
- Dawson M.

For the permitted changes to the location of a water allocation given in this section, conversion factors do not apply to the volume for the water allocation – that is, the volume for the water allocation will be the same before and after the change of location. However, this does not preclude consideration of conversion factors to enable changes under Section 3.

1.1.1 Limitations on change of location

A proposed change is not a permitted change if the proposed change would result in a distribution of medium and high priority water allocations not provided for in Tables 1, 2, 3 and 4 (see Section 3 for proposed changes that can be processed under Section 130 of the Water Act).

If a location for a medium A priority water allocation is changed from Dawson I to another location, at the time the change of location is approved, the priority group will be set as medium.

1.2 Purpose

A change to the purpose of a water allocation from ‘any’ to ‘agriculture’ or from ‘agriculture’ to ‘any’.

1.3 Priority group

A change to the priority group of a water allocation from medium priority to medium A priority if the zone specified for the water allocation is Dawson I, provided:

- The proposed change would not cause the maximum volume in Table 4 to be breached.

1.4 Amalgamation or subdivision

A change to subdivide a water allocation provided:

- The sum of the nominal volumes of the new water allocations is equal to the nominal volume of the water allocation that is being subdivided; and
- The location and priority group of the new water allocations is the same as that of the water allocation that is being subdivided.

A change to amalgamate water allocations provided:

- The nominal volume of the new water allocation is equal to the sum of the nominal volumes of the water allocations that are being amalgamated;
- The location and priority group of the water allocations that are being amalgamated are the same; and
- The location and priority group for the new water allocation is the same as that of the water allocations that are being amalgamated.

Table 1: Permitted distributions of high priority water allocations in zones Dawson M, L, K, J, I, H, G, F, E, D, C and B

Volume of high priority water allocation (ML)	Dawson M & Dawson L	Dawson K & Dawson J	Dawson I & Dawson H	Dawson G, Dawson F & Dawson E	Dawson D, Dawson C & Dawson B
Minimum volume	0	200	662	3,119	998
Maximum volume	0	600	1,060	3,519	998

Table 2: Permitted distributions of medium (including medium A) priority water allocations and interim water allocations in zones Dawson M, L, K, J, I, H, G, F, E, D, C and B

Volume of medium priority water allocation (ML)	Dawson M & Dawson L	Dawson K & Dawson J	Dawson I & Dawson H	Dawson G, Dawson F & Dawson E	Dawson D, Dawson C & Dawson B
Minimum volume	560	6,350	25,500	9,450	6,838
Maximum volume	1,760	9,850	30,500	14,450	8,838

Table 3: Maximum volumes of medium and high priority water allocations in specified zones

Location (Zone)	Volume of high priority water allocation (ML)		Volume of medium priority water allocation (ML)	
	Volume on ROP approval	Maximum volume	Volume on ROP approval	Maximum volume
Dawson C	0	0	1,892	1,942
Dawson B	350	350	683	733

Table 4: Minimum and maximum volumes of medium A priority water allocations in Zone Dawson I

Location	Volume of medium A priority water allocation (ML)		
	Volume on ROP approval	Minimum volume	Maximum volume
Dawson I	19,456	3,405	19,456

2 Prohibited changes

The following changes are prohibited changes:

2.1 Location

A change to a location that is not within the extent of the Dawson Valley, Nogoia Mackenzie, Lower Fitzroy or Fitzroy Barrage water supply scheme.

2.2 Priority group

A change to a priority group that is not medium, medium A or high.

2.3 Purpose

A change to a purpose that is not 'agriculture' or 'any'.

2.4 Volume

A change to the volume that is not a consequence of a change to another attribute of a water allocation.

2.5 Other

A change that requires an amendment to this ROP, other than an amendment provided for in Chapter 8.

3 Application for change under Section 130 of the Water Act

If a water allocation holder wishes to apply for a change to a water allocation that is not permitted under Section 1, and not prohibited under Section 2, an application may be made under Section 130 of the Water Act for the change.

The chief executive will deal with applications made under Section 130 of the Water Act, in accordance with the Water Act. That process is as follows:

- Notice of the application is published in local newspapers. The notice includes information about where the application can be inspected and invites submissions from the public on the application;
- The chief executive determines if the application should be approved having regard to the potential impact on a range of interests including other entitlement holders and aquatic ecosystems;
- If the chief executive approves the application, the chief executive will issue a change certificate that may be lodged with the registrar of water allocations; and
- If the chief executive refuses the application, the Water Act provides for an appeal process.

3.1 Purpose

Any application to change the purpose of a water allocation from 'distribution loss' to 'any' must be supported by information to substantiate to the satisfaction of the chief executive an efficiency gain within the associated channel system. An application may be made for efficiency gains made since the issue of the interim resource operations licence for the Dawson Valley Water Supply Scheme in November 2000.

4 Registration of change

If an application to change a water allocation is approved, the chief executive will issue a change certificate. The water allocation holder may lodge the change certificate with the registrar of water allocations who will change the water allocation on the water allocation register.

However, the registrar will not register the change until a supply contract has been entered into between the water allocation holder and the ROL holder for supply of the changed water allocation.

Attachment 4.11

Dawson Valley Water Supply Scheme

Amending critical water supply management arrangements

1 Critical water supply management arrangements

1.1 Introduction

The Resource Operations Plan (ROP) rules for infrastructure operation and environmental management (refer Attachment 4.1E) and for water sharing (refer Attachment 4.1F) include arrangements for dealing with periods of low water availability. These arrangements are referred to as the critical water supply management arrangements.

The critical water supply management arrangements initially specified in the ROP are based on broad-scale basin-wide hydrologic modelling. These initial arrangements may need to be refined and further developed to ensure the arrangements appropriately deal with local issues and circumstances particular to the Dawson Valley Water Supply Scheme.

Over time the arrangements can also be amended to allow adaptation to changing circumstances and refinement through improved knowledge about the operation of the system at times of low water supply.

For example, the critical water supply water sharing rules given in Attachment 4.1F deal with situations when the full announced allocation entitlements cannot be supplied as a consequence of a substantial failure of a wet season. The initial arrangements for sharing the available supplies, including securing supplies for essential needs, may warrant ongoing development.

Variations to the rules associated with the minimum operating levels for storages and to the waterhole drawdown limits given in Attachment 4.1E may also be considered to accommodate local water user and environmental needs under particular circumstances.

1.2 Criteria for critical water supply management arrangements

Critical water supply management arrangements must have regard to the following:

- Provision of water for essential water needs must have first priority;
- The objectives of the Water Resource Plan;
- The effects on water allocation security performance;
- The effects on natural ecosystems and the physical integrity of the watercourse; and
- The public interest.

For the purpose of the critical water supply management arrangements, essential water needs must include that part of a town water supply required for essential services including drinking water and sanitation but excluding lawns and gardens. The Resource Operations Licence (ROL) holder in conjunction with water allocation holders may establish additional essential purposes.

1.3 Initial review of the critical water supply management arrangements

The ROL holder must undertake an initial review of the suitability of the critical water supply management arrangements. A report on the initial review must be provided to the chief executive within 6 months of the commencement of the ROP.

The initial review must include recommendations on whether amendments to the arrangements should be considered.

1.4 Proposals to amend the critical water supply management arrangements

The ROL holder may submit a proposal to amend the critical water supply management arrangements at any time.

The chief executive may require the ROL holder to prepare a proposal to amend the critical water supply management arrangements at any time.

If the initial review of the critical water supply management arrangements under Section 1.3 indicates changes to the arrangements should be considered, the chief executive may require the ROL holder to prepare a proposal to amend the critical water supply management arrangements within a timeframe set by the chief executive.

A proposal to amend the critical water supply management arrangements must include:

- Proposed changes to the rules for infrastructure operation and environmental management (refer Attachment 4.1E) and for water sharing (refer Attachment 4.1F);
- An assessment of the effects of the proposal on natural ecosystems and the physical integrity of the watercourse and the proposed environmental monitoring requirements;
- Details of consultation with stakeholders including water users, local communities and environmental interests; and
- Any other information that will assist the chief executive to decide the proposal.

1.5 Amending the critical water supply management arrangements

The chief executive may amend the rules for infrastructure operation and environmental management (refer Attachment 4.1E) and for water sharing (refer Attachment 4.1F) that apply during periods of low water availability. The chief executive will consider the following in deciding to amend the rules:

- Any proposal to amend the critical water supply management arrangements submitted by the ROL holder; and
- The criteria given in Section 1.2.

1.6 Evaluation of critical water supply management arrangements

The ROL holder must annually evaluate the critical water supply management arrangements in regard to their suitability for periods of low water availability.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
272			TC		1/2	Mackenzie E	Agriculture	1600	Medium	51614F
			TC		1/2					
274			TC		1/2	Mackenzie E	Agriculture	52	Medium	40105F
			TC		1/2					
277			TC		1/2	Mackenzie F	Agriculture	200	Medium	51631F, 51632F
			TC		1/2					
376			TC		1/3	Mackenzie F	Any	10	Medium	101005
			TC		1/3					
			TC		1/3					
279			TC		1/2	Mackenzie F	Agriculture	628	Medium	19148F, 48344F
			TC		1/2					
282			TC		1/2	Mackenzie G	Agriculture	420	Medium	38935F
			TC		1/2					
281	BHP COAL PTY LTD		SP		1	Mackenzie G	Any	7400	High	103086
285	CAPRICORN COAL MANAGEMENT PTY LTD		SP		1	Mackenzie G	Any	2250	High	103083
287			TC		1/2	Mackenzie G	Agriculture	68	Medium	46388F
			TC		1/2					
317	SUNWATER		SP		1	Mackenzie G	Any	980	High	103029
318	SUNWATER		SP		1	Mackenzie G	Any	537	High	103030
298			SP		1	Mackenzie H	Agriculture	100	Medium	52676F
289			TC		1/2	Mackenzie H	Agriculture	200	Medium	33113F
			TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
295	[REDACTED]	[REDACTED]	TC		1/9	Mackenzie H	Agriculture	309	Medium	057826F
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TTE	T [REDACTED] R	1/9					
296	[REDACTED]	[REDACTED]	TC		1/9	Mackenzie H	Agriculture	519	Medium	38974F
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TC		1/9					
			TTE	TRUSTEE FOR DALE KELVIN SIBSON	1/9					
814	STANWELL CORPORATION LIMITED		SP		1	Mackenzie H	Any	220	High	171191
294	YARRABEE COAL COMPANY PTY LTD		SP		1	Mackenzie H	Any	70	High	103088
308	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie I	Agriculture	245	Medium	29241F
			TC		1/2					
307	BHP COAL PTY LTD		SP		1	Mackenzie I	Any	1603	High	103074

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
300	[REDACTED]	[REDACTED]	TC		1/6	Mackenzie I	Agriculture	1828	Medium	52669F, 52675F
			TC		1/6					
			TC		1/6					
			TC		1/6					
			TC		1/6					
			TC		1/6					
302	COOK RESOURCE MINING PTY LTD		SP		1	Mackenzie I	Any	1333	High	103087
304	DUARINGA SHIRE COUNCIL		SP		1	Mackenzie I	Any	1595	High	103076
311	[REDACTED]	[REDACTED]	SP		1	Mackenzie I	Agriculture	1100	Medium	52647F, 52660F
306	OAKY CREEK COAL PTY LTD		SP		1	Mackenzie I	Any	2800	High	103072
305	SOUTH BLACKWATER COAL LIMITED		SP		1	Mackenzie I	Any	678	High	103081
377	SUNWATER		SP		1	Mackenzie I	Any	300	High	103011
378	SUNWATER		SP		1	Mackenzie I	Any	200	High	103013
379	SUNWATER		SP		1	Mackenzie I	Any	1155	High	103025
380	SUNWATER		SP		1	Mackenzie I	Any	309	High	103026
929	SUNWATER		SP		1	Mackenzie I	Distribution Loss	313	High	103027
303	WESFARMERS CURRAGH PTY LTD		SP		1	Mackenzie I	Any	1500	High	103080
899	WESFARMERS CURRAGH PTY LTD		SP		1	Mackenzie I	Any	1500	High	174792
410	EMERALD RURAL TRAINING SCHOOL BOARD		SP		1	Mackenzie J	Agriculture	1100	Medium	26600F, 34481F, 40135F, 46162F
849	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie K	Agriculture	4000	Medium	57794F
			TC		1/2					
454	VANCARD PTY LTD ACN010660867		TTE	TRUSTEE UNDER NOMINATION OF TRUSTEES NO C693822B	1	Mackenzie K	Agriculture	8	Medium	0426437F

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
847	VANCARD PTY LTD ACN 010660867		TTE	TRUSTEE UNDER NOMINATION OF TRUSTEES NO C693822B	1	Mackenzie K	Agriculture	3228	Medium	33545F, 33546F, 52700F
861	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie K	Agriculture	5	Medium	103039
			TC		1/2					
858	[REDACTED] CURRIMUNDI PTY LTD	[REDACTED]	TC		1/3	Mackenzie K	Agriculture	4000	Medium	48388F
			TC		1/3					
			TTE	AS TRUSTEE UNDER NOMINATION OF TRUSTEES C693819K	1/3					
841	BRAYLAND PTY LTD		SP		1	Mackenzie L	Agriculture	5828	Medium	41212F
835	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie L	Agriculture	3000	Medium	38165F
			TC		1/2					
854	CENTRAL QLD HOLDINGS PTY LTD ACN 011041866		SP		1	Mackenzie L	Agriculture	9	Medium	105293
446	ENSHAM RESOURCES PTY LTD		SP		1	Mackenzie L	Any	1000	High	103056
845	ENSHAM RESOURCES PTY LTD		SP		1	Mackenzie L	Agriculture	828	Medium	33033F, 46297F
458	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie L	Any	12	Medium	57701F
			TC		1/2					
558	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie L	Agriculture	100	Medium	102965
			TC		1/2					
839	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie L	Agriculture	1100	Medium	52603F
			TC		1/2					
833	LOCHARBOR HOLDINGS PTY LTD		TTE	TRUSTEES UNDER NOMINATION OF TRUSTEES NO C507566	1	Mackenzie L	Agriculture	3000	Medium	52717F
341	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie L	Agriculture	500	Medium	45332F
			TC		1/3					
			TC		1/3					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation		
402	[REDACTED]	[REDACTED]	TC		1/3							
	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie L	Agriculture	1000	Medium	52635F		
	[REDACTED]	[REDACTED]	TC		1/3							
837	[REDACTED]	[REDACTED]	TC		1/3							
	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie L	Agriculture	1145	Medium	41228F		
	[REDACTED]	[REDACTED]	TC		1/3							
832	[REDACTED]	[REDACTED]	TC		1/4							
	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie L	Agriculture	3000	Medium	52685F		
	[REDACTED]	[REDACTED]	TC		1/4							
	[REDACTED]	[REDACTED]	TC		1/4							
843	[REDACTED]	[REDACTED]	SP		1	Mackenzie L	Agriculture	828	Medium	102845		
794	BHP COAL PTY LTD		SP		1	Mackenzie M	Any	1600	High	103054		
783	[REDACTED]	[REDACTED]	TC		1/2							
			TC		1/2	Mackenzie M	Agriculture	100	Medium	057811F		
774			TC		1/2		Mackenzie M	Agriculture	2	Medium	57804F	
			TC		1/2							
772			TC		1/2		Mackenzie M	Agriculture	15	Medium	52633F	
			TC		1/2							
807			TC		1/2		Mackenzie M	Agriculture	6	Medium	37200F	
			TC		1/2							
819					SP		1	Mackenzie M	Agriculture	10	Medium	41149F
768					TC		1/2					
			TC		1/2	Mackenzie M	Agriculture	100	Medium	52683F		
782	COTTRELL FARMS PTY LTD ACN 056289288		SP		1	Mackenzie M	Agriculture	1030	Medium	0426508F		
776	[REDACTED]	[REDACTED]	SP		1	Mackenzie M	Agriculture	20	Medium	103035		

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
823			SP		1	Mackenzie M	Agriculture	2	High	48307F
824			SP		1	Mackenzie M	Agriculture	152	Medium	48307F
790			SP		1	Mackenzie M	Agriculture	200	Medium	45329F
788			TC		1/2	Mackenzie M	Agriculture	348	Medium	41142F
			TC		1/2					
816			TC		1/2	Mackenzie M	Agriculture	16	Medium	45311F
			TC		1/2					
829			TC		1/2	Mackenzie M	Agriculture	928	Medium	41165F
			TC		1/2					
822			TC		1/2	Mackenzie M	Agriculture	31	Medium	41146F
			TC		1/2					
801			EMERALD HORSE AND PONY CLUB INC		SP		1	Mackenzie M	Any	16
804	EMERALD SHIRE COUNCIL		SP		1	Mackenzie M	Any	3505	High	103055
805	EMERALD GOLF CLUB INC		SP		1	Mackenzie M	Agriculture	180	Medium	40260F
852	EMERALD SHIRE COUNCIL		SP		1	Mackenzie M	Any	2195	High	102922
817			SP		1	Mackenzie M	Agriculture	1158	Medium	48397F
796			TC		1/2	Mackenzie M	Agriculture	1	High	103001
			TC		1/2					
797			TC		1/2	Mackenzie M	Agriculture	1	Medium	103001
			TC		1/2					
820			TC		1/2	Mackenzie M	Agriculture	16	Medium	48461F
			TC		1/2					
813			TC		1/2	Mackenzie M	Agriculture	5	Medium	173229
			TC		1/2					
888			TC		1/2	Mackenzie M	Agriculture	5	Medium	173231
			TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
889	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie M	Agriculture	5	Medium	173232
			TC		1/2					
890			TC		1/2	Mackenzie M	Agriculture	5	Medium	173233
			TC		1/2					
891			TC		1/2	Mackenzie M	Agriculture	7	Medium	173234
			TC		1/2					
892			TC		1/2	Mackenzie M	Agriculture	8	Medium	173235
			TC		1/2					
893			TC		1/2	Mackenzie M	Agriculture	22	Medium	173236
			TC		1/2					
894	TC		1/2	Mackenzie M	Agriculture	23	Medium	173237		
	TC		1/2							
793			SP		1	Mackenzie M	Agriculture	1	High	103017
818			TTE	TRUSTEE UNDER INSTRUMENT 706488151	1/6					
			TTE	TRUSTEE UNDER INSTRUMENT 706488151	1/6					
			TTE			Mackenzie M	Agriculture	826	Medium	02257F
			TTE	TRUSTEE UNDER INSTRUMENT 706488151	1/6					
			TTE							
			TTE	TRUSTEE UNDER INSTRUMENT 706488151	1/2					
800	I W BURNETT PTY LTD ACN 054475393		TTE	TRUSTEE UNDER INSTRUMENT 704616024	1	Mackenzie M	Agriculture	53	Medium	176926
777	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie M	Agriculture	100	Medium	101159
			TC		1/2					
906	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie M	Agriculture	53	Medium	175752
			TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
795	KESTREL COAL PTY LTD		SP		1	Mackenzie M	Any	1300	High	103207
825			SP		1	Mackenzie M	Agriculture	120	Medium	48303F
778	MAIDSTONE VINEYARD CONTRACTING PTY LTD ACN 098269786		TC		1/4	Mackenzie M	Agriculture	38	Medium	103034
	JAYAUST PTY LTD ACN 103320887		TC		1/4					
	CODY PTY LTD ACN 103320896		TC		1/4					
	J & M CONTRACTORS PTY LTD ACN 098420494		TC		1/4					
779	MAIDSTONE VINEYARD CONTRACTING PTY LTD ACN 098269786		TC		1/4	Mackenzie M	Agriculture	50	Medium	52694F
	J & M CONTRACTORS PTY LTD ACN 098420494		TC		1/4					
	JAYAUST PTY LTD ACN 103320887		TC		1/4					
	CODY PTY LTD ACN 103320896		TC		1/4					
792			TC		1/2	Mackenzie M	Agriculture	1	High	103003
			TC		1/2					
810			TC		1/6	Mackenzie M	Any	50	High	35169F
			TC		1/6					
			TC		1/6					
			TC		1/6					
			TC		1/6					
806			TC		1/2	Mackenzie M	Agriculture	2400	Medium	52715F
			TC		1/2					
468			TC		1/2	Mackenzie M	Agriculture	400	Medium	37486F
			TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
757	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		TTE	TRUSTEE UNDER INSTRUMENT 703416830	1	Mackenzie M	Agriculture	175	Medium	103145
767			SP		1	Mackenzie M	Agriculture	25	Medium	103036
771			SP		1	Mackenzie M	Agriculture	10	Medium	103037
466			TC		1/3					
			TC		1/3	Mackenzie M	Agriculture	4700	Medium	38178F
			TC		1/3					
477			TTE	TRUSTEE UNDER INSTRUMENT 704203674	1					
			TTE			Mackenzie M	Agriculture	500	Medium	51415F
			TTE							
483			TTE	TRUSTEE UNDER INSTRUMENT 704203674	1					
			TTE			Mackenzie M	Agriculture	100	High	51415F
			TTE							
492			TTE	TRUSTEE UNDER INSTRUMENT 701651129	1					
			TTE			Mackenzie M	Agriculture	150	Medium	32220F
			TTE							
775			TTE	TRUSTEE UNDER INSTRUMENT 702033808/701651129/700671673/701366204	1					
			TTE			Mackenzie M	Agriculture	1160	High	102999
			TTE							
764			SP		1	Mackenzie M	Agriculture	10	Medium	103062
811			TC		1/2					
			TC		1/2	Mackenzie M	Agriculture	2	High	103129

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
812			TC		1/2	Mackenzie M	Agriculture	31	Medium	103129
			TC		1/2					
404			SP		1	Mackenzie M	Agriculture	2	Medium	103033
752			TC		1/3	Mackenzie M	Agriculture	148	Medium	38143WF
			TC		1/3					
			TC		1/3					
780	SHELDA PTY LTD ACN 010186777		SP		1	Mackenzie M	Agriculture	4	High	103018
781	SHELDA PTY LTD ACN 010186777		SP		1	Mackenzie M	Agriculture	10	Medium	103018
815			TC		1/2	Mackenzie M	Agriculture	16	Medium	45286F
			TC		1/2					
798			TC		1/2	Mackenzie M	Agriculture	25	High	36853F
			TC		1/2					
799			TC		1/2	Mackenzie M	Agriculture	25	Medium	36853F
			TC		1/2					
785	SP			1	Mackenzie M	Agriculture	100	Medium	38836F	
763	TC			1/2	Mackenzie M	Any	10	Medium	100462	
	TC			1/2						
802			SP		1	Mackenzie M	Any	2	Medium	52693F
856	SUNWATER		SP		1	Mackenzie M	Any	120	High	102921
808	THE EMERALD RURAL TRAINING SCHOOL BOARD		SP		1	Mackenzie M	Agriculture	2166	Medium	26600F, 34481F, 40135F, 46162F
803	THE ROMAN CATHOLIC TRUST CORP FOR THE DIOCESE OF ROCKHAMPTON		SP		1	Mackenzie M	Agriculture	40	Medium	0426535F
765			TC		1/2	Mackenzie M	Agriculture	10	Medium	52644F
			TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
787	██████	██████	TC		1/2	Mackenzie M	Agriculture	850	Medium	29811F
			TC		1/2					
494	██████	██████	SP		1	Mackenzie M	Agriculture	39	Medium	103040
495	██████	██████	SP		1	Mackenzie M	Any	6	Medium	103040
770	██████	██████	TC		1/2	Mackenzie M	Agriculture	40	Medium	103041
			TC		1/2					
827	██████	██████	TC		1/2	Mackenzie M	Agriculture	20	Medium	48462F
			TC		1/2					
693	██████	██████	TC		1/2	Mackenzie N	Any	2	Medium	0563SD1F
			TC		1/2					
560	██████	██████	TC		1/2	Mackenzie N	Agriculture	4	Medium	102979
			TC		1/2					
620	██████	██████	TC		1/2	Mackenzie N	Agriculture	1172	Medium	500479F
			TC		1/2					
621	██████	██████	TC		1/2	Mackenzie N	Any	2	Medium	0479SD1F
			TC		1/2					
630	ARMFLEECE PTY LTD ACN 055681797		SP		1	Mackenzie N	Agriculture	2432	Medium	500233F
734	ARMFLEECE PTY LTD ACN 055681797		TTE	TRUSTEE UNDER DOCUMENT NO 704345916	1	Mackenzie N	Agriculture	1575	Medium	500506F
875	AXILGROW PTY LTD		SP		1	Mackenzie N	Any	10	Medium	0570SD1F
701	██████	██████	TC		1/2	Mackenzie N	Any	2	Medium	1532SD1F
			TC		1/2					
600	██████	██████	TC		1/2	Mackenzie N	Any	2	Medium	0859SD1F
			TC		1/2					
601	██████	██████	TC		1/2	Mackenzie N	Agriculture	30	Medium	500859F
			TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
569	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	2	High	102957
			TC		1/2					
679	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	1868SD1F
			TC		1/2					
912	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	4	Medium	176685
			TC		1/2					
553	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Agriculture	1	High	176233
909	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Agriculture	1	High	176234
564	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	2	High	102942
			TC		1/2					
470	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Agriculture	200	Medium	175963
885	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	10	Medium	171987
			TC		1/2					
670	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	421	Medium	500533F
			TC		1/2					
671	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0533SD1F
			TC		1/2					
586	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	1893	Medium	500523F
			TC		1/2					
594	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Any	2	Medium	0524SD1F
595	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Agriculture	2465	Medium	500497F
611	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Any	2	Medium	0497SD1F
705	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	24	Medium	500539F
			TC		1/2					
660	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	1331	Medium	500503F
			TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
661	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0503SD1F
			TC		1/2					
387	CAMERON MILLAR PTY LTD ACN 010582073		SP		1	Mackenzie N	Any	2	Medium	0505SD1F
636	CAMERON MILLAR PTY LTD ACN 010582073		SP		1	Mackenzie N	Agriculture	1563	Medium	500505F
557	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	40	Medium	102962
			TC		1/2					
690	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	10	High	1889SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					
691	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	2	Medium	1889SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					
762	CENTRAL HIGHLANDS WATER SPORTS CLUB INC.		SP		1	Mackenzie N	Any	7	Medium	46284F
498	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	1128	Medium	41247F
			TC		1/4					
			TC		1/4					
			TC		1/4					
747	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Any	2	Medium	57783F
568	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	42	Medium	103143
			TC		1/2					
472	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0552SD1F
			TC		1/2					
908	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	1210	Medium	175962
			TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation								
749	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	828	Medium	41135F								
			TC		1/2													
724			[REDACTED]	[REDACTED]	JTI		1/3	Mackenzie N	Agriculture	45	Medium	501176F						
					JTI													
					TC		1/3											
					TC													
659					[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	5	Medium	0573SD1F				
							TC		1/2									
696							[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0565SD1F		
									TC		1/2							
666									[REDACTED]	[REDACTED]	TC		1/5	Mackenzie N	Any	2	Medium	0244SD1F
											TC		1/5					
											TC		1/5					
											TC		1/5					
	TC										1/5							
731	[REDACTED]	[REDACTED]									TC		1/5	Mackenzie N	Agriculture	319	Medium	0426541F
			TC								1/5							
			TC								1/5							
			TC								1/5							
			TC								1/5							
907			[REDACTED]	[REDACTED]	TC						1/5	Mackenzie N	Agriculture	181	High	0426541F		
					TC						1/5							
					TC		1/5											
					TC		1/5											
					TC		1/5											
563					[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	2	Medium	102963				
							TC		1/2									

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
710	COTTRELL FARMS PTY LTD ACN 056289288		SP		1	Mackenzie N	Agriculture	400	High	500501F
711	COTTRELL FARMS PTY LTD ACN 056289288		SP		1	Mackenzie N	Agriculture	300	Medium	500501F
582	██████ ██████	██████ ██████	TC		1/2	Mackenzie N	Agriculture	1250	Medium	500519F
			TC		1/2					
688	██████	██████	TTE	TRUSTEE OF THE WINTON CREEK VINEYARD TRUST	1	Mackenzie N	Agriculture	15	High	501921F
689	██████	██████	TTE	TRUSTEE UNDER INSTRUMENT 702613952	1	Mackenzie N	Agriculture	100	Medium	501921F
456	DENACE PTY LTD		SP		1	Mackenzie N	Any	21	Medium	1179SD1F
460	DEPARTMENT OF EDUCATION		SP		1	Mackenzie N	Any	16	Medium	48389F (CAMP FAIRBAIRN)
580	DEPARTMENT OF PRIMARY INDUSTRIES		SP		1	Mackenzie N	Any	2	Medium	0518SD1F
581	DEPARTMENT OF PRIMARY INDUSTRIES		SP		1	Mackenzie N	Agriculture	75	Medium	500518F
624	██████ ██████	██████ ██████	TC		1/2	Mackenzie N	Agriculture	1337	Medium	500500F
			TC		1/2					
625	██████ ██████	██████ ██████	TC		1/2	Mackenzie N	Any	2	Medium	0500SD1F
			TC		1/2					
570	DOUG SLACK CONSTRUCTIONS PTY LTD ACN 010537407		TTE	TRUSTEE UNDER INSTRUMENT 700871721 AND 701366211	1	Mackenzie N	Agriculture	8	Medium	0426540F
551	DOUG SLACK CONSTRUCTIONS PTY LTD ACN 010637407		TTE	UNDER NOMINATION OF TRUSTEES 700096881	1	Mackenzie N	Agriculture	10	High	102951
913	██████ ██████	██████ ██████	TC		1/2	Mackenzie N	Agriculture	10	Medium	176689
			TC		1/2					
552	DUGALD CAMERON DAUGHTERS PTY LTD ACN 076266718		SP		1	Mackenzie N	Agriculture	10	Medium	102969

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
597	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	1388	Medium	500494F
	[REDACTED]	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/2					
673	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	10	Medium	500540F
	[REDACTED]	[REDACTED]	TC		1/2					
675	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0540SD1F
	[REDACTED]	[REDACTED]	TC		1/2					
626	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie N	Agriculture	300	Medium	501598F
	[REDACTED]	[REDACTED]	TC		1/3					
	[REDACTED]	[REDACTED]	TC		1/3					
714	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie N	Agriculture	1273	Medium	500498F
	[REDACTED]	[REDACTED]	TC		1/3					
	[REDACTED]	[REDACTED]	TC		1/3					
750	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	1705	Medium	500515F
	[REDACTED]	[REDACTED]	TC		1/2					
755	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie N	Agriculture	1397	Medium	500558F
	[REDACTED]	[REDACTED]	TC		1/3					
	[REDACTED]	[REDACTED]	TC		1/3					
567	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	8	Medium	102970
	[REDACTED]	[REDACTED]	TC		1/2					
826	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	1576SD1F
	[REDACTED]	[REDACTED]	TC		1/2					
614	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	4279	Medium	500516F
	[REDACTED]	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/4					
	[REDACTED]	[REDACTED]	TC		1/4					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
615	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Any	2	Medium	0516SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					
883	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Any	2	Medium	0517SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					
331	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	1232	Medium	500550F
			TC		1/4					
			TC		1/4					
			TC		1/4					
583	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Any	2	Medium	0513SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					
585	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	4044	Medium	500486F
			TC		1/4					
			TC		1/4					
			TC		1/4					
739	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Any	2	Medium	0550SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
741			TC		1/4	Mackenzie N	Any	2	Medium	0514SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					
830	GARDEN CREEK PTY LTD		TTE	TRUSTEE UNDER INSTRUMENT NO 700311849	1	Mackenzie N	Agriculture	1377	Medium	500525F
572			TC		1/2	Mackenzie N	Any	2	Medium	0490SD1F
			TC		1/2					
573			TC		1/2	Mackenzie N	Agriculture	1394	Medium	500490F
			TC		1/2					
706			SP		1	Mackenzie N	Agriculture	11	Medium	500534F
655	GILLIAN CREST PTY LTD ACN 006921268		SP		1	Mackenzie N	Agriculture	200	High	502112F
656	GILLIAN CREST PTY LTD ACN 006921268		SP		1	Mackenzie N	Agriculture	500	Medium	502112F
699			TC		1/2	Mackenzie N	Agriculture	12	Medium	500561F
			TC		1/2					
697			TC		1/2	Mackenzie N	Agriculture	24	Medium	500537F
			TC		1/2					
698			TC		1/2	Mackenzie N	Any	2	Medium	0537SD1F
			TC		1/2					
555			SP		1	Mackenzie N	Agriculture	10	High	102952
584			SP		1	Mackenzie N	Agriculture	76	Medium	102952
716			SP		1	Mackenzie N	Agriculture	1089	Medium	500499F
633			TC		1/2	Mackenzie N	Any	2	Medium	1175SD1F
			TC		1/2					
703			SP		1	Mackenzie N	Agriculture	20	Medium	1630SD1F
905			SP		1	Mackenzie N	Agriculture	20	Medium	501194F

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
490			SP		1	Mackenzie N	Agriculture	22	Medium	171356
647			SP		1	Mackenzie N	Agriculture	10	Medium	500541F
648			SP		1	Mackenzie N	Any	2	Medium	0541SD1F
882			SP		1	Mackenzie N	Any	2	Medium	0541SD2F
562			TC		1/2	Mackenzie N	Agriculture	30	Medium	103151
			TC		1/2					
895			TC		1/2	Mackenzie N	Agriculture	20	Medium	174059
			TC		1/2					
754			TC		1/5	Mackenzie N	Agriculture	1328	Medium	37447F
			TC		1/5					
			TC		1/5					
			TC		1/5					
			TC		1/5					
751	I.W. BURNETT PTY LTD ACN 054475393		TTE	TRUSTEE UNDER INSTRUMENT 704345837	1	Mackenzie N	Agriculture	828	Medium	40243F
662	I.W. BURNETT PTY LTD ACN 054475393		TTE	TRUSTEE OF THE I.W. BURNETT FAMILY TRUST	1	Mackenzie N	Agriculture	1721	Medium	500502F
618			TC		1/2	Mackenzie N	Agriculture	1469	Medium	500529F
			TC		1/2					
619			TC		1/2	Mackenzie N	Any	2	Medium	0529SD1F
			TC		1/2					
649			TC		1/4	Mackenzie N	Agriculture	1282	Medium	500576F
			TC		1/4					
			TC		1/4					
			TC		1/4					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
713	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Any	2	Medium	0576SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					
828	JURIS ACE PTY LTD		TTE	TRUSTEE UNDER NOMINATION OF TRUSTEE NO C621955G	1	Mackenzie N	Agriculture	2885	Medium	500509F
590	KAESBIE PTY LTD ACN 055652027 [REDACTED] [REDACTED]	[REDACTED] [REDACTED] [REDACTED]	TTE	TRUSTEE UNDER DOCUMENT 705049190	1/3	Mackenzie N	Any	2	Medium	0578SD1F
			TTE	TRUSTEE UNDER DOCUMENT 705049190	1/3					
			TTE	TRUSTEE UNDER DOCUMENT 705049190	1/3					
591	KAESBIE PTY LTD ACN 055652027 [REDACTED] [REDACTED]	[REDACTED] [REDACTED] [REDACTED]	TTE	TRUSTEE UNDER DOCUMENT 705049190	1/3	Mackenzie N	Agriculture	1227	Medium	500578F
			TTE	TRUSTEE UNDER DOCUMENT 705049190	1/3					
			TTE	TRUSTEE UNDER DOCUMENT 705049190	1/3					
723	[REDACTED] [REDACTED] [REDACTED] [REDACTED]	[REDACTED] [REDACTED] [REDACTED] [REDACTED]	TC		1/4	Mackenzie N	Agriculture	471	Medium	500547F
			TC		1/4					
			TC		1/4					
			TC		1/4					
668	[REDACTED] [REDACTED]	[REDACTED] [REDACTED] [REDACTED] [REDACTED]	TC		1/4	Mackenzie N	Agriculture	1177	Medium	500510F
			TC		1/4					
			TC		1/4					
			TC		1/4					
669	[REDACTED] [REDACTED]	[REDACTED] [REDACTED] [REDACTED] [REDACTED]	TC		1/4	Mackenzie N	Any	2	Medium	0510SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
876	KEENGREY PTY LTD ACN 065404631		TTE	TRUSTEE UNDER INSTRUMENT 700860351	1	Mackenzie N	Agriculture	34	Medium	173990
727			TC		1/2	Mackenzie N	Agriculture	1337	Medium	500480F
			TC		1/2					
733			TC		1/2	Mackenzie N	Agriculture	1348	Medium	500511F
			TC		1/2					
566			TC		1/2	Mackenzie N	Agriculture	25	Medium	103078
			TC		1/2					
559			TC		1/2	Mackenzie N	Agriculture	75	Medium	102978
			TC		1/2					
709			TC		1/2	Mackenzie N	Any	2	Medium	1584SD1F
			TC		1/2					
886			SP		1	Mackenzie N	Agriculture	11	Medium	172008
561	LESLIE ROSE PTY LTD ACN 075734333		TTE	TRUSTEE UNDER INSTRUMENT 704058357	1	Mackenzie N	Agriculture	10	Medium	102998
622			TC		1/2	Mackenzie N	Agriculture	1466	Medium	500583F
			TC		1/2					
623			TC		1/2	Mackenzie N	Any	2	Medium	0583SD1F
			TC		1/2					
744			TC		1/2	Mackenzie N	Any	2	Medium	0583SD2F
			TC		1/2					
758			TC		1/2	Mackenzie N	Any	13	Medium	38866F
			TC		1/2					
606			TC		1/2	Mackenzie N	Agriculture	1117	Medium	501171F
			TC		1/2					
607			TC		1/2	Mackenzie N	Any	2	Medium	1171SD1F
			TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
676	LOCHARBOR HOLDINGS PTY LTD ACN 010464409		TTE	TRUSTEES UNDER NOMINATION OF TRUSTEES NO C507566	1	Mackenzie N	Agriculture	1100	Medium	501182F
638	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	64	Medium	500544F
			TC		1/2					
684			TC		1/2	Mackenzie N	Agriculture	6	High	1888SD1F
			TC		1/2					
685			TC		1/2	Mackenzie N	Agriculture	2	Medium	1888SD1F
			TC		1/3					
577	CLEARMAIZE PTY LTD ACN 062437352	[REDACTED]	TC		1/3	Mackenzie N	Any	2	Medium	0520SD1F
			TC		1/3					
			TTE	UNDER NOMINATION OF TRUSTEES 700089026	1/3					
578	[REDACTED]	[REDACTED]	TC		1/8	Mackenzie N	Agriculture	1144	Medium	500520F
	[REDACTED]	[REDACTED]	TC		1/8					
	CLEARMAIZE PTY LTD ACN 062437352		TTE	UNDER NOMINATION OF TRUSTEES 700089026	3/4					
759	MARABOON POWER BOAT AND SKI CLUB INC		SP		1	Mackenzie N	Any	3	Medium	46285F
911	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	5	Medium	176525
			TC		1/2					
682	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	1144	Medium	500555F
			TC		1/2					
683	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0555SD1F
			TC		1/2					
730	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0555SD2F
			TC		1/2					
874	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0555SD3F
	[REDACTED]	[REDACTED]	TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
579			TC	TRUSTEES UNDER NOMINATION OF TRUSTEES C535930N	1/3	Mackenzie N	Agriculture	2349	Medium	500495F
			TC		1/3					
			TTE		1/3					
			TTE							
686			TC		1/2	Mackenzie N	Agriculture	1414	Medium	500512F
			TC		1/2					
687			TC		1/2	Mackenzie N	Any	2	Medium	0512SD1F
			TC		1/2					
643			TC		1/2	Mackenzie N	Agriculture	24	Medium	500535F
			TC		1/2					
712			TC		1/2	Mackenzie N	Any	2	Medium	0535SD1F
			TC		1/2					
634			SP		1	Mackenzie N	Agriculture	1590	Medium	500504F
635			SP		1	Mackenzie N	Any	2	Medium	0504SD1F
593	MILLAR HARVESTING CO. PTY LTD		TTE	TRUSTEE UNDER NOMINATION OF TRUSTEES NO C671948Y	1	Mackenzie N	Agriculture	1315	Medium	500577F
631			TC		1/2	Mackenzie N	Agriculture	24	Medium	500538F
			TC		1/2					
702			TC		1/2	Mackenzie N	Any	2	Medium	0538SD1F
			TC		1/2					
550	MOODLODGE PTY LTD ACN 011051308		TTE	TRUSTEE UNDER INSTRUMENT 706964964	1/2	Mackenzie N	Agriculture	10	High	102954
	DOUG SLACK CONSTRUCTION PTY LTD ACN 010637407		TTE	TRUSTEE UNDER INSTRUMENT 706964964	1/2					
642			TC		1/2	Mackenzie N	Any	2	Medium	1787SD1F
			TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation	
881			TC		1/2	Mackenzie N	Agriculture	1123	Medium	173991	
			TC		1/2						
664			TC		1/2	Mackenzie N	Agriculture	69	High	500244F	
			TC		1/2						
665			TC		1/2	Mackenzie N	Agriculture	796	Medium	500244F	
			TC		1/2						
653			TC		1/2	Mackenzie N	Any	2	Medium	0562SD1F	
			TC		1/2						
401			TC		1/2	Mackenzie N	Agriculture	17	Medium	103150	
			TC		1/2						
565			TC		1/2	Mackenzie N	Agriculture	22	Medium	102980	
			TC		1/2						
629			TC		1/2	Mackenzie N	Agriculture	680	Medium	500546F	
			TC		1/2						
677			TC		1/3	Mackenzie N	Agriculture	571	Medium	500545F	
			TC		1/3						
			TC		1/3						
678			SP		1	Mackenzie N	Any	2	Medium	0568SD1F	
52	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		TTE	TRUSTEE UNDER INSTRUMENT 703416784	1	Mackenzie N	Agriculture	2000	Medium	46144F	
207	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		TTE	TRUSTEE UNDER INSTRUMENT 703416745	1	Mackenzie N	Agriculture	2000	Medium	46141F	
576	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		TTE	TRUSTEE UNDER INSTRUMENT 703883301	1	Mackenzie N	Any	2	Medium	0554SD1F	
592	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		TTE	TRUSTEE UNDER INSTRUMENT 703883301	1	Mackenzie N	Agriculture	1144	Medium	500554F	

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
604	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		SP		1	Mackenzie N	Agriculture	1200	Medium	500492F
605	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		SP		1	Mackenzie N	Any	2	Medium	0492SD1F
756	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		TTE	TRUSTEE UNDER INSTRUMENT 703416803	1	Mackenzie N	Agriculture	2000	Medium	52637F
760	PACIFIC EXCHANGE HOLDINGS PTY LTD ACN 074549965		TTE	TRUSTEE UNDER INSTRUMENT 703416803	1	Mackenzie N	Agriculture	382	High	52637F
646			SP		1	Mackenzie N	Agriculture	64	Medium	500543F
617			TTE	TRUSTEE UNDER INSTRUMENT 700871673 AND 701366204	1	Mackenzie N	Agriculture	1037	Medium	500530F
		TTE								
		TTE								
658			TTE	TRUSTEE UNDER INSTRUMENT 705747047	1	Mackenzie N	Agriculture	100	Medium	501920F
		TTE								
		TTE								
672			TTE	TRUSTEE UNDER INSTRUMENT 702493040	1	Mackenzie N	Agriculture	340	High	0426576F
		TTE								
		TTE								
674			TTE	TRUSTEE UNDER INSTRUMENT 702493040	1	Mackenzie N	Agriculture	348	Medium	0426576F
		TTE								
		TTE								

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
692	[REDACTED]	[REDACTED]	TTE	TRUSTEE UNDER INSTRUMENT 702033808	1	Mackenzie N	Agriculture	370	Medium	0426525F
			TTE							
			TTE							
640	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Any	2	Medium	0564SD1F
587	QUINGILLI PTY LTD ACN 080004682		SP		1	Mackenzie N	Any	2	Medium	0528SD1F
588	QUINGILLI PTY LTD ACN 080004682		SP		1	Mackenzie N	Agriculture	1607	Medium	500528F
667	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Any	2	Medium	0567SD1F
707	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	281	Medium	500556F
			TC		1/2					
708	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0556SD1F
			TC		1/2					
632	[REDACTED]	[REDACTED]	SP		1	Mackenzie N	Any	2	Medium	0561SD1F
657	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	50	Medium	501574F
			TC		1/2					
704	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	160	Medium	501735F
			TC		1/2					
641	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	24	Medium	500536F
			TC		1/2					
609	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	0493SD1F
			TC		1/2					
610	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	1350	Medium	500493F
			TC		1/2					
680	[REDACTED]	[REDACTED]	TC		1/3					
			TC		1/3	Mackenzie N	Agriculture	1640	Medium	500507F
			TC		1/3					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
681			TC		1/3					
			TC		1/3	Mackenzie N	Any	2	Medium	0507SD1F
			TC		1/3					
650			SP		1	Mackenzie N	Agriculture	1400	Medium	500508F
651			SP		1	Mackenzie N	Any	2	Medium	0508SD1F
753			TC		1/2					
			TC		1/2	Mackenzie N	Agriculture	1	Medium	103038
694			TC		1/2					
			TC		1/2	Mackenzie N	Agriculture	140	Medium	501736F
695			TC		1/2					
			TC		1/2	Mackenzie N	Any	2	Medium	1736SD1F
608			TC		1/4					
			TC		1/4					
			TC		1/4	Mackenzie N	Any	2	Medium	0571SD1F
			TC		1/4					
644			TC		1/2					
			TC		1/2	Mackenzie N	Agriculture	20	High	500756F
645			TC		1/2					
			TC		1/2	Mackenzie N	Agriculture	50	Medium	500756F
360			TC		1/2					
			TC		1/2	Mackenzie N	Any	2	Medium	1533SD1F
628			TC		1/2					
			TC		1/2	Mackenzie N	Any	2	Medium	0559SD1F
663			TTE	UNDER NOMINATION OF TRUSTEES NO 700288994	1					
			TTE			Mackenzie N	Agriculture	100	Medium	501640F

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
637			TC		1/2	Mackenzie N	Agriculture	553	Medium	500580F
			TC		1/2					
554	STEPHEN BARRY CONSTRUCTIONS PTY LTD ACN 069756574		TTE	TRUSTEE UNDER INSTRUMENT 706860404	1	Mackenzie N	Agriculture	14	Medium	103077
654	STEPHEN BARRY CONSTRUCTIONS PTY LTD ACN 069756574		TTE	TRUSTEE UNDER INSTRUMENT 706860404	1	Mackenzie N	Agriculture	36	Medium	0426561F
853	SUNWATER		SP		1	Mackenzie N	Any	4	Medium	102923
927	SUNWATER		SP		1	Mackenzie N	Distribution Loss	25048	Medium	102919
928	SUNWATER		SP		1	Mackenzie N	Distribution Loss	6840	High	102917
602			TC		1/2	Mackenzie N	Agriculture	1150	Medium	500527F
			TC		1/2					
603			TC		1/2	Mackenzie N	Any	2	Medium	0527SD1F
			TC		1/2					
910	TONLENA PTY LTD ACN 097449404		TTE	TRUSTEE UNDER INSTRUMENT 704976151	1	Mackenzie N	Agriculture	5	Medium	176161
612			TC		1/2	Mackenzie N	Any	2	Medium	0526SD1F
			TC		1/2					
613			TC		1/2	Mackenzie N	Agriculture	1117	Medium	500526F
			TC		1/2					
589			SP		1	Mackenzie N	Agriculture	2749	Medium	500521F
598			SP		1	Mackenzie N	Any	2	Medium	0521SD2F
745			SP		1	Mackenzie N	Any	2	Medium	0521SD1F
761			TC		1/2	Mackenzie N	Agriculture	10	High	103000
			TC		1/2					

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
556	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie N	Agriculture	10	High	102953
			TC		1/3					
			TC		1/3					
599	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie N	Agriculture	85	Medium	102953
			TC		1/3					
			TC		1/3					
571	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	2032	Medium	500488F
			TC		1/4					
			TC		1/4					
			TC		1/4					
574	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Any	2	Medium	0488SD1F
			TC		1/4					
			TC		1/4					
			TC		1/4					
652	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie N	Agriculture	4	Medium	72F
			TC		1/3					
			TC		1/3					
821	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie N	Agriculture	597	Medium	501181F
			TC		1/4					
			TC		1/4					
			TC		1/4					
575	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	1271	Medium	500491F
			TC		1/2					
748	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	450	Medium	500532F
			TC		1/2					
616	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	64	Medium	500542F
			TC		1/2					

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
627	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	25	High	500542F
			TC		1/2					
596	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Agriculture	1364	Medium	500551F
			TC		1/2					
700	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie N	Any	2	Medium	1174SD1F
			TC		1/2					

JTI: Joint Tenants Inter se
SP: Sole Proprietor
TC: Tenants in Common
TTE: Trustee

Note that Attachment 4.2A shows details of relevant authorisations supplied through the Nogoia Mackenzie Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Attachment 4.2B

Nogoa Mackenzie Water Supply Scheme

Rules for conversion to water allocations

1 Locations where existing authorisations are being converted to water allocations

Existing authorisations for supplemented water are being converted to water allocations on:

- The Nogoa River from the upstream limit of Fairbairn Dam to the Comet River junction;
- The Mackenzie River from the Comet River junction to the Springton Creek junction; and
- Sections of tributaries of these rivers that contain water ponded from natural waterholes or infrastructure within the above sections of the Nogoa and Mackenzie rivers.

2 Rules for conversion of existing authorisations to water allocations

The following rules apply for the conversion of existing authorisations to water allocations to establish the details required for the registration of supplemented water allocations.

2.1 Location

The location from which water may be supplied under a water allocation is specified as a zone according to the position of the existing authorisation. Descriptions of the zones for the Nogoa and Mackenzie rivers are given in Attachment 2.2.

2.2 Purpose

The purpose for which water may be taken under a water allocation is specified as 'agriculture', 'distribution loss' or 'any'. 'Agriculture' is the nominated purpose for those existing authorisations that are primarily used for agricultural purposes. 'Distribution loss' is the nominated purpose for water allocations for distribution losses associated with the Selma and Weemah channel systems and Blackwater pipeline. 'Any' is the nominated purpose for all other uses of water.

2.3 Volume

The nominal volume for a water allocation will be the volume stated on existing authorisations subject to the following arrangements for entitlements associated with watering stock normally depastured on the land and domestic purposes.

Under the Water Act, an owner of land adjoining a watercourse, lake or spring may take water for domestic purposes and watering stock that would be normally depastured on the land without a water entitlement. Therefore any existing authorisation that provides for the taking of water for stock and domestic purposes on land adjoining a watercourse will not be converted to a water allocation.

2.3.1 Arrangements for authorisations for irrigation and stock and domestic purposes

- a) For an authorisation for irrigation, stock and domestic purposes, where all the land supplied adjoins a watercourse:
- If the authorisation states an irrigation volume and a stock and domestic volume, the irrigation volume is the volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- b) For an authorisation for irrigation, stock and domestic purposes, where all the land supplied does not adjoin a watercourse:
- If the authorisation states an irrigation volume and a stock and domestic volume, the combined irrigation volume and stock and domestic volume is the total volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- c) For an authorisation for irrigation, stock and domestic purposes, where part of the land supplied is not contiguous with the land that adjoins a watercourse:
- If the authorisation states an irrigation volume and a stock and domestic volume, the combined irrigation volume and the calculated volume for stock and domestic purposes on the non-adjoining land is the volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- d) For an authorisation for stock and domestic purposes only, where all the land supplied does not adjoin a watercourse:
- If the authorisation states a stock and domestic volume, the stock and domestic volume is the volume for the water allocation; or
 - If the authorisation does not state a stock and domestic volume, the annual volume calculated for stock and domestic purposes is the volume for the water allocation.
- e) For Section 2.3.1c) and Section 2.3.1d), the annual volume calculated for domestic purposes is:
- i) 1 ML; or
 - ii) An alternative volume determined by the chief executive based on consideration of a submission received on this matter on the draft Resource Operations Plan (ROP).
- f) For Section 2.3.1c) and Section 2.3.1d), the annual volume calculated for stock watering is:
- i) A volume equivalent to 1 ML per 250 ha of land; or
 - ii) An alternative volume determined by the chief executive based on consideration of a submission received on this matter on the draft ROP.

Where an existing authorisation does not state a stock and domestic volume, the annual volume specified for the water allocation is the combined volume calculated using Section 2.3.1e)i) and Section 2.3.1f)i).

2.4 Priority group

The priority group for a water allocation converted from an existing authorisation to take supplemented water is medium priority, except where a product specification or other undertaking associated with the authorisation identifies the authorisation's water supply as being high priority water allocation.

Attachment 4.2C

Nogoa Mackenzie Water Supply Scheme

Total volume of supplemented water allocations

Table 1: Total volume of supplemented water allocations at Resource Operations Plan approval

Zone	Medium priority water allocation (ML)	High priority water allocation (ML)
Mackenzie N	125,239 (note 1)	8,589 (note 2)
Mackenzie M	17,534	10,066
Mackenzie L	20,350	1,000
Mackenzie K	11,241	0
Mackenzie J	1,100	0
Mackenzie I	3,173	13,286
Mackenzie H	1,128	290
Mackenzie G	488	11,167
Mackenzie F	838	0
Mackenzie E	1,652	0
Mackenzie D	2,330	0
Mackenzie C	4,592	0
Mackenzie B	1,260	0
Total	190,925	44,398

Note 1: Includes 155 ML to be granted to SunWater under Section 6.2.7 of Chapter 6.

Note 2: Includes 45 ML to be granted to SunWater under Section 6.2.7 of Chapter 6.

Attachment 4.2D

Nogoa Mackenzie Water Supply Scheme Infrastructure details

Storage: Fairbairn Dam – Nogoa River AMTD 685.6 km

Description of water infrastructure	
Main embankment	Earth fill dam
Full supply level	EL 204.23 m AHD
Fixed crest level	EL 204.23 m AHD
Saddle dam(s)	Six saddle dams. Saddle dam 3 has a concrete chute spillway
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	1,301,000 ML
Dead storage volume	12,300 ML
Surface area/elevation and storage volume/elevation relationship	Natural Resources Drawing No. A3-203831 & A3-203832 (19/09/96)
Spillway arrangement	
Description of works	Curved approach channel to a mass concrete ogee crest. Concrete lined chute with energy dissipaters.
Spillway level	EL 204.23 m AHD
Spillway width	167.64 metres
Discharge characteristics	Irrigation and Water Supply Commission spillway discharge curve No. L42944 1054-D1189 (Aug 1974)
River inlet/outlet works	
Description of works	An intake tower, equipped with two 1200 mm by 1800 mm regulating gates, diverting under gravity via a 6.1 metre diameter tunnel to headworks controlled by 1 vertical lift gate for releases to the Nogoa River Methods may be employed to enable a maximum discharge capacity of up to 400 ML/day when the level of water stored in Fairbairn Dam is between EL190.21 m AHD and EL185.85 m AHD.
Multi-level inlet	Works do not accommodate selective withdrawal.
Cease to flow level	EL 190.21 m AHD (river outlet)
Discharge characteristics	Right bank outlet (River & Weemah Channel) L42946 1054-D1191 (Aug 1974) The existing maximum discharge capacity of the river outlet is approximately 600 ML/day. <i>Note: Chapter 8 provides for the river outlet to be modified to accommodate an increased discharge capacity to up to 1,600 ML/day.</i>
Fish transfer system	
Description of works	Nil

Storage: Selma Weir – Nogoia River AMTD 668.7 km

Description of water infrastructure	
Main embankment	Mass concrete weir
Full supply level	EL 170.39 m AHD
Fixed crest level	EL 170.39 m AHD
Saddle dam(s)	Nil
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	1180 ML
Dead storage volume	25 ML
Surface area/elevation and storage volume/elevation relationship	Drawing No. F35379 (27/6/73)
Spillway arrangement	
Description of works	Mass concrete ogee crest
Spillway level	EL 170.39 m AHD
Spillway width	From left to right along structure: EL 170.39 m AHD (der) – Length 23.77 metres EL 171.92 m AHD (der) – Length 54.86 metres EL 171.31 m AHD (der) – Length 34.75 metres EL 171.00 m AHD (der) – Length 34.75 metres
Discharge characteristics	Irrigation and Water Supply Commission Drawing No. F-12400 (5/3/54)
River inlet/outlet works	
Description of works	Outlet works: 300 mm RC pipe with a gate valve at the concrete outlet box
Multi-level inlet	Single-level offtake only
Cease to flow level	Outlet works: Invert EL 165.52 m AHD
Discharge characteristics	Maximum discharge capacity of approximately 35 ML/day
Fish transfer system	
Description of works	Nil

Storage: Bedford Weir – Mackenzie River AMTD 548.8 km

Description of water infrastructure	
Main embankment	Mass concrete weir with fabridam
Full supply level	EL 124.0 m AHD
Fixed crest level	EL 122.80 m AHD
Saddle dam(s)	Nil
Fabridams	1.2 m fabridam
Gates	Nil
Storage volume and surface area	
Full supply volume	22,900 ML
Dead storage volume	3,290 ML
Surface area/elevation and storage volume/elevation relationship	Department of Primary Industries (Water Resources) Storage Curve No. A3-110858A (22/3/96)
Spillway arrangement	
Description of works	Reinforced concrete crest (with deflated dam)
Spillway level	EL 122.80 m AHD
Spillway width	185.90 metres
Discharge characteristics	Ref: SWP ES, Bedford Weir Stage 2 Weir Operation, July 97
River inlet/outlet works	
Description of works	Original outlet works: Concrete outlet recess. 750 mm diameter RC pipe reducing to 450 mm diameter RC pipe controlled by a gate valve on the downstream end. New outlet works: 1200 mm by 1200 mm square unlined conduit cut from the original mass concrete monolith, controlled by 1200 mm by 1200 mm roller gate.
Multi-level inlet	New inlet works have selective withdrawal capabilities.
Cease to flow level	Original outlet works: EL 112.88 m AHD New outlet works: EL 116.08 m AHD
Discharge characteristics	Maximum design discharge capacity of original outlet 160 ML/day Maximum design discharge capacity of new outlet 890 ML/day Ref: SWP ES, Bedford Weir Stage 2 Weir Operation, July 97
Fish transfer system	
Description of works	Nil

Storage: Bingegang Weir – Mackenzie River AMTD 489.2 km

Description of water infrastructure	
Main embankment	Mass concrete weir
Full supply level	EL 102.90 m AHD
Fixed crest level	EL 102.90 m AHD
Saddle dam(s)	Nil
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	8,060 ML
Dead storage volume	1,400 ML
Surface area/elevation and storage volume/elevation relationship	Natural Resources Storage Curve No. A3-110940 (22/5/96)
Spillway arrangement	
Description of works	Reinforced concrete crest
Spillway level	EL 102.90 m AHD
Spillway width	107.30 metres
Discharge characteristics	Ref: SWP ES, Bingegang Weir Stage 2 Weir Operation, June 97
River inlet/outlet works	
Description of works	Original outlet works: 600 mm diameter pipe controlled by a 450 mm diameter gate valve with a 150 mm diameter scour around gate valve. New outlet works: 1200 mm by 1200 mm square unlined conduit cut from the original mass concrete monolith, controlled by 1200 mm by 1200 mm roller gate.
Multi level inlet	Single level offtake only
Cease to flow level	Original outlet works: EL 94.81 m AHD Invert level of scour: EL 94.97 m AHD New outlet works: EL 98.74 m AHD
Discharge characteristics	Maximum design discharge capacity of original outlet 92 ML/day Maximum design discharge capacity of new outlet 690 ML/day Ref: SWP ES, Bingegang Weir Stage 2 Weir Operation, June 97
Fish transfer system	
Description of works	Nil

Storage: Tartus Weir – Mackenzie River AMTD 429.5 km

Description of water infrastructure	
Main embankment	Mass concrete weir
Full supply level	EL 81.75 m AHD
Fixed crest level	EL 81.75 m AHD
Saddle dam(s)	Nil
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	12,000 ML
Dead storage volume	2,530 ML
Surface area/elevation and storage volume/elevation relationship	Queensland Water Resources Commission storage Curve No. A3-72973 (27/1/87)
Spillway arrangement	
Description of works	Central reinforced concrete ogee crest
Spillway level	EL 81.75 m AHD
Spillway width	170.0 metres
Discharge characteristics	Drawing No. 158999 E-A4-1989 (18/12/89) as submitted to NR&M on 30/3/01
River inlet/outlet works	
Description of works	Outlet works: 1200 mm diameter RC pipe controlled by a circular opening penstock.
Multi level inlet	Single level offtake
Cease to flow level	Outlet works: EL 76.85 m AHD Nib: EL76.9 m AHD (cease to flow level)
Discharge characteristics	Queensland Water Resources Commission outlet rating Curve No. CQ-A2-4903
Fish transfer system	
Description of works	Nil

Attachment 4.2E

Nogoa Mackenzie Water Supply Scheme

Rules for infrastructure operation and environmental management

1 Operating levels of storages and waterholes

1.1 Nominal operating levels of storages

The nominal operating level for each storage in the scheme is given in Table 1.

Releases must be made from the relevant upstream storage given in Table 1 to maintain the water level in a storage at its nominal operating level, unless the water level in Fairbairn Dam is below EL 191.0 m AHD (92,900 ML).

Storage levels may vary above and below the nominal operating level due to practical limitations of estimating and making releases and for unforeseen circumstances.

Table 1: Nominal operating levels of storages

Storage	Upstream storage	Nominal operating level
Fairbairn Dam	Not Applicable	Not Applicable
Selma Weir	Fairbairn Dam	EL 169.89 m AHD (900 ML)
Bedford Weir	Fairbairn Dam	EL 118.38 m AHD (6,500 ML)
Bingegang Weir	Bedford Weir	EL 99.94 m AHD (3,100 ML)
Tartrus Weir	Bingegang Weir	EL 79.25 m AHD (6,160 ML)

1.2 Minimum operating level of storages

The minimum operating level for each storage in the scheme are given in Table 2.

Table 2: Local supply areas and minimum operating levels of storages

Storage	Local supply area	Minimum Operating Levels
Fairbairn Dam	Fairbairn Dam pond and downstream to, but excluding, Bedford Weir pond	EL 185.85 m AHD
Selma Weir	Not applicable	EL 165.52 m AHD
Bedford Weir	Bedford Weir pond and downstream to, but excluding, Bingegang Weir pond	EL 115.08 m AHD
Bingegang Weir	Bingegang Weir pond and downstream to, but excluding, Tartrus Weir pond	EL 97.74 m AHD
Tartrus Weir	Tartrus Weir pond and downstream to Springton Creek junction	EL 76.85 m AHD

Water must not be released or supplied from a storage if the water level in that storage is below its minimum operating level, unless otherwise authorised by the chief executive.

Bedford Weir may be drawn down to its minimum operating level only if Fairbairn Dam is below EL 191.0 m AHD (92,900 ML).

Bingegang Weir may be drawn down to its minimum operating level only if Bedford Weir is below its nominal operating level.

Tartus Weir may be drawn down to its minimum operating level only if Bingegang Weir is below its nominal operating level.

1.3 Minimum levels in waterholes

For the waterholes listed in Table 3:

- Supplemented water must not be taken from a waterhole that is below the level stated in Table 3, unless otherwise authorised by the chief executive.

Table 3: Drawdown levels for specific waterholes within the area of the Nogoia Mackenzie Water Supply Scheme

Waterhole AMTD and local name (see note re AMTD)	Allowable drawdown below cease to flow level of waterhole (m)
436.6 to 467.2 km (downstream of Bingegang Weir)	0.9
Tartus Weir - 419.2 km (downstream of Tartus Weir)	1.0
412.3 km	1.0
408.5 km	1.0
378.8 km	1.0
373.2 km (10 Mile Waterhole)	1.0
371.3 km (10 Mile Waterhole)	1.0
357.9 km (at end of scheme)	1.0

The waterhole referred to is that waterhole for which the stated AMTD is inclusive

For a waterhole within the extent of the Nogoia Mackenzie Water Supply Scheme other than a waterhole listed in Table 3:

- Supplemented water should not be taken from a waterhole that is more than 0.5 metres below its cease to flow level; and
- The chief executive may authorise supplemented water to be supplied from a waterhole when the level is more than 0.5 metres below its cease to flow level.

2 Releases of water from storages

2.1 General rules

When determining releases from a storage, the ROL holder must have regard to the following:

- Total volume of water ordered, and its distribution;
- The rules for the supply of water orders in zone Mackenzie I, H, G, F and E, when the total volume of medium and high priority water allocations in those zones exceeds 33,000 ML;
- The likely contribution of inflows from tributaries that could assist the supply of orders;
- The likely transmission and operating losses;

- The travel time for water delivery;
- The volume of releases required to maintain nominal operating levels in downstream storages, and to maintain levels in waterholes;
- The first post-winter flow management strategy;
- The seasonal base flow management strategy; and
- The quality of water released from storages.

The ROL holder may incorporate provisions in supply contracts for circumstances when the release capacity of a storage is insufficient to meet downstream demand.

2.2 Release rate rules

Water may be released from a storage at a rate up to the maximum discharge capacity of its outlet works.

The maximum discharge capacity of the outlet works is to be used for meeting downstream demand or passing environmental flows as required.

A change to the rate of a release through the outlet works of a storage must have regard to the limits described in Table 4.

Table 4: Limits on changes to rate of release through the outlet works of storages

Storage	Limits on changes to rate of release through outlet works
Fairbairn Dam, Selma Weir, Bedford Weir, Bingeang Weir, and Tartrus Weir	<ul style="list-style-type: none"> • Reductions of release rate must occur incrementally, such that the risk of fish stranding and bank slumping is minimised. • Maximum rates of increase in release rate are not specified.

2.3 Bedford Weir fabridam deflation/inflation rules

Inflation and deflation of the Bedford Weir fabridam must occur incrementally, such that the risk of fish stranding and bank slumping is minimised.

2.4 Rules for the supply of water orders in zone Mackenzie I, H, G, F and E

2.4.1 Fairbairn Dam

This section only applies if:

- The total volume of medium and high priority water allocations in zone Mackenzie I, H, G, F and E exceeds 33,000 ML at the start of the water year;
- The level in Bedford Weir is between nominal operating level (EL 118.38 m AHD) and EL 123.5 m AHD;
- The level in Bingeang Weir is between nominal operating level (99.94 m AHD) and EL 102.4 m AHD; and
- The level in Fairbairn Dam is above EL 195.1 m AHD (300,000 ML).

If the total volume of medium and high priority water allocation in zone Mackenzie I, H, G, F and E exceeds 33,000 ML:

- Releases must be made from Fairbairn Dam to meet a portion of the volume of water ordered in zones Mackenzie I, H, G, F and E; and
- The volume of water ordered in zones Mackenzie I, H, G, F and E to be met by releases from Fairbairn Dam must be determined from the following relationship:

$$\text{FDO(Fairbairn)} = (\text{X} - 31,000) * \text{TD1/X}$$

Where:

FDO(Fairbairn) is the volume of water ordered in zones Mackenzie I, H, G, F and E that must be met by releases from Fairbairn Dam.

X is the total nominal volume for all medium and high priority water allocations in zones Mackenzie I, H, G, F and E at the start of the water year, adjusted by the net volume of medium and high priority water seasonally assigned into or out of this zone grouping to date since the start of the water year.

TD1 is the total volume of water ordered in zones Mackenzie I, H, G, F and E.

For the purpose of this rule:

- Volumes of water to be released under this rule may be accumulated up to 200 ML to improve the efficiency and effectiveness of the release.

2.4.2 Bedford Weir

This section only applies if:

- The total volume of medium and high priority water allocations in zone Mackenzie I, H, G, F and E exceeds 33,000 ML at the start of the water year;
- The level in Bedford Weir is between nominal operating level (EL 118.38 m AHD) and EL 123.5 m AHD;
- The level in Bingegang Weir is between nominal operating level (99.94 m AHD) and EL 102.4 m AHD; and
- The level in Fairbairn Dam is above EL 195.1 m AHD (300,000 ML).

If the total volume of medium and high priority water allocation in zones Mackenzie I, H, G, F and E exceeds 33,000 ML:

- Releases must be made from Bedford Weir to meet a portion of the volume of water ordered in zones Mackenzie G, F and E; and
- The volume of water ordered in zones Mackenzie G, F and E to be met by releases from Bedford Weir must be determined from the following relationship:

$$\text{FDO(Bedford)} = \text{FDO(Fairbairn)} * \text{TD2/TD1}$$

Where:

FDO(Bedford) is the volume of water ordered in zones Mackenzie G, F and E that must be met by releases from Bedford Weir.

FDO(Fairbairn) is the volume of water ordered in zones Mackenzie I, H, G, F and E that must be met by releases from Fairbairn Dam determined under Section 2.4.1.

TD2 is the total volume of water ordered in zones Mackenzie G, F and E.

TD1 is the total volume of water ordered in zones Mackenzie I, H, G, F and E.

For the purpose of this rule:

- Volumes of water to be released under this rule may be accumulated up to 200 ML to improve the efficiency and effectiveness of the release.

3 First post-winter flow management strategy

3.1 Node 11 (Carnangarra) first post-winter flow management strategy

3.1.1 Notification of activation of strategy

The Node 11 (Carnangarra) first post-winter flow management strategy is activated when the chief executive notifies the Nogoia Mackenzie Water Supply Scheme ROL holder that the strategy is activated.

The chief executive will activate the first post-winter flow management strategy for the first flow event with the following attributes:

- General stream flow level rises of at least 1.5 metres in the Mackenzie River between the Comet River junction and the effective upstream limit of Bedford Weir between 1 October and 10 April, to indicate circumstances that would potentially trigger ecological processes associated with the first post-winter flow; or
- General stream flow level rises of at least 1.5 metres in the Mackenzie River between the Comet River junction and the effective upstream limit of Bedford Weir after 14 September, to indicate circumstances that would potentially trigger ecological processes associated with the first post-winter flow, provided that the water temperature is expected to be above the critical level for these processes; and
- Flow characteristics that would typically indicate an event resulting in flows between the Comet River junction and the effective upstream limit of Bedford Weir with a duration greater than the base flow of at least 15 days, to support ecological processes associated with the intent of the first post-winter flow.

The following guidelines will apply to evaluation of these flow attributes and in making a decision to activate the first post-winter flow management strategy:

- The ecological processes trigger will generally be identified by a rise in stream flow of at least 2,500 ML/day in the Mackenzie River immediately downstream of the Comet River junction.
- For an event with the ecological processes trigger occurring in September, the water temperature should be at least 23°C; and
- The characteristics of the flow event will be evaluated to decide whether the event would typically result in extended periods of flow immediately downstream of the Comet River junction above the base flow (the Water Resource Plan (WRP) specifies a base flow of 156 ML/day at the Comet River junction). This evaluation will be based on stream flow as well as Bureau of Meteorology weather and rainfall information.

The decision to activate the first post-winter flow management strategy will typically be made

within 3 days of the occurrence of the ecological process trigger flow. However the decision may occur later if subsequent weather, rainfall and runoff conditions indicate that the flow duration attributes could be achieved.

The department will prepare work practices that further guide evaluations associated with the activation of the first post-winter flow management strategies. These guidelines will be regularly reviewed to adapt to technological advances and operational experience.

3.1.2 Strategy details

Releases to pass flows under the Node 11 (Carnangarra) first post-winter flow management strategy are in addition to any releases required for water supply or for maintaining operating levels in downstream weirs.

(a) Fairbairn Dam

The ROL holder must implement the node 11 (Carnangarra) first post-winter flow management strategy at Fairbairn Dam within 1 day of the activation of the strategy by the chief executive.

For 19 days from the date that implementation of the strategy begins at Fairbairn Dam, inflows to Fairbairn Dam must be passed as they occur, except:

- Releases must not be made if the water level in Fairbairn Dam is below EL 195.1 m AHD (300,000 ML);
- Releases are not required when Fairbairn Dam overflow is more than 220 ML/day; and
- Releases are not required when Fairbairn Dam inflow is less than 20 ML/day.

For the purpose of implementing the strategy:

- The passing flow may vary above and below that required under this strategy due to practical limitations of estimating and making releases, the maximum discharge capacity of the outlet works, and for unforeseen circumstances;
- The shape of the passing flow hydrograph should follow as far as practicable the shape of the inflow hydrograph; and
- At those times when the maximum discharge capacity of the outlet works limits the ability to pass inflows, the excess inflow volume will be retained in storage.

3.2 Node 10 (Bingegang) first post-winter flow management strategy

3.2.1 Notification of activation of strategy

The Node 10 (Bingegang) first post-winter flow management strategy is activated when the chief executive notifies the Nogoia Mackenzie Water Supply Scheme ROL holder that the strategy is activated.

The chief executive will activate the first post-winter flow management strategy for the first flow event with the following attributes:

- General stream flow level rises of at least 1.5 metres in the Mackenzie River between Bedford Weir and the effective upstream limit of Tartrus Weir between 1 October and 10 April, to indicate circumstances that would potentially trigger ecological processes associated with the first post-winter flow; or

- General stream flow level rises of at least 1.5 metres in the Mackenzie River between the Bedford Weir and the effective upstream limit of Tartrus Weir after 14 September, to indicate circumstances that would potentially trigger ecological processes associated with the first post-winter flow, provided that the water temperature is expected to be above the critical level for these processes; and
- Flow characteristics that would typically indicate an event resulting in flows between Bedford Weir and the effective upstream limit of Tartrus Weir with a duration greater than the base flow of at least 15 days, to support ecological processes associated with the intent of the first post-winter flow.

The following guidelines will apply to evaluation of these flow attributes and in making a decision to activate the first post-winter flow management strategy:

- The ecological processes trigger will generally be identified by a rise in stream flow of at least 2,500 ML/day in the Mackenzie River immediately downstream of the Bingegang Weir.
- For an event with the ecological processes trigger occurring in September, the water temperature should be at least 23°C; and
- The characteristics of the flow event will be evaluated to decide whether the event would typically result in extended periods of flow immediately downstream of the Bingegang Weir above the base flow (the WRP specifies a base flow of 163 ML/day at the Bingegang Weir). This evaluation will be based on stream flow as well as Bureau of Meteorology weather and rainfall information.

The decision to activate the first post-winter flow management strategy will typically be made within 3 days of the occurrence of the ecological process trigger flow. However, the decision may occur later if subsequent weather, rainfall and runoff conditions indicate that the flow duration attributes could be achieved.

The department will prepare work practices that further guide evaluations associated with the activation of the first post-winter flow management strategies. These guidelines will be regularly reviewed to adapt to technological advances and operational experience.

3.2.2 Strategy details

The ROL holder must implement the node 10 (Bingegang) first post-winter flow management strategy at Bedford Weir within 1 day of the activation of the strategy by the chief executive.

For 21 days from the date that implementation of the strategy begins at Bedford Weir, inflows to Bedford Weir must be passed as they occur, except:

- Releases must not be made if the water level in Bedford Weir is below EL 118.86 m AHD (7,500 ML);
- Releases are not required when Bedford Weir overflow is more than 220 ML/day; and
- Releases are not required when Bedford Weir inflow is less than 50 ML/day.

For the purpose of implementing the strategy;

- The passing flow may vary above and below that required under this strategy due to practical limitations of estimating and making releases, the maximum discharge capacity of the outlet works, the operational limitations of the fabridam, and for unforeseen circumstances;

- The shape of the passing flow hydrograph should follow as far as practicable the shape of the inflow hydrograph;
- At those times when the maximum discharge capacity of the outlet works limits the ability to pass inflows, the excess inflow volume will be retained in storage;
- The ROL holder must, by 31 July 2006, submit to the chief executive for approval proposed operating arrangements for the inflation of the fabridam during implementation of this strategy. The submission must include an assessment of the impact of the inflation of the fabridam on flow; and
- During implementation of this strategy, inflation of the fabridam must be consistent with arrangements approved by the chief executive.

4 Seasonal base flow management strategy

4.1 Bedford Weir seasonal base flow management strategy

A seasonal base flow equal to the inflow to Bedford Weir must pass Bedford Weir if:

- Inflows to the weir are between 100 ML/day and 220 ML/day;
- The water level in the weir is above EL 118.86 m AHD (7,500 ML); and
- The Node 10 (Bingegang) first post-winter flow management strategy is not in effect.

A seasonal base flow of 220 ML/day must pass Bedford Weir if:

- Inflows to the weir are greater than 220 ML/day;
- The water level in the weir is above EL 118.86 m AHD (7,500 ML); and
- The Node 10 (Bingegang) first post-winter flow management strategy is not in effect.

Seasonal base flow passed through Bedford Weir is in addition to any release required for supply between Bedford Weir and the Bingegang Weir pond.

For the purpose of implementing this strategy:

- The volume passed over a 48-hour period must be within plus 20% and minus 20% of the volume required to be passed under the strategy;
- The commencement and cessation of any release required under this strategy may be delayed by up to 48 hours; and
- Inflows to the weir do not include any water which was released from Fairbairn Dam intended to maintain the level in Bedford Weir at its nominal operating level or to supply users between Fairbairn Dam and the Bedford Weir pond.

4.2 Bingegang Weir seasonal base flow management strategy

A seasonal base flow equal to the inflow to Bingegang Weir must pass Bingegang Weir if:

- Inflows to the weir are between 100 ML/day and 220 ML/day;
- The water level in the weir is above EL 100.34 m AHD (3,500 ML); and
- The Node 10 (Bingegang) first post-winter flow management strategy is not in effect.

A seasonal base flow of 220 ML/day must pass Bingegang Weir if:

- Inflows to the weir are greater than 220 ML/day;
- The water level in the weir is above EL 100.34 m AHD (3,500 ML); and
- The Node 10 (Bingegang) first post-winter flow management strategy is not in effect.

Seasonal base flow passed through Bingegang Weir is in addition to any release required for supply between Bingegang Weir and the Tartrus Weir pond.

For the purpose of implementing this strategy:

- The volume passed over a 48-hour period must be within plus 20% and minus 20% of the volume required to be passed under the strategy;
- The commencement and cessation of any release required under this strategy may be delayed by up to 48 hours; and
- Inflows to the weir do not include any water which was released from Bedford Weir intended to maintain the level in Bingegang Weir at its nominal operating level or to supply users between Bedford Weir and the Bingegang Weir pond.

4.3 Tartrus Weir seasonal base flow management strategy

A seasonal base flow equal to the inflow to Tartrus Weir must pass Tartrus Weir between 1 September and 31 December if:

- Inflows to the weir are between 150 ML/day and 240 ML/day; and
- The water level in the weir is above EL 81.36 m AHD (11,000 ML).

A seasonal base flow of 240 ML/day must pass Tartrus Weir between 1 September and 31 December if:

- Inflows to the weir are greater than 240 ML/day; and,
- The water level in the weir is above EL 81.36 m AHD (11,000 ML).

Seasonal base flow passed through Tartrus Weir is in addition to any release required for supply between Tartrus Weir and the Springton Creek.

For the purpose of implementing this strategy:

- The volume passed over a 48-hour period must be within plus 20% and minus 20% of the volume required to be passed under the strategy;
- The commencement and cessation of any release required under this strategy may be delayed by up to 48 hours; and
- Inflows to the weir do not include any water which was released from Bingegang Weir intended to maintain the level in Tartrus Weir at its nominal operating level or to supply users between Tartrus Weir and the Springton Creek junction.

5 Fishway management strategy

There are no fishways in the scheme.

6 Quality of water released from storages

Where a storage incorporates a multi-level outlet, the ROL holder must draw water from the level that optimises the quality of the water released (for example, dissolved oxygen concentration and the temperature in the release water optimised), to minimise the impact on the downstream water quality. If this level does not provide enough capacity for the required release, other levels must be used to give the required discharge.

7 Use of watercourses for distribution of water

The ROL holder may use the following watercourses for the purposes of distribution of water:

- The Nogoia River from the upstream limit of Fairbairn Dam to the Comet River junction;
- The Mackenzie River from the Comet River junction to the Springton Creek junction;
- Sections of tributaries of these rivers that contain water from natural waterholes and infrastructure within the above sections of the Nogoia and Mackenzie rivers; and
- The Comet River from AMTD 10.0 km to the Mackenzie River junction.

8 Use of unsupplemented watercourses for delivery of supplemented water

The ROL holder may use the following unsupplemented watercourses for the purpose of delivery of supplemented water under the specified conditions:

8.1 Retreat Creek

Retreat Creek from the confluence of Drain RR6 (approximately AMTD 9.5 km) to the Blair Athol Railway line crossing of Retreat Creek (approximately AMTD 3.0).

The ROL holder is responsible for metering of all supplemented water supplied from Retreat Creek.

For any day, the amount of supplemented water supplied by the ROL holder must not exceed the amount of supplemented water released to Retreat Creek by the ROL holder. For any day, the amount of water taken from Retreat Creek in excess of the amount of water released is unsupplemented water.

9 Riparian stock and domestic use

Under Section 20(3) of the Water Act, an owner of land adjoining a watercourse, lake or spring may take water for domestic purposes and watering stock that would be normally depastured on the land without a water entitlement. In this section this is referred to as 'riparian entitlement water'.

This means that riparian entitlement water might also be taken through the same metered water facilities as supplemented water and some users might desire appropriate allowances be made for their riparian entitlement use. The historical arrangements for accounting for individual riparian use taken through metered facilities will not apply following commencement of the ROP.

9.1 Rules for adjusting metered use for riparian entitlement water use

This section provides arrangements to allow adjustments for riparian entitlement water metered use.

The ROL holder must enter into an arrangement with any water user who requests metered use adjustments for riparian entitlement water use taken through a metered facility. The ROL holder must supply details of the arrangements with each individual user to the chief executive within 5 business days of an agreement.

An arrangement must comply with the departmental guidelines for this purpose.

If the ROL holder and a water user are unable to reach agreement on an arrangement, the chief executive will decide the arrangement that will apply in that particular instance.

Attachment 4.2F

Nogoa Mackenzie Water Supply Scheme

Water sharing rules

This attachment provides water sharing rules for:

- Announced allocations;
- Critical water supply;
- Transfer of water between water years; and
- Seasonal water assignments.

There are two types of water allocation proposed to be supplied to water users in the Nogoa Mackenzie Water Supply Scheme, medium and high priority water allocations. The water sharing rules specify the way the water resources of the Nogoa Mackenzie Water Supply Scheme will be shared between each of the water allocation priority groups.

1 Announced allocation

The announced allocation percentage is the percentage of the water allocation volume that may be supplied during the water year.

The Resource Operations Licence (ROL) holder is required to calculate announced allocation percentages for each priority group through the use of formulas and associated parameters. Details for each parameter used are specified in Section 5.

The amount of water that can be apportioned to each of the priority groups at any given time is determined by taking into account a number of factors, including:

- The time of year an assessment is made;
- The amount of water used by each priority group in the current water year up to the date of the assessment;
- The amount of water stored in Fairbairn Dam and the weirs;
- Allowance for evaporative and seepage losses from Fairbairn Dam and the weirs;
- Allowance for future inflows;
- Allowance for the requirements of high priority water allocation in future water years;
- Allowance for transmission and operational losses along the river; and
- The net amount of water allocation moved into the current water year from the previous water year.

The values for these factors applied in the announced allocation formula seek to maximise the availability of medium priority water allocation and secure the reliability for high priority water allocations as determined by testing in the department's hydrologic model (IQQM) over the long-term historical period. Importantly, the values given for these factors should not be taken out of the context of their purpose as part of the overall package used to determine the announced allocation.

1.1 General rules for announced allocations

The water year for the Nogoia Mackenzie Water Supply Scheme is from 1 July to 30 June in the following year.

Separate assessment of announced allocation percentages must be made for each priority group.

The initial announced allocation percentage for a water year must be announced within 2 weeks after the start of that water year.

The ROL holder may announce an interim announced allocation at any time during the water year. An interim announced allocation percentage must not be greater than the percentage that would be calculated using the formulas in Section 1.2. An interim announced allocation has effect as if it was an announced allocation calculated using the formulas in Section 1.2.

The ROL holder must announce an interim announced allocation immediately prior to the commencement of a water year. The basis/criteria for the determination of the interim announced allocation for the start of the water year must take into account water user requirements, and be made available to water users.

Announced allocation percentages must not be reduced during a water year.

Announced allocation percentages must not be greater than 100%.

Announced allocation percentages must be rounded to the nearest 1%.

Announced allocation percentages must be reviewed, and revised percentages announced within 2 weeks after a major inflow occurs. A major inflow is defined as one that would result in:

- The announced allocation percentage increasing to 100%; or
- The announced allocation percentage increasing by 5% or more.

If the announced allocation percentage is less than 100%, the announced allocation percentage should be reviewed at intervals not greater than 3 months.

The ROL holder should advise water users of forecast announced allocations, including details of the parameters used in determining the forecast values. The criteria for forecasting announced allocations, including the timing, frequency and level of accuracy must take into account water user requirements, and be made available to water users.

1.2 Calculation of announced allocation percentages

1.2.1 Medium priority water allocations

The initial announced allocation and any revised announced allocation for medium priority water allocations (AAm) must be determined from the following relationship.

$$AAm * MPA = (UV + IN - HPA - RE - TOL + USE - VIWY) * 100$$

The parameters used in this relationship are defined in Section 5.

For a medium priority water allocation that has been converted from a high priority water allocation, medium priority announced allocation must not apply to the medium priority allocation for the water year in which the change to a medium priority water allocation was registered.

1.2.2 High priority water allocations

The announced allocation percentage for high priority water allocations (AAh) must be 100% if the announced allocation determined for medium priority water allocations is greater than zero.

If the announced allocation percentage for medium priority water allocations is zero, the amount of water that may be taken by high priority water allocations may be subject to the critical water supply water sharing rules in Section 2.1.

For a high priority water allocation that has been converted from a medium priority water allocation, high priority announced allocation must not apply to the high priority allocation for the water year in which the change to a high priority water allocation was registered.

Critical water supply water sharing rules

2.1 High priority water allocations

If the announced allocation percentage for medium priority water allocations is zero, the amount of water that may be taken by high priority water allocations must be determined from the following relationship.

$$AAh * HPA = (UV + IN - TOL + USE - VIWY) * 100$$

The parameters used in this relationship are defined in Section 5.

3 Transfer of water between water years

The ROL holder may develop and apply scheme practices for carry over and forward draw of water entitlements in accordance with the principles and rules in this section.

3.1 Principles for transfer of water between water years

The ROL holder must have regard to the following principles in developing and applying scheme practices for carry over and forward draw of water entitlements.

Carry over and forward draw practices must not have an adverse impact on the objectives of the Water Resource Plan (WRP).

Entitlements must not be:

- Carried over from the current water year to any future year; other than the next water year; or
- Brought forward from a future water year to the current water year, other than from the

next water year.

The volume of an individual water entitlement carried over to the next water year must not exceed the unused portion of the entitlement at the end of the water year.

The volume of individual water allocation brought forward to the current water year must not exceed the announced allocation volume for the allocation at the start of the next water year.

The ROL holder must apply such loss factors to carry over water as necessary to avoid:

- Adverse impacts on other water entitlement holders; and
- Adverse impacts on the objectives of the WRP.

The ROL holder must consider the effects of storage overflow on the volume of carry over.

3.2 Rules for transfer of water between water years

The following rules apply for the transfer of water between water years.

The total volume permitted to be brought forward to a water year must not exceed the volume given in Table 1.

Table 1: Maximum water allocation volume that may be brought forward to a water year

Storage level of Fairbairn Dam at 1 July in next water year (m AHD)	Maximum total water allocation volume permitted to be brought forward to a water year (ML)
Greater than EL 197 m (460,000 ML)	40,000
Between EL 197 m & EL 193 m (184,000 ML)	25,000
Below EL 193 m	5,000

The total volume permitted to be carried over to a water year must not exceed the volume given in Table 2.

Table 2: Maximum water allocation volume that may be carried over to a water year

Storage level of Fairbairn Dam at 1 July (m AHD)	Maximum total water allocation volume permitted to be carried over to a water year (ML)
Greater than EL 197 m (460,000 ML)	150,000
Between EL 197 m & EL 193 m (184,000 ML)	75,000
Below EL 193 m	25,000

The ROL holder must not supply any water carried over from the previous water year that was unused at the time an overflow of Fairbairn Dam commences.

3.3 End of water year minor adjustments

As an administrative arrangement to account for the timing of the end of water year metered use reading and for the operational convenience of water users, the ROL holder may, in addition to any carry over or forward draw permitted under Section 3.1 and Section 3.2, make minor carry over and forward draw adjustments to entitlements. For an individual, the adjustments must not exceed 2% of the individual entitlement at the end of the water year for which the meter reading applies, or 10 ML whichever is the lesser.

4 Seasonal water assignment rules

Under Section 146B of the Water Act the holder of a water allocation may enter into an arrangement for a seasonal assignment in relation to the allocation. However the allocation holder may enter into the arrangement only with the consent of the ROL holder. The ROL holder may give consent only if the assignment is allowed under the seasonal water assignment rules in the ROP.

The ROL holder is required to report (refer Section 3.2.1 of Attachment 4.2G) on trends in seasonal assignment and evaluate whether seasonal assignment practices are impacting on supply for individual water users or groups of water users or impacting on the objectives of the WRP.

Chapter 8 of the ROP allows the chief executive to initiate changes to the seasonal assignment rules if considered necessary to protect the objectives of the WRP.

4.1 Principles for seasonal water assignment

The ROL holder must have regard to the following principles in developing scheme practices and for making decisions for consent of seasonal water assignment arrangements.

The effects of an individual seasonal assignment and the cumulative effects of successive or repeated seasonal assignments must not:

- Impact adversely on the WRP objectives;
- Impact adversely on the availability of water to other water users in any part of the scheme; or
- Subject waterholes to an increased potential for environmental harm.

The water under seasonal assignment may only be supplied from within the Nogoia Mackenzie Water Supply Scheme area.

4.2 Rules for seasonal water assignment

The following rules apply in developing scheme practices and for making decisions for consent of seasonal water assignment arrangements.

Water supplied under a seasonal water assignment may be used for any purpose.

Seasonal assignment of a water allocation with a specified purpose of ‘distribution loss’ is not permitted.

A seasonal water assignment must not result in the seasonal water assignment value lying outside the seasonal water assignment limits in Table 3. The seasonal water assignment value for a zone grouping in Table 3 is the total nominal volume for all medium and high priority water allocations in that zone grouping at the start of the water year, adjusted by the net volume of water seasonally assigned into or out of that zone grouping to date since the start of the water year.

Table 3: Seasonal water assignment limits

Seasonal water assignment limits (ML)	Mackenzie N, Mackenzie M, Mackenzie L, Mackenzie K & Mackenzie J	Mackenzie I & Mackenzie H	Mackenzie G, Mackenzie F & Mackenzie E	Mackenzie D, Mackenzie C & Mackenzie B
Minimum volume		12,000	10,000	5,182
Maximum volume		46,000		18,882

5 Definition of parameters

AAM = Announced allocation percentage medium priority

The percentage of the nominal volume for a medium priority water allocation that may be supplied for the current water year.

AAH = Announced allocation percentage high priority

The percentage of the nominal volume for a high priority water allocation that may be supplied for the current water year.

MPA = Medium priority water allocations

The volume of medium priority water allocations in the scheme.

HPA = High priority water allocations

The volume of high priority water allocations in the scheme.

USE = Volume of water taken

The volume of water taken in the current water year up to the time of the assessment of the announced allocation (excluding any water taken in the current water year that had been carried over).

UV = Useable volume

UV is determined by summing the useable volume of each of the storages included in the assessment of the announced allocation, as per the following equations:

$$UV = \text{sum}(UV_{\text{storage}})$$

$$UV_{\text{storage}} = (CV - DSV - SL)$$

$$UV_{\text{storage}} = 0 \text{ if } (CV - DSV - SL) \text{ is less than zero}$$

Where:

UV_{storage} is the useable volume of each storage.

CV is the current volume of the storage.

DSV is the dead storage volume of the storage.
SL is the storage losses.

For the purpose of the assessment of the announced allocations, the volumes of Fairbairn Dam, Bedford Weir, Bingegang Weir and Tartrus Weir are included in the calculation. The volume of Selma Weir is ignored in the calculation.

SL = Storage losses

SL is the projected storage losses from the storages for the remainder of the water year (note: storage losses include lake evaporation plus seepage, minus direct rainfall onto the storage).

The storage loss depths to be used for each storage are given in Table 4. The value for the current month is multiplied by the current surface area of the storage. The storage loss for each storage is determined and then summed to give the total storage loss.

Table 4: Projected storage losses for each storage

Month in which announced allocation is calculated	Storage loss for Fairbairn Dam (mm)	Storage loss for Bedford Weir, Bingegang Weir and Tartrus Weir (mm)
July	1,660	1,770
August	1,580	1,680
September	1,470	1,570
October	1,340	1,420
November	1,170	1,240
December	990	1,050
January	770	830
February	580	620
March	410	440
April	260	290
May	160	170
June	75	85

IN = Inflow

IN is the allowance for inflows used in the resource assessment. The inflows to be used for this system are given in Table 5. The number used in the equation for inflows (IN) is the value in the table for the month in which the calculation is undertaken.

Table 5: Inflow allowances

Month in which announced allocation is calculated	Inflow (ML)
July	0
August	0
September	0
October	0
November	0
December	0
January	0
February	0
March	0
April	0
May	0
June	0

RE = Reserve

RE is the storage volume set aside for supply and associated losses in future water years. RE must be determined using the following relationship:

$$\mathbf{RE = (RES * HPA)/44,398}$$

Where RES is the reserve volume for the current month at the time of the calculation given in Table 6.

Table 6: Reserve volumes

Month in which announced allocation is calculated	Reserve (ML)
July	54,700
August	54,700
September	60,400
October	66,400
November	72,700
December	79,200
January	86,000
February	93,100
March	100,300
April	100,300
May	107,800
June	115,400

TOL = Transmission and operational losses

TOL is an allowance for river transmission and operational losses expected to occur in running the system from the date of the announced allocation assessment to the end of the current water year. TOL varies with the announced allocation for medium priority water allocations.

The transmission and operational loss allowance to be used is given in Table 7. TOL is to be linearly interpolated for intermediate values of medium priority announced allocation.

Table 7: Transmission and operational losses

Month in which announced allocation is calculated	Transmission and operational loss allowance (ML)	
	At AAm = 0%	At AAm = 100%
July	9,020 *F ₀	25,880 *F ₁₀₀
August	8,250 *F ₀	24,610 *F ₁₀₀
September	7,490 *F ₀	23,340 *F ₁₀₀
October	6,750 *F ₀	21,250 *F ₁₀₀
November	5,980 *F ₀	17,450 *F ₁₀₀
December	5,240 *F ₀	16,030 *F ₁₀₀
January	4,470 *F ₀	12,400 *F ₁₀₀
February	3,710 *F ₀	7,920 *F ₁₀₀
March	3,020 *F ₀	4,700 *F ₁₀₀
April	2,250 *F ₀	3,600 *F ₁₀₀
May	1,510 *F ₀	2,520 *F ₁₀₀
June	740 *F ₀	1,420 *F ₁₀₀

Where:

$$F_0 = \text{HPA}/44,398$$

$$F_{100} = (\text{HPA} + \text{MPA})/235,323$$

VIWY = Net total volume of unused water allocation moved into current water year

VIWY is the net total volume of unused water allocation that is moved into a water year from the previous water year, taking into account:

- The volume of water carried over to the current water year from the previous water year;
- The volume of water brought forward from the current water year to the previous water year; and
- The volume of water carried over to the current water year that had been supplied in the current water year as at the date of the assessment of the announced allocation.

Attachment 4.2G

Nogoa Mackenzie Water Supply Scheme Monitoring program

1 Water quantity

1.1 Height and stream flow

The Resource Operations Licence (ROL) holder must record height and flow data in accordance with Table 1.

Table 1: Locations in the Nogoa and Mackenzie rivers where height and flow data is required

Location	Height data	Flow data
Fairbairn Dam inflow		✓
Fairbairn Dam storage	✓	
Fairbairn Dam outflow		✓
Bedford Weir inflow		✓
Bedford Weir storage	✓	
Bedford Weir outflow		✓
Bingegang Weir inflow		✓
Bingegang Weir storage	✓	
Bingegang Weir outflow		✓
Tartrus Weir inflow		✓
Tartrus Weir storage	✓	
Tartrus Weir outflow		✓

It is preferred that continuous time series data be collected. However, the chief executive may approve the collection of data in a format and standard other than for continuous time series data.

The methodology for determining height and flow data, including data format and standard, must be approved by the chief executive.

1.1a Operating level of storages

The ROL holder must record for Fairbairn Dam, Bedford Weir, Bingegang Weir and Tartrus Weir:

- The daily storage height; and
- The daily storage outflow.

The ROL holder must record for Selma Weir:

- The daily storage height when Selma Weir is below nominal operating level.

For the purposes of this section:

- The methodology for determining the daily storage height and daily storage outflow must be approved by the chief executive; and
- The data must be real time information upon which operational decisions were based not data that has subsequently changed for example through a verification process.

1.1b Stream flow for the purpose of first post-winter flow management strategies

The ROL holder must record for each storage where a first post-winter flow management strategy applies under Section 3 of Attachment 4.2E:

- The storage inflow;
- The storage height; and
- The storage outflow.

For the purposes of this section:

- The methodology for determining the storage inflow, storage height and storage outflow must be approved by the chief executive;
- The storage inflow, storage height and storage outflow are only required to be recorded for the duration of the implementation of the first post-winter flow management strategy; and
- The data must be real time information upon which operational decisions for the implementation of the strategy were based not data that has subsequently changed for example through a verification process.

1.1c Stream flow for the purpose of seasonal base flow management strategies

The ROL holder must record for each storage where a seasonal base flow management strategy applies under Section 4 of Attachment 4.2E:

- The daily storage inflow volume;
- The daily storage inflow volume adopted for the purpose of determining passing flow requirements under the rules for the seasonal base flow management strategy. That is, the inflow volume after any adjustment to account for water released from an upstream storage for maintaining storage heights or to supply water users, in accordance with the seasonal base flow rules;
- The daily storage height; and
- The daily storage outflow.

For the purposes of this section:

- The methodology for determining the daily storage inflow volume, daily storage inflow volume adopted for the purpose of determining passing flow requirements, daily storage height and daily storage outflow must be approved by the chief executive; and
- The data must be real time information upon which operational decisions for the implementation of the strategy were based not data that has subsequently changed for example through a verification process.

1.2 Releases from storages

The ROL holder must record details of the basis for each release decision for each storage under the rules for releases of water from storages given in Section 2 of Attachment 4.2E, including:

- The general rules for releases including those specified in Section 2.4 of Attachment 4.2E;
- The release rate rules;
- The first post-winter flow and seasonal base flow management strategies; and

- The quality of water released from storages.

The ROL holder must record the time, date and release rate each time a release rate is changed for each storage. In addition, for storages with a multi-level inlet, the ROL holder must record the level from which the release is made and the basis of the decision for determining that level.

The ROL holder must record the daily volume released (through the outlet/s) from each storage.

The ROL holder must record daily volumes of supplemented water released to Retreat Creek under the rules for use of unsupplemented watercourses for delivery of supplemented water given in Section 8 of Attachment 4.2E.

The ROL holder must provide a proposed methodology for accounting for the supply of water orders under Section 2.4 of Attachment 4.2E to the chief executive within 40 business days of the commencement of the plan amendment (revision 2) for approval.

1.3 Announced allocations

The ROL holder must record details of announced allocation determinations, referred to in Section 1 and Section 2 of Attachment 4.2F, including:

- The date and value for announced allocations, including the initial and any interim announced allocations; and
- The parameters applied for each announced allocation determination, including the initial and any interim announced allocations.

1.4 Transfer of water between water years

The ROL holder must record details of the transfer of water between water years referred to in Section 3 of Attachment 4.2F, including:

- Scheme practices applied for carry over and forward draw of water entitlements;
- The basis of each decision to adjust the amount of water an individual may be supplied in a water year and the volume of the adjustment;
- The basis of each decision to approve a carry over or forward draw for each individual water user;
- The volume of water carried over from a water year to the next water year; and
- The volume of water brought forward from the next water year to a water year by priority group.

1.5 Seasonal water assignment

The ROL holder must record details of individual seasonal water assignment arrangements.

1.6 Water taken by water users

The ROL holder must record the volume of water taken by water users as follows:

- For each individual water user specified for each zone:
 - The total volume of supplemented water taken each quarter;
 - The total volume of supplemented water entitled to be taken at any time;

-
- The basis for determining the total volume of supplemented water entitled to be taken at any time, including any adjustments for approved seasonal water assignments and transfers into or out of the water years;
 - The total volume of metered water taken as ‘riparian entitlement water’; and
 - The zone.

Note: Water taken under a water allocation with purpose ‘distribution loss’ should be recorded as an individual water user.

The ROL holder must record the daily volumes of supplemented water supplied to each water user from Retreat Creek and the associated meter readings.

1.7 Water diversions

The ROL holder must record the daily volume of water diverted to:

- Selma channel system;
- Weemah channel system; and
- Blackwater pipeline.

The methodology for determining the volume must be approved by the chief executive.

1.8 Waterholes

The ROL holder must:

- Establish a unique identifier for any waterhole from which supplemented water is taken that is drawn down more than 0.6 metres below cease to flow level; and
- Record the water level in the waterhole each day that supplemented water is taken from the waterhole and the water level is more than 0.6 metres below the cease to flow level.

2 Impact of storage operation on aquatic ecosystems

The ROL holder must undertake the following to establish any impacts on aquatic ecosystems that are potentially related to the operation of storages.

Section 2.1 Bank condition

The ROL holder must inspect banks for evidence of collapse and/or erosion within the ponded area and downstream of storages following instances of rapid water level changes or large flows through storages, or other occasions when collapse and/or erosion of banks may be likely. The distance downstream is the distance of influence of storage operations.

Any instances of bank slumping or erosion observed must be investigated to determine if the instability was associated with the nature or operation of the infrastructure.

2.2 Water Quality

The ROL holder must monitor water quality in relation to relevant infrastructure in accordance with the department's Water Monitoring Data Collection Standard.

2.3 This section not required

2.4 Fish stranding

The ROL holder must investigate instances of fish stranding downstream of storages to determine if the fish stranding is associated with operation of infrastructure. The distance downstream of storages is the distance of influence of storage operations.

3 Reporting

There are four levels of reporting for ROL holders:

- Quarterly report for the previous quarter;
- Annual report for the previous water year;
- Operational reports; and
- Emergency reports.

3.1 Quarterly report

The ROL holder must transfer the following data to the chief executive:

- Water quantity all records referred to in Sections 1.1a and 1.1c;
- Release from storages where applicable, the level from which releases were made referred to in Section 1.2;
- Waterholes all records referred to in Section 1.8;
- A summary of bank condition monitoring and incidences of slumping referred to in Section 2.1;
- Water quality all records referred to in Section 2.2; and
- Seasonal water assignments all records referred to in section 1.5.

3.2 Annual report

The annual report must include, but not be limited to, discussion and recommendations with regard to monitoring and assessment for the previous water year as follows.

3.2.1 Water monitoring

A summary of the implementation of the rules for releases from storages, other than for first post-winter flow and seasonal base flow management and quality of water released from storages.

A summary of the implementation of the first post-winter flow and seasonal base flow management strategies for each applicable storage, including:

- Overview of strategy implementation, including the basis of decisions; and
- An evaluation of the first post-winter flow and seasonal base flow management arrangements and outcomes.

A summary of the implementation of the quality of water released from storages rules for

each applicable storage, including:

- Overview of rule implementation;
- Basis of the decisions on the level from which to make releases; and
- Periods of release from each offtake level.

A summary of waterhole management including:

- Overview of waterhole management implementation; and
- Periods when the water level in a waterhole was more than 0.6 metres below its cease to flow level for more than 2 consecutive days and supplemented water was being taken.

A summary of announced allocation determinations, including:

- An evaluation of the announced allocation procedures and outcomes; and
- The date and value for each announced allocation.

A summary of the critical water supply water sharing rules, including:

- An evaluation of the rules and outcomes.

A summary of the transfer of water between water years including:

- An evaluation of the rules and outcomes;
- The total volume of water carried over to the water year from the previous water year;
- The total volume of water carried over from the water year to the next water year;
- The total volume of water brought forward by priority group to the water year from the next water year; and
- The total volume of water brought forward by priority group from the water year to the previous water year.

A summary of the volumes of water taken by water users, specified by zone, including:

- The total volume of supplemented water taken;
- The total volume of supplemented water entitled to be taken;
- The basis for determining the total volume of supplemented water entitled to be taken, including any adjustments for approved seasonal water assignments and transfers into or out of the water years;
- The announced allocation volume at the end of the water year; and
- The total volume of metered water taken as 'riparian entitlement water'.

A summary of seasonal water assignment arrangements, including:

- An evaluation of the seasonal water assignment rules and outcomes, including:
 - An evaluation of any circumstances of supply difficulties when the supply difficulties were linked to seasonal water assignment practices; and
 - Identification of and reporting on any trends in seasonal water assignment;
- The total number of seasonal water assignment arrangements;
- The total volume of water seasonally assigned;
- The maximum seasonal water assignment value for each zone grouping in Table 3 of Attachment 4.2F; and
- The minimum seasonal water assignment value for each zone grouping in Table 3 of Attachment 4.2F.

Details of changes to storages or their operation that may have an impact on the implementation of the ROP.

Details of new monitoring devices such as equipment to measure stream flow.

3.2.2 Impact of storage operation on aquatic ecosystems

Bank condition and fish stranding

A summary of bank condition and fish stranding monitoring including:

- Results of investigations of bank slumping or erosion identified in ponded areas and downstream of storages;
- Results of any investigations of fish stranding downstream of storages; and
- Changes to operation of storages to reduce instances of bank slumping, erosion or fish stranding.

Water quality

Discussion and assessment of the following water quality issues:

- Thermal and chemical stratification in each storage;
- Water quality in each storage;
- Contribution of the storage and its management to the quality of water released;
- Cumulative effect of successive storages on water quality; and
- Cyanobacteria population changes in response to stratification in each storage.

3.3 Operational reports

The ROL holder must notify the chief executive within 1 business day of becoming aware of the following operational incidents:

- Noncompliance by the ROL holder with the rules given in the ROP;
- A decision relating to each announced allocation; and
- Instances of fish stranding downstream of a storage.

The ROL holder must provide an operational report to the chief executive for the following operational incidents:

- Noncompliance with the rules in the ROP;
- Instances where the amount of water taken by users being supplied with supplemented water from Retreat Creek in any day exceeds the amount of supplemented water released to Retreat Creek on that day; and
- Instances of fish stranding downstream of a storage.

The report must provide details of the incident, conditions under which the incident occurred and any responses or activities carried out as a result of the incident.

The ROL holder must provide an operational report to the chief executive within 5 business days after a decision relating to each announced allocation. The report should include the parameters applied referred to in Section 1.3.

The ROL holder must provide a report to the chief executive within 5 business days after

implementation of a first post-winter flow management strategy ends. The report should include:

- Storage inflow, storage height and storage outflow records referred to in Section 1.1b.

3.4 Emergency report

An emergency for the purpose of this ROP includes an occurrence, which by the nature of its severity, extent or timing might be regarded as an emergency (for example, contamination of water supply, structural damage to infrastructure or a danger to human health).

For any emergency, the ROL holder must:

- Notify the chief executive immediately; and
- Provide a report to the chief executive on the emergency including details of the emergency, conditions under which the emergency occurred, any responses or activities carried out as a result of the emergency and any impacts on the ROP.

Attachment 4.2H

Nogoa Mackenzie Water Supply Scheme

Water allocation change rules

1 Permitted changes

The permitted changes apply only to water allocations with purpose ‘agriculture’ or ‘any’.

Application for the following changes to a water allocation will be approved. On approval, a change certificate will be issued by the chief executive, which may be lodged with the registrar of water allocations.

1.1 Location

Subject to Section 1.1.1, a change to the location of a water allocation from one of the following zones to any other of those zones:

- Mackenzie B;
- Mackenzie C;
- Mackenzie D;
- Mackenzie E;
- Mackenzie F;
- Mackenzie G;
- Mackenzie H;
- Mackenzie I;
- Mackenzie J;
- Mackenzie K;
- Mackenzie L;
- Mackenzie M; or
- Mackenzie N.

For the permitted changes to the location of a water allocation given in this section, conversion factors do not apply to the volume for the water allocation – that is, the volume for the water allocation will be the same before and after the change of location. However, this does not preclude consideration of conversion factors to enable changes under Section 3.

1.1.1 Limitations on change of location

A proposed change is not a permitted change if the proposed change would result in a distribution of medium and high priority water allocations not provided for in Tables 1, 2 and 3.

1.2 Purpose

A change to the purpose of a water allocation from ‘any’ to ‘agriculture’ or from ‘agriculture’ to ‘any’.

1.3 Amalgamation or subdivision

A change to subdivide a water allocation provided:

- The sum of the nominal volumes of the new water allocations is equal to the nominal volume of the water allocation that is being subdivided; and
- The location and priority group of the new water allocations is the same as that of the water allocation that is being subdivided.

A change to amalgamate water allocations provided:

- The nominal volume of the new water allocation is equal to the sum of the nominal volumes of the water allocations that are being amalgamated;
- The location and priority group of the water allocations that are being amalgamated are the same; and
- The location and priority group for the new water allocation is the same as that of the water allocations that are being amalgamated.

1.4 Priority

A change to the priority group of a water allocation from medium to high, provided:

- The conversion rate is 3.0 ML of medium-priority water allocation converts to 1 ML of high-priority water allocation; and
- The storage level in Fairbairn Dam is not less than EL 199.5 m AHD (702,000 ML) on the date the application for the change is received by the chief executive.

A change to the priority group of a water allocation from high to medium priority, provided:

- The conversion rate is 1 ML of high-priority water allocation converts to 3 ML of medium-priority water allocation.

1.4.1 Limitations on change of priority

A proposed change is not a permitted change if the proposed change would result in a distribution of medium- and high-priority water allocations not provided for in Tables 1, 2 and 3.

Table 1: Permitted distributions of high-priority water allocations in zones Mackenzie N, M, L, K, J, I, H, G, F, E, D, C and B

Volume of high priority water allocation (ML)	Mackenzie N, Mackenzie M, Mackenzie L, Mackenzie K & Mackenzie J	Mackenzie I & Mackenzie H	Mackenzie G, Mackenzie F & Mackenzie E	Mackenzie D, Mackenzie C & Mackenzie B
Minimum volume		12,000	10,000	
Maximum volume	56,000			700

Table 2: Permitted distributions of medium-priority water allocations in zones Mackenzie N, M, L, K, J, I, H, G, F, E, D, C and B

Volume of water allocation (ML)	Mackenzie N, Mackenzie M, Mackenzie L, Mackenzie K & Mackenzie J	Mackenzie I & Mackenzie H	Mackenzie G, Mackenzie F & Mackenzie E	Mackenzie D, Mackenzie C & Mackenzie B
Minimum volume				5,182
Maximum volume		18,000		18,182
		191,000		

Table 3: Permitted distributions of water allocations in zones Mackenzie N, M, L, K, J, I, H, G, F, E, D, C and B

Volume of water allocation (ML)	Mackenzie N, Mackenzie M, Mackenzie L, Mackenzie K & Mackenzie J	Mackenzie I & Mackenzie H	Mackenzie G, Mackenzie F & Mackenzie E	Mackenzie D, Mackenzie C & Mackenzie B
Minimum volume				
Maximum volume		46,000		

2 Prohibited changes

The following changes are prohibited changes:

2.1 Location

A change to a location that is not within the extent of the Dawson Valley, Nogoia Mackenzie, Lower Fitzroy or Fitzroy Barrage water supply schemes.

2.2 Priority group

A change to a priority group that is not medium or high.

2.3 Purpose

A change to a purpose that is not 'agriculture' or 'any'.

2.4 Volume

A change to the volume that is not a consequence of a change to another attribute of a water allocation.

2.5 Other

A change that requires an amendment to this ROP, other than an amendment provided for in Chapter 8.

3 Application for change under Section 130 of the Water Act

If a water allocation holder wishes to apply for a change to a water allocation that is not permitted under Section 1, and not prohibited under Section 2, an application may be made under Section 130 of the Water Act for the change.

The chief executive will deal with applications made under Section 130 of the Water Act, in accordance with the Water Act. That process is as follows:

- Notice of the application is published in local newspapers. The notice includes information about where the application can be inspected and invites submissions from the public on the application;
- The chief executive determines if the application should be approved having regard to the potential impact on a range of interests including other entitlement holders and aquatic ecosystems;
- If the chief executive approves the application, the chief executive will issue a change certificate that may be lodged with the registrar of water allocations; and
- If the chief executive refuses the application, the Water Act provides for an appeal process.

3.1 Purpose

Any application to change the purpose of a water allocation from 'distribution loss' to 'any' must be supported by information to substantiate to the satisfaction of the chief executive an efficiency gain within the associated channel system. An application may be made for efficiency gains made since the issue of the interim resource operations licence for the Nogo Mackenzie Water Supply Scheme in November 2000.

4 Registration of change

If an application to change a water allocation is approved, the chief executive will issue a change certificate. The water allocation holder may lodge the change certificate with the registrar of water allocations who will change the water allocation on the water allocation register.

However, the registrar will not register the change until a supply contract has been entered into between the water allocation holder and the Resource Operations Licence (ROL) holder for supply of the changed water allocation.

Attachment 4.2I

Nogoa Mackenzie Water Supply Scheme

Amending critical water supply management arrangements

1 Critical water supply management arrangements

1.2 Introduction

The Resource Operations Plan (ROP) rules for infrastructure operation and environmental management (refer Attachment 4.2E) and for water sharing (refer Attachment 4.2F) include arrangements for dealing with periods of low water availability. These arrangements are referred to as the critical water supply management arrangements.

The critical water supply management arrangements initially specified in the ROP are based on broad-scale basin-wide hydrologic modelling. These initial arrangements may need to be refined and further developed to ensure the arrangements appropriately deal with local issues and circumstances particular to the Nogoa Mackenzie Water Supply Scheme.

Over time the arrangements can also be amended to allow adaptation to changing circumstances and refinement through improved knowledge about the operation of the system at times of low water supply.

For example, the initial arrangements for sharing the available supplies may warrant ongoing development to secure supplies for essential water needs.

Variations to the rules associated with the minimum operating levels for storages and to the waterhole drawdown limits given in Attachment 4.2E may also be considered to accommodate local water user and environmental needs under particular circumstances.

1.2 Criteria for critical water supply management arrangements

Critical water supply management arrangements must have regard to the following:

- Provision of water for essential water needs must have first priority;
- The objectives of the Water Resource Plan;
- The effects on water allocation security performance;
- The effects on natural ecosystems and the physical integrity of the watercourse; and
- The public interest.

For the purpose of the critical water supply management arrangements, essential water needs must include that part of a town water supply required for essential services including drinking water and sanitation but excluding lawns and gardens. The Resource Operations Licence (ROL) holder in conjunction with water allocation holders may establish additional essential purposes.

1.3 Initial review of the critical water supply management arrangements

The ROL holder must undertake an initial review of the suitability of the critical water supply management arrangements. A report on the initial review must be provided to the chief executive within 12 months of the commencement of the ROP.

The initial review must include recommendations on whether amendments to the arrangements should be considered.

1.4 Proposals to amend the critical water supply management arrangements

The ROL holder may submit a proposal to amend the critical water supply management arrangements at any time.

The chief executive may require the ROL holder to prepare a proposal to amend the critical water supply management arrangements at any time.

If the initial review of the critical water supply management arrangements under Section 1.3 indicates changes to the arrangements should be considered, the chief executive may require the ROL holder to prepare a proposal to amend the critical water supply management arrangements within a timeframe set by the chief executive.

A proposal to amend the critical water supply management arrangements must include:

- Proposed changes to the rules for infrastructure operation and environmental management (refer Attachment 4.2E) and for water sharing (refer Attachment 4.2F);
- An assessment of the effects of the proposal on natural ecosystems and the physical integrity of the watercourse and the proposed environmental monitoring requirements;
- Details of consultation with stakeholders including water users, local communities and environmental interests; and
- Any other information that will assist the chief executive to decide the proposal.

1.5 Amending the critical water supply management arrangements

The chief executive may amend the rules for infrastructure operation and environmental management (refer Attachment 4.2E) and for water sharing (refer Attachment 4.2F) that apply during periods of low water availability. The chief executive will consider the following in deciding to amend the rules:

- Any proposal to amend the critical water supply management arrangements submitted by the ROL holder; and
- The criteria given in Section 1.2.

1.6 Evaluation of critical water supply management arrangements

The ROL holder must annually evaluate the critical water supply management arrangements in regard to their suitability for periods of low water availability.

Attachment 4.3A

Lower Fitzroy Water Supply Scheme

Details of conversions to water allocations

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
369			TC		1/2	Fitzroy A	Any	1	High	51661U
			TC		1/2					
372			TC		1/2	Fitzroy A	Any	1	High	51655U
			TC		1/2					
365			TC		1/2	Fitzroy A	Any	2	High	51656U
			TC		1/2					
373			SP		1	Fitzroy A	Any	1	High	51658U
371			TC		1/2	Fitzroy A	Any	1.5	High	51657U
			TC		1/2					
375			TC		1/2	Fitzroy A	Any	1	High	51659U
			TC		1/2					
367			TC		1/2	Fitzroy A	Any	1	High	51662U
			TC		1/2					
364			TC		1/2	Fitzroy A	Any	2	High	51665U
			TC		1/2					
370			TC		1/3	Fitzroy A	Any	1.5	High	102201
			TC		1/3					
			TC		1/3					
34	STANWELL CORPORATION LIMITED ACN 078848674		SP		1	Fitzroy A	Any	24000	High	103012
374	STANWELL CORPORATION LIMITED ACN 078848674		SP		1	Fitzroy A	Any	2	High	51660U
292	SUNWATER		SP		1	Fitzroy A	Any	223	High	103007
930	SUNWATER		SP		1	Fitzroy A	Distribution Loss	1275	High	103009

Note that Attachment 4.3A shows details of relevant authorisations supplied through the Lower Fitzroy Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
366			TC		1/2	Fitzroy A	Any	1.5	High	57562U
			TC		1/2					
368			TC		1/2	Fitzroy A	Any	1.5	High	102136
			TC		1/2					
195			TC		1/2	Fitzroy B	Agriculture	600	Medium	57407U
			TC		1/2					
192	PETER O'BRIEN PTY LTD ACN 069166874		SP		1	Fitzroy B	Agriculture	600	Medium	57406U
188	PLATANUS PTY LTD ACN 002822773		SP		1	Fitzroy B	Agriculture	1380	Medium	46391U
212			SP		1	Fitzroy C	Agriculture	480	Medium	51604U
209			TC		1/2	Fitzroy C	Any	5	Medium	46345U
			TC		1/2					
199			SP		1	Fitzroy C	Agriculture	36	Medium	51682U
290	SUNWATER		SP		1	Fitzroy C	Any	5	High	103006

SP: *Sole Proprietor*

TC: *Tenants in Common*

Note that Attachment 4.3A shows details of relevant authorisations supplied through the Lower Fitzroy Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Attachment 4.3B

Lower Fitzroy Water Supply Scheme

Rules for conversion to water allocations

1 Locations where existing authorisations are being converted to water allocations

Existing authorisations for supplemented water are being converted to water allocations on:

- The Fitzroy River from the upstream limit of Eden Bann Weir to the upstream limit of the Fitzroy Barrage; and
- Sections of tributaries of the Fitzroy River that contain water ponded from natural waterholes or infrastructure within the above section of the Fitzroy River.

2 Rules for conversion of existing authorisations to water allocations

The following rules apply for the conversion of existing authorisations to water allocations to establish the details required for the registration of supplemented water allocations.

2.1 Location

The location from which water may be supplied under a water allocation is specified as a zone according to the position of the existing authorisation. Descriptions of the zones for the Fitzroy River are given in Attachment 2.3.

2.2 Purpose

The purpose for which water may be taken under a water allocation is specified as 'agriculture', 'distribution loss' or 'any'. 'Agriculture' is the nominated purpose for those existing authorisations that are primarily used for agricultural purposes. 'Distribution loss' is the nominated purpose for water allocations for distribution losses associated with the Stanwell Pipeline. 'Any' is the nominated purpose for all other uses of water.

2.3 Volume

For an authorisation that states a volume, the nominal volume for a water allocation is the volume stated on the existing authorisation.

For an authorisation that states an area that may be irrigated, the nominal volume is calculated by multiplying the area (in hectares) stated on the existing authorisation by six (6).

2.4 Priority group

The priority group for a water allocation converted from an existing authorisation to take supplemented water is medium priority, except where a product specification or other undertaking associated with the authorisation identifies the authorisation's water supply as being high priority water allocation.

Attachment 4.3C

Lower Fitzroy Water Supply Scheme

Total volume of supplemented water allocations

Table 1: Total volume of supplemented water allocations at Resource Operations Plan approval

Zone	Medium priority water allocation (ML)	High priority water allocation (ML)
Fitzroy C	521	5
Fitzroy B	2,580	0
Fitzroy A	0	25,515
Total	3,101	25,520

Attachment 4.3D

Lower Fitzroy Water Supply Scheme Infrastructure details

Storage: Eden Bann Weir – Fitzroy River AMTD 141.2 km

Description of water infrastructure	
Main embankment	Mass concrete gravity weir
Full supply level	EL 14.5 m AHD
Fixed crest level	EL 14.5 m AHD
Saddle dam(s)	Nil
Fabridams	Nil
Gates	Nil
Storage volume and surface area	
Full supply volume	35,900 ML
Dead storage volume	9,650 ML
Surface area/storage volume/elevation relationship	Department of Primary Industries (Water Resources) Drawing No's. A3-110383 and A3-110384
Spillway arrangement	
Description of works	Two level concrete spillway
Spillway level	High level crest EL 14.8 m AHD Low level crest EL 14.5 m AHD
Spillway width	High level crest: 180 metres on right abutment Low level crest: 90 metres on left abutment
Discharge characteristics	Not available
River inlet/outlet works	
Description of works	Inlet structure through 1200 mm by 1200 mm sluice gate to 1500 mm by 1500 mm box culvert.
Multi level inlet	Works can accommodate selective withdrawal
Cease to flow level	EL 7.25 metres AHD
Discharge characteristics	Water Resources Drawing No. A3-101635
Fish transfer system	
Description of works	Fishlock located near the left bank adjacent to the outlet works

Attachment 4.3E

Lower Fitzroy Water Supply Scheme Rules for infrastructure operation and environmental management

1 Operating levels of storages and waterholes

1.1 Nominal operating level of Fitzroy Barrage

Releases must be made from Eden Bann Weir to maintain the water level in the Fitzroy Barrage at its nominal operating level, unless the water level in Eden Bann Weir is below its local supply level.

Fitzroy Barrage storage levels may vary above and below the nominal operating level due to practical limitations of estimating and making releases and for unforeseen circumstances.

The nominal operating level for the Fitzroy Barrage is EL 3.38 m AHD (75,000 ML).

1.2 Local supply level of Eden Bann Weir

The local supply level and local supply area for Eden Bann Weir are given in Table 1.

Table 1: Local supply level and local supply area for Eden Bann Weir

Storage	Local supply level	Local supply area
Eden Bann Weir	EL 9.55 m AHD (11,280 ML)	Eden Bann Weir pond and downstream, but excluding Fitzroy Barrage pond

Releases must not be made from Eden Bann Weir to the Fitzroy Barrage when the water level in Eden Bann Weir is below its local supply level, except:

- If the water level in the Fitzroy Barrage is below EL -0.5 m AHD (27,950 ML), releases should be made from Eden Bann Weir to the Fitzroy Barrage, to the extent that it is practicable; and
- To supply water allocation holders located within Eden Bann Weir's local supply area. The local supply area for Eden Bann Weir at a particular time extends to the pond of the Fitzroy Barrage at that particular time.

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1.3 Minimum operating level of Eden Bann Weir and the Fitzroy Barrage

The minimum operating levels for Eden Bann Weir and the Fitzroy Barrage are given in Table 2.

Table 2: Minimum operating level of storages

Storage	Minimum operating level
Eden Bann Weir	EL 7.25 m AHD (4,800 ML)
Fitzroy Barrage	EL -1.2 m AHD (21,900 ML)

Water must not be released or supplied from Eden Bann Weir if the water level in Eden Bann Weir is below its minimum operating level, unless otherwise authorised by the chief executive.

1.4 Minimum level in waterholes

For a waterhole within the extent of the Lower Fitzroy Water Supply Scheme:

- Supplemented water should not be taken from a waterhole that is more than 0.5 metres below its cease to flow level; and
- The chief executive may authorise supplemented water to be supplied from a waterhole when the level is more than 0.5 metres below its cease to flow level.

2 Releases of water from storages

2.1 General rules

When determining releases from Eden Bann Weir, the Resource Operations Licence (ROL) holder must have regard to the following:

- Total volume of water ordered, and its distribution;
- The likely contribution of inflows from tributaries that could assist the supply of orders;
- The likely transmission and operating losses;
- The travel time for water delivery;
- The volume of releases required to maintain the nominal operating level in the Fitzroy Barrage and to maintain levels in waterholes;
- The volume of releases required to maintain the minimum operating level in the Fitzroy Barrage;
- The local supply level of Eden Bann Weir;
- The fishway management strategy; and
- The quality of water released from Eden Bann Weir.

The ROL holder may incorporate provisions in supply contracts for circumstances when the release capacity of Eden Bann Weir is insufficient to meet downstream demand.

2.2 Release rate rules

Water may be released from Eden Bann Weir at a rate up to the maximum discharge capacity of its outlet works.

Any reduction in the rate of a release must occur incrementally, such that the risk of fish stranding and bank slumping is minimised.

3 First post-winter flow management strategy

3.1 Lower Fitzroy first post-winter flow management strategy

There is no first post-winter flow management strategy.

4 Seasonal base flow management strategy

There is no seasonal base flow management strategy.

While no specific releases are required to be made by the ROL holder for the Lower Fitzroy Water Supply Scheme for seasonal base flows, seasonal base flows will be passed through Eden Bann Weir as a consequence of:

- The seasonal base flow management rules for the Fitzroy Barrage Water Supply Scheme which require the ROL holder for that scheme to pass seasonal base flows based on inflows to Eden Bann Weir; and
- The release rules for the Lower Fitzroy Water Supply Scheme which require the ROL holder for this scheme to maintain the water level in the Fitzroy Barrage by releases from Eden Bann Weir.

5 Fishway management strategy

The ROL holder is authorised to operate the Eden Bann Weir fishlock when the level of the water in the weir is between EL 12.7 m AHD and EL 16.0 m AHD.

The ROL holder may operate the fishlock at other times provided the releases from the weir are no more than that required to:

- Supply water; and
- Maintain nominal operating levels in the Fitzroy Barrage.

6 Quality of water released from Eden Bann Weir

The ROL holder must draw water from the level that optimises the quality of the water released (for example, dissolved oxygen concentration and the temperature in the release water optimised), to minimise the impact on the downstream water quality. If this level does not provide enough capacity for the required release, other levels must be used to give the required discharge.

7 Use of watercourses for distribution of water

The ROL holder may use the following watercourses for the purposes of distribution of water:

- The Fitzroy River from the upstream limit of Eden Bann Weir to the upstream limit of the Fitzroy Barrage;
- The Fitzroy River from the upstream limit of the Fitzroy Barrage to the Fitzroy Barrage; and
- Sections of tributaries of the Fitzroy River that contain water from natural waterholes and infrastructure within the above sections of the Fitzroy River.

The ROL holder must not divert water to any watercourse other than those given above for distribution of water.

8 Riparian stock and domestic use

Under Section 20(3) of the Water Act, an owner of land adjoining a watercourse, lake or spring may take water for domestic purposes and watering stock that would be normally depastured on the land without a water entitlement. In this section this is referred to as 'riparian entitlement water'.

This means that riparian entitlement water might also be taken through the same metered water facilities as supplemented water and some users might desire appropriate allowances be made for their riparian entitlement water use. The historical arrangements for accounting for individual riparian use taken through metered facilities will not apply following commencement of the ROP.

8.1 Rules for adjusting metered use for riparian entitlement water use

This section provides arrangements to allow adjustments for riparian entitlement water metered use.

The ROL holder must enter into an arrangement with any water user who requests metered use adjustments for riparian entitlement water use taken through a metered facility. The ROL holder must supply details of the arrangements with each individual user to the chief executive within 5 business days of an agreement.

An arrangement must comply with the departmental guidelines for this purpose.

If the ROL holder and a water user are unable to reach agreement on an arrangement, the chief executive will decide the arrangement that will apply in that particular instance.

Attachment 4.3F

Lower Fitzroy Water Supply Scheme

Water sharing rules

This attachment provides water sharing rules for:

- Announced allocations;
- Critical water supply;
- Transfer of water between water years; and
- Seasonal water assignment.

1 Announced allocation

1.1 General rules

The water year for the Lower Fitzroy Water Supply Scheme is from 1 July to 30 June in the following year.

1.2 Calculation of announced allocation percentages

1.2.1 Medium priority water allocations

The announced allocation percentage for medium priority water allocations must be 100%.

1.2.2 High priority water allocations

The announced allocation percentage for high priority water allocations must be 100%.

2 Critical water supply water sharing rule

2.1 Critical water supply water sharing rules during the medium priority restriction period

For the Lower Fitzroy and the Fitzroy Barrage water supply schemes, the announced allocation must be 100% for both medium and high priority water. This means that at times the total medium priority allocation cannot be supplied without increasing the risk to high priority supply security.

This risk during critical water supply periods is addressed by preventing the supply of medium priority entitlements when the Fitzroy Barrage is below specified levels. In addition, the maximum allowable distribution of supply of high priority entitlement will be constrained during those periods when medium priority supply is restricted.

2.1.1 Medium priority restriction rule

Medium priority water allocation supply through the Lower Fitzroy Water Supply Scheme must:

- Cease when the water level in the Fitzroy Barrage falls below EL 0.75 m AHD (40,500 ML); and
- Not recommence unless the water level in the Fitzroy Barrage has risen above EL 0.85 m AHD (41,600 ML).

A period when the water level in the Fitzroy Barrage has fallen below EL 0.75 m AHD and not re-risen to above EL 0.85 m AHD is a ‘medium priority restriction period’.

2.1.2 High priority water use during the medium priority restriction period

During a medium priority restriction period referred to in Section 2.1.1, the holder of a high priority water entitlement must not be supplied more than a specified maximum volume during a specified period as defined by the high priority demand pattern assigned to the entitlement. The high priority demand pattern for water allocations is referred to in Section 2.1.3.

An entitlement may also include a seasonal water assignment of a high priority allocation referred to in Section 4.

2.1.3 High priority demand pattern

The Resource Operations Licence (ROL) holder must assign to each high priority water allocation a ‘high priority demand pattern’.

The high priority demand pattern has effect only when a medium priority restriction period is in effect.

During a medium priority restriction period, the high priority demand pattern defines the maximum amount of water that may be supplied under a high priority water allocation for specified calendar periods (for example, on a specific date, or a specific week, or a specific month). Any specified period must not be greater than 1 month.

The combined total of the high priority demand patterns for high priority water allocations supplied by the Lower Fitzroy Water Supply Scheme must not exceed the limits in Table 1.

Table 1: Maximum percentage of total high priority water allocation in Lower Fitzroy Water Supply Scheme that may be assigned to the specified period under the high priority demand pattern

Period	Percentage of total high priority allocation
July to September	31
October to December	34
January to March	34
April to June	31

2.1.4 Other restrictions

During the medium priority restriction period, the ROL holder may implement further restrictions on the supply of high priority water, decided by the ROL holder in conjunction with high priority water allocation holders for the purpose of extending the period that water supplies are available, provided the objectives of the Water Resource Plan (WRP) are not compromised.

3 Transfer of water between water years

The ROL holder may develop and apply scheme practices for forward draw of water entitlements in accordance with the principles and rules in this section.

3.1 Principles for transfer of water between water years

The ROL holder must have regard to the following principles in developing and applying scheme practices for forward draw of water entitlements.

Forward draw practices must not have an adverse impact on the objectives of the WRP.

Entitlements must not be:

- Carried over from the current water year to any future year, other than a minor carry over adjustment under Section 3.3; or
- Brought forward from a future water year to the current water year, other than from the next water year.

The volume of individual water allocation brought forward to the current water year must not exceed the announced allocation volume for the allocation at the start of the next water year.

3.2 Rules for transfer of water between water years

The following rule applies for the transfer of water between water years.

The total volume permitted to be brought forward to a water year must not exceed 2% of the total nominal volume.

3.3 End of water year minor adjustments

As an administrative arrangement to account for the timing of the end of water year metered use reading and for the operational convenience of water users, the ROL holder may, in addition to any forward draw permitted under Section 3.1 and Section 3.2, make minor carry over and forward draw adjustments to entitlements. For an individual, the adjustments must not exceed 2% of the individual entitlement at the end of the water year for which the meter reading applies, or 10 ML whichever is the lesser.

4 Seasonal water assignment rules

Under Section 146B of the Water Act, the holder of a water allocation may enter into an arrangement for a seasonal assignment in relation to the allocation. However the allocation holder may enter into the arrangement only with the consent of the ROL holder. The ROL holder may give consent only if the assignment is allowed under the seasonal water assignment rules in the Resource Operations Plan (ROP).

High priority water supply during medium priority restriction periods (Refer to Section 2) must comply with specified high priority demand patterns. A seasonal water assignment of a high priority water allocation also requires an assigned demand pattern for the purposes of Section 2.

The ROL holder is required to report (refer Section 4.1.1 Attachment 4.3G) on trends in seasonal assignment and evaluate whether seasonal assignment practices are impacting on supply for individual water users or groups of water users or impacting on the objectives of the WRP.

Chapter 8 of the ROP allows the chief executive to initiate changes to the seasonal assignment rules if considered necessary to protect the objectives of the WRP.

4.1 Principles for seasonal water assignment

The ROL holder must have regard to the following principles in developing scheme practices and for making decisions for consent of seasonal water assignment arrangements.

The effects of an individual seasonal assignment and the cumulative effects of successive or repeated seasonal assignments must not:

- Impact adversely on the WRP objectives;
- Impact adversely on the availability of water to other water users in any part of the scheme; or
- Subject waterholes to an increased potential for environmental harm.

Water with a location zone Fitzroy A must continue to be supplied in zone Fitzroy A.

Water with a location of either Fitzroy B or Fitzroy C must continue to be supplied in either zone Fitzroy B or Fitzroy C.

4.2 Rules for seasonal water assignment

The following rules apply in developing scheme practices and for making decisions for consent of seasonal water assignment arrangements.

Water supplied under a seasonal water assignment may be used for any purpose.

Seasonal assignment of a water allocation with a specified purpose of ‘distribution loss’ is not permitted.

A high priority demand pattern must be assigned to a seasonal water assignment of a high priority water allocation, the ‘original entitlement’, for the purposes of Section 2. An adjusted high priority demand pattern must be assigned for the ‘original allocation’ to account for the seasonal assignment. The combined demand patterns for the resultant entitlements must not exceed the demand pattern for the original entitlement.

Attachment 4.3G

Lower Fitzroy Water Supply Scheme Monitoring program

1 Water quantity

1.1 Height and stream flow

The Resource Operations Licence (ROL) holder must record height and flow data in accordance with Table 1.

Table 1: Locations in the Fitzroy River where height and flow data is required

Location	Height data	Flow data
Eden Bann Weir inflow		✓
Eden Bann Weir storage	✓	
Eden Bann Weir outflow		✓

It is preferred that continuous time series data be collected. However, the chief executive may approve the collection of data in a format and standard other than for continuous time series data.

The methodology for determining height and flow data, including data format and standard, must be approved by the chief executive.

1.1a Operating level of storages

The ROL holder must record under Section 1 of Attachment 4.3E:

- The daily storage height for Eden Bann Weir and the Fitzroy Barrage; and
- The daily storage outflow for Eden Bann Weir.

For the purposes of this section:

- The methodology for determining the daily storage height and daily storage outflow must be approved by the chief executive; and
- The data must be real time information upon which operational decisions were based not data that has subsequently changed for example through a verification process.

1.2 Releases from storages

The ROL holder must record details of the basis for each release decision for Eden Bann Weir under the rules for releases of water from storages given in Section 2 of Attachment 4.3E, including:

- The general rules for releases;
- The release rate rules;
- The fishway management strategy; and
- The quality of water released from Eden Bann Weir.

The ROL holder must record the time, date and release rate each time a release rate is

changed for Eden Bann Weir. In addition, the ROL holder must record the level from which the release is made and the basis of the decision for determining that level.

The ROL holder must record the daily volume released (through the outlet/s and fishway) from Eden Bann Weir.

1.3 Announced allocations

The ROL holder must record details of announced allocation determinations, referred to in Section 1 of Attachment 4.3F.

1.4 Restrictions on the taking of medium priority water during the medium priority restriction period

The ROL holder must record details of any restrictions on the taking of medium priority water referred to in Section 2.1.1 of Attachment 4.3F, including:

- The date of the restriction;
- The nature of the restriction; and
- The basis for the determination of the restriction.

1.5 Restrictions on the taking of high priority water during medium priority restriction period

The ROL holder must record details of any restrictions on the taking of high priority water referred to in Section 2.1.2 and Section 2.1.3 of Attachment 4.3F, including:

- The date of the restriction;
- The nature of the restriction; and
- The basis for the determination of the restriction.

1.6 Transfer of water between water years

The ROL holder must record details of the transfer of water between water years referred to in Section 3 of Attachment 4.3F, including:

- The basis of each decision to adjust the amount of water an individual may be supplied in a water year and the volume of the adjustment;
- The basis of each decision to approve a forward draw for each individual water user; and
- The volume of water brought forward from the next water year to a water year by priority group.

1.7 Seasonal water assignment

The ROL holder must record details of individual seasonal water assignment arrangements, including assigned high priority demand patterns.

1.8 Water taken by water users

The ROL holder must record the volume of water taken by water users as follows:

- For each individual water user specified for each zone:
 - The total volume of supplemented water taken each quarter;
 - The total volume of supplemented water entitled to be taken at any time;
 - The basis for determining the total volume of supplemented water entitled to be taken at any time, including any adjustments for approved seasonal water assignments and transfers into or out of the water years;
 - The total volume of metered water taken as ‘riparian entitlement water’; and
 - The zone.

Note: Water taken under a water allocation with purpose ‘distribution loss’ should be recorded as an individual user.

1.9 Water diversions

The ROL holder must record the daily volume of water diverted to Stanwell pipeline.

The methodology for determining the volume must be approved by the chief executive.

1.10 Waterholes

The ROL holder must:

- Establish a unique identifier for any waterhole from which supplemented water is taken that is drawn down more than 0.6 metres below cease to flow level; and
- Record the water level in the waterhole each day that supplemented water is taken from the waterhole and the water level is more than 0.6 metres below the cease to flow level.

1.11 High priority demand pattern

The ROL holder must record details of individual high priority demand patterns, referred to in Section 2.1.3 of Attachment 4.3F.

2 Impact of storage operation on aquatic ecosystems

The ROL holder must undertake the following to establish any impacts on aquatic ecosystems that are potentially related to the operation of storages.

Section 2.1 Bank condition

The ROL holder must inspect banks for evidence of collapse and/or erosion within the ponded area and downstream of Eden Bann Weir following instances of rapid water level changes or large flows through Eden Bann Weir, or other occasions when collapse and/or erosion of banks may be likely. The distance downstream is the distance of influence of storage operations.

Any instances of bank slumping or erosion observed must be investigated to determine if the instability was associated with the nature or operation of the infrastructure.

2.2 Water Quality

The ROL holder must monitor water quality in relation to relevant infrastructure in accordance with the department's Water Monitoring Data Collection Standard.

2.3 This section not required

2.4 Fish stranding

The ROL holder must investigate instances of fish stranding downstream of storages to determine if the fish stranding is associated with operation of infrastructure. The distance downstream of storages is the distance of influence of storage operations.

3 Reporting

There are four levels of reporting for ROL holders:

- Quarterly report for the previous quarter;
- Annual report for the previous water year;
- Operational reports; and
- Emergency reports.

3.1 Quarterly report

The ROL holder must transfer the following data to the chief executive:

- Water quantity all records referred to in Section 1.1a;
- Release from storages where applicable, the level from which releases were made referred to in Section 1.2;
- Waterholes all records referred to in Section 1.10;
- A summary of bank condition monitoring and incidences of slumping referred to in Section 2.1;
- Water quality all records referred to in Section 2.2; and
- Seasonal water assignments all records referred to in section 1.7.

3.2 Annual report

The annual report must include, but not be limited to, discussion and recommendations with regard to the monitoring results for the previous water year.

3.2.1 Water monitoring

A summary of the implementation of the rules for releases from storages, other than for fishway management and quality of water released from Eden Bann Weir.

A summary of the implementation of the fishway management strategy for Eden Bann Weir, including:

- Overview of strategy implementation;
- Periods of operation of the fishway; and
- Total period of operation of the fishway.

A summary of the implementation of the quality of water released from Eden Bann Weir rule, including:

- Overview of rule implementation;
- Basis of the decisions on the level from which to make releases; and
- Periods of release from each offtake level.

A summary of waterhole management including:

- Overview of waterhole management implementation; and
- Periods when the water level in a waterhole was more than 0.6 metres below its cease to flow level for more than 2 consecutive days and supplemented water was being taken.

A summary of announced allocation determinations, including:

- An evaluation of the announced allocation procedures and outcomes.

A summary of restrictions on the taking of medium priority water, including:

- An evaluation of the restriction arrangements and outcomes; and
- The date and nature of each restriction decision.

A summary of restrictions on the taking of high priority water, including:

- An evaluation of the restriction arrangements and outcomes; and
- The date and nature of each restriction decision.

A summary of the transfer of water between water years including:

- An evaluation of the rules and outcomes;
- The total volume of water brought forward by priority group to the water year from the next water year; and
- The total volume of water brought forward by priority group from the water year to the previous water year.

A summary of the volumes of water taken by water users, specified by zone, including:

- The total volume of supplemented water taken;
- The total volume of supplemented water entitled to be taken;
- The basis for determining the total volume of supplemented water entitled to be taken, including any adjustments for approved seasonal water assignments and transfers into or out of the water years;
- The announced allocation volume at the end of the water year;
- The total volume of supplemented water taken during a medium priority restriction period; and
- The total volume of metered water taken as ‘riparian entitlement water’.

A summary of seasonal water assignment arrangements, including:

- An evaluation of the seasonal water assignment rules and outcomes, including:
 - An evaluation of any circumstances of supply difficulties when the supply difficulties were linked to seasonal assignment practices; and
 - Identification of and reporting on any trends in seasonal water assignment;
- The total number of seasonal water assignment arrangements; and
- The total volume of water seasonally assigned.

Details of changes to Eden Bann Weir or its operation that may have an impact on the

implementation of the ROP.

Details of new monitoring devices such as equipment to measure stream flow.

3.2.2 Impact of storage operation on aquatic ecosystems

Bank condition and fish stranding

A summary of bank condition and fish stranding monitoring including:

- Results of investigations of bank slumping or erosion identified in the ponded area of and downstream of Eden Bann Weir;
- Results of any investigations of fish stranding downstream of Eden Bann Weir; and
- Changes to operation of storages to reduce instances of bank slumping, erosion or fish stranding.

Water quality

Discussion and assessment of the following water quality issues:

- Thermal and chemical stratification in Eden Bann Weir;
- Water quality in Eden Bann Weir;
- Contribution of the storage and its management to the quality of water released;
- Cumulative effect of successive storages on water quality; and
- Cyanobacteria population changes in response to stratification in Eden Bann Weir.

3.3 Operational reports

The ROL holder must notify the chief executive within 1 business day of becoming aware of the following operational incidents:

- Noncompliance by the ROL holder with the rules given in the ROP;
- A decision relating to any restrictions on the taking of medium priority water;
- A decision relating to any restrictions on the taking of high priority water; and
- Instances of fish stranding downstream of Eden Bann Weir.

The ROL holder must provide an operational report to the chief executive for the following operational incidents:

- Noncompliance with the rules in the ROP; and
- Instances of fish stranding downstream of Eden Bann Weir.

The report must provide details of the incident, conditions under which the incident occurred and any responses or activities carried out as a result of the incident.

The ROL holder must provide a report to the chief executive within 5 business days of the start of the water year detailing the high priority demand patterns assigned to each high priority water allocation referred to in Section 2.1.3 of Attachment 4.3F. The report should include:

- Water allocation number;
- Holder of water allocation; and
- High priority demand pattern.

The ROL holder must provide a report to the chief executive within 5 business days of a change to the high priority demand pattern associated with a high priority water allocation, or the establishment of a new high priority water allocation. The report should include:

- Water allocation number;
- Holder of water allocation; and
- High priority demand pattern.

3.4 Emergency report

An emergency for the purpose of this ROP includes an occurrence, which by the nature of its severity, extent or timing might be regarded as an emergency (for example, contamination of water supply, structural damage to infrastructure or a danger to human health).

For any emergency, the ROL holder must:

- Notify the chief executive immediately; and
- Provide a report to the chief executive on the emergency including details of the emergency, conditions under which the emergency occurred, any responses or activities carried out as a result of the emergency and any impacts on the ROP.

Attachment 4.3H

Lower Fitzroy Water Supply Scheme

Water allocation change rules

1 Permitted changes

The permitted changes apply only to water allocations with purpose ‘agriculture’ or ‘any’

Application for the following changes to a water allocation will be approved. On approval, a change certificate will be issued by the chief executive, which may be lodged with the registrar of water allocations.

1.1 Location

A change to the location of a water allocation from zone Fitzroy B to Fitzroy C, or from Fitzroy C to Fitzroy B.

For the permitted changes to the location of a water allocation given in this section, conversion factors do not apply to the volume for the water allocation – that is, the volume for the water allocation will be the same before and after the change of location. However, this does not preclude consideration of conversion factors to enable changes under Section 3.

1.2 Priority

A change to the priority of a water allocation from medium to high or from high to medium, provided:

- The conversion rate is 1.5 ML of medium priority water converts to 1 ML of high priority water allocation;
- The maximum volume of high priority water allocation supplied through the scheme is 25,800 ML; and
- The minimum volume of high priority water allocation supplied through the scheme is 25,200 ML.

1.3 Purpose

A change to the purpose of a water allocation from ‘any’ to ‘agriculture’ or from ‘agriculture’ to ‘any’.

1.4 Amalgamation or subdivision

A change to subdivide a water allocation provided:

- The sum of the nominal volumes of the new water allocations is equal to the nominal volume of the water allocation that is being subdivided; and
- The location and priority group of the new water allocations is the same as that of the water allocation that is being subdivided.

A change to amalgamate water allocations provided:

- The nominal volume of the new water allocation is equal to the sum of the nominal volumes of the water allocations that are being amalgamated;
- The location and priority group of the water allocations that are being amalgamated are the same; and
- The location and priority group for the new water allocation is the same as that of the water allocations that are being amalgamated.

2 Prohibited changes

The following changes are prohibited changes:

2.1 Location

A change to a location that is not within the extent of the Dawson Valley, Nogoia Mackenzie, Lower Fitzroy or Fitzroy Barrage water supply schemes.

2.2 Priority group

A change to a priority group that is not medium or high.

2.3 Purpose

A change to a purpose that is not 'agriculture' or 'any'.

2.4 Volume

A change to the volume that is not a consequence of a change to another attribute of a water allocation.

2.5 Other

A change that requires an amendment to this ROP.

3 Application for change under Section 130 of the Water Act

If a water allocation holder wishes to apply for a change to a water allocation that is not permitted under Section 1, and not prohibited under Section 2, an application may be made under Section 130 of the Water Act for the change.

The chief executive will deal with applications made under Section 130 of the Water Act, in accordance with the Water Act. That process is as follows:

- Notice of the application is published in local newspapers. The notice includes information about where the application can be inspected and invites submissions from the public on the application;
- The chief executive determines if the application should be approved having regard to the potential impact on a range of interests including other entitlement holders and aquatic ecosystems;
- If the chief executive approves the application, the chief executive will issue a change certificate that may be lodged with the registrar of water allocations; and
- If the chief executive refuses the application, the Water Act provides for an appeal process.

3.1 Purpose

Any application to change the purpose of a water allocation from 'distribution loss' to 'any' must be supported by information to substantiate to the satisfaction of the chief executive an efficiency gain within the channel system. An application may be made for efficiency gains made since the issue of the interim resource operations licence for the Lower Fitzroy Water Supply Scheme in November 2000.

4 Registration of change

If an application to change a water allocation is approved, the chief executive will issue a change certificate. The water allocation holder may lodge the change certificate with the registrar of water allocations who will change the water allocation on the water allocation register.

However, the registrar will not register the change until a supply contract has been entered into between the water allocation holder and the Resource Operations Licence holder for supply of the changed water allocation.

Attachment 4.3I

Lower Fitzroy Water Supply Scheme

Amending critical water supply management arrangements

1 Critical water supply management arrangements

1.3 Introduction

The Resource Operations Plan (ROP) rules for infrastructure operation and environmental management (refer Attachment 4.3E) and for water sharing (refer Attachment 4.3F) include arrangements for dealing with periods of low water availability. These arrangements are referred to as the critical water supply management arrangements.

The critical water supply management arrangements initially specified in the ROP are based on broad-scale basin-wide hydrologic modelling. These initial arrangements may need to be refined and further developed to ensure the arrangements appropriately deal with local issues and circumstances particular to the Lower Fitzroy Water Supply Scheme.

Over time the arrangements can also be amended to allow adaptation to changing circumstances and refinement through improved knowledge about the operation of the system at times of low water supply.

For example, the critical water supply water sharing rules given in Attachment 4.3F deal with situations when supply to medium priority water allocations must cease to secure high priority water allocations. The initial arrangements for sharing the available supplies may warrant ongoing development to secure supplies for essential water needs.

Variations to the rules associated with the minimum operating levels for storages and to the waterhole drawdown limits given in Attachment 4.3E may also be considered to accommodate local water user and environmental needs under particular circumstances.

1.2 Criteria for critical water supply management arrangements

Critical water supply management arrangements must have regard to the following:

- Provision of water for essential water needs must have first priority;
- The objectives of the Water Resource Plan;
- The effects on water operation security performance;
- The effects on natural ecosystems and the physical integrity of the watercourse; and
- The public interest.

For the purpose of the critical water supply management arrangements, essential water needs must include that part of a town water supply required for essential services including drinking water and sanitation but excluding lawns and gardens. The Resource Operations Licence (ROL) holder in conjunction with water allocation holders may establish additional essential purposes.

1.3 Initial review of the critical water supply management arrangements

The ROL holder must undertake an initial review of the suitability of the critical water supply management arrangements. A report on the initial review must be provided to the chief executive within 12 months of the commencement of the ROP.

The initial review must include recommendations on whether amendments to the arrangements should be considered.

1.4 Proposals to amend the critical water supply management arrangements

The ROL holder may submit a proposal to amend the critical water supply management arrangements at any time.

The chief executive may require the ROL holder to prepare a proposal to amend the critical water supply management arrangements at any time.

If the initial review of the critical water supply management arrangements under Section 1.3 indicates changes to the arrangements should be considered, the chief executive may require the ROL holder to prepare a proposal to amend the critical water supply management arrangements within a timeframe set by the chief executive.

A proposal to amend the critical water supply management arrangements must include:

- Proposed changes to the rules for infrastructure operation and environmental management (refer Attachment 4.3E) and for water sharing (refer Attachment 4.3F);
- An assessment of the effects of the proposal on natural ecosystems and the physical integrity of the watercourse and the proposed environmental monitoring requirements;
- Details of consultation with stakeholders including water users, local communities and environmental interests; and
- Any other information that will assist the chief executive to decide the proposal.

1.5 Amending the critical water supply management arrangements

The chief executive may amend the rules for infrastructure operation and environmental management (refer Attachment 4.3E) and for water sharing (refer Attachment 4.3F) that apply during periods of low water availability. The chief executive will consider the following in deciding to amend the rules:

- Any proposal to amend the critical water supply management arrangements submitted by the ROL holder; and
- The criteria given in Section 1.2.

1.6 Evaluation of critical water supply management arrangements

The ROL holder must annually evaluate the critical water supply management arrangements in regard to their suitability for periods of low water availability.

Attachment 4.4A

Fitzroy Barrage Water Supply Scheme

Details of conversions to water allocations

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
129	AGFORCE QUEENSLAND INDUSTRIAL UNION OF EMPLOYERS		SP		1	Fitzroy A	Agriculture	550	Medium	173002
72	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	60	Medium	41383U
			TC		1/2	Fitzroy A	Agriculture	60	Medium	41383U
175			SP		1	Fitzroy A	Agriculture	24	Medium	46158U
114			TC		1/2	Fitzroy A	Agriculture	500	Medium	38878WU
			TC		1/2	Fitzroy A	Agriculture	500	Medium	38878WU
126			TC		1/2	Fitzroy A	Any	2	Medium	57487U
			TC		1/2	Fitzroy A	Any	2	Medium	57487U
8			TC		1/2	Fitzroy A	Any	5	Medium	41103U
			TC		1/2	Fitzroy A	Any	5	Medium	41103U
196			SP		1	Fitzroy A	Agriculture	38	Medium	26044U
180			TC		1/2	Fitzroy A	Agriculture	800	Medium	48414U, 48415U
			TC		1/2	Fitzroy A	Agriculture	800	Medium	48414U, 48415U
160			TC		1/3	Fitzroy A	Agriculture	25	Medium	27978U
			TC		1/3	Fitzroy A	Agriculture	25	Medium	27978U
			TC		1/3	Fitzroy A	Agriculture	25	Medium	27978U
198			TC		1/2	Fitzroy A	Agriculture	10	Medium	26166U
	TC		1/2	Fitzroy A	Agriculture	10	Medium	26166U		
3	TC		1/2	Fitzroy A	Any	5	Medium	40171U		
	TC		1/2	Fitzroy A	Any	5	Medium	40171U		

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
152	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	24	Medium	46330U
			TC		1/2					
78			TC		1/2	Fitzroy A	Agriculture	20	Medium	102080
			TC		1/2					
769			TC		1/6	Fitzroy A	Agriculture	10	Medium	51426U
			TC		1/6					
			TC		1/6					
			TC		1/6					
			TC		1/6					
			TC		1/6					
887			TC		1/2	Fitzroy A	Agriculture	50	Medium	173000
			TC		1/2					
22			SP		1	Fitzroy A	Agriculture	24	Medium	41355U
23			SP		1	Fitzroy A	Agriculture	25	Medium	26359U
89	TC		1/2	Fitzroy A	Any	2	Medium	51694U		
	TC		1/2							
5	SP		1	Fitzroy A	Agriculture	10	Medium	27268U		
149	TC		1/2	Fitzroy A	Agriculture	70	Medium	35633U		
	TC		1/2							
11	[REDACTED]	[REDACTED]	Personal Representative	UNDE	1	Fitzroy A	Agriculture	10	Medium	25887U
			Personal Representative	OF						
715	[REDACTED]	[REDACTED]	TC		1/4	Fitzroy A	Any	2	Medium	57496U
			TC		1/4					
			TC		1/4					
			TC		1/4					

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
120			TC		1/2	Fitzroy A	Agriculture	5	Medium	57480U
			TC		1/2					
185	BURNETT ASPHALTS PTY LTD ACN 010130177		SP		1	Fitzroy A	Agriculture	160	Medium	48572U
68			SP		1	Fitzroy A	Agriculture	75	Medium	41214U
137	CAPRICORN COUNTRY CLUB INC		SP		1	Fitzroy A	Agriculture	208	Medium	45314U
29			TC		1/2					
			TC		1/4	Fitzroy A	Any	2	Medium	57472U
			TC		1/4					
208			SP		1	Fitzroy A	Agriculture	40	Medium	28644U
			TC		1/4					
151			TC		1/4	Fitzroy A	Agriculture	451	Medium	48496U, 48497U, 48498U
			TC		1/4					
			TC		1/4					
202			TC		1/2	Fitzroy A	Agriculture	40	Medium	48517U
			TC		1/2					
283	COUNCIL OF THE CITY OF ROCKHAMPTON		SP		1	Fitzroy A	Any	50000	High	57574U
104			SP		1	Fitzroy A	Agriculture	75	Medium	26060U
110			SP		1	Fitzroy A	Agriculture	75	Medium	101364
			TC		1/3					
26			TC		1/3	Fitzroy A	Any	3	Medium	175206
			TC		1/3					
			TC		1/2					
18			TC		1/2	Fitzroy A	Agriculture	24	Medium	41323U
			TC		1/2					
9			SP		1	Fitzroy A	Agriculture	24	Medium	41216U
13			SP		1	Fitzroy A	Agriculture	24	Medium	48333U, 51579U

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
17	[REDACTED]	[REDACTED]	TC		1/5	Fitzroy A	Agriculture	24	Medium	51525U
			TC		1/5					
			TC		1/5					
			TC		1/5					
			TC		1/5					
19	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	200	Medium	48598U, 48599U, 48600U, 51401U
			TC		1/3					
			TC		1/3					
141	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	30	Medium	51513U
			TC		1/2					
138	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	12	Medium	25846U
48	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	75	Medium	45399U
			TC		1/2					
50	[REDACTED]	[REDACTED]	TC		1/5	Fitzroy A	Agriculture	50	Medium	103584
			TC		1/5					
			TC		1/5					
			TC		1/5					
			TC		1/5					
190	[REDACTED]	[REDACTED]	TC		1/4	Fitzroy A	Any	2	Medium	57571U
			TC		1/4					
			TC		1/4					
			TC		1/4					
145	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	31	Medium	26403U
			TC		1/2					
41	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	24	Medium	41388U
			TC		1/2					

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
118			TC		1/2	Fitzroy A	Agriculture	21	Medium	57479U
			TC		1/2					
501	FITZROY RIVER HEIGHTS WATER SUPPLY PTY LIMITED		SP		1	Fitzroy A	Any	24	Medium	46346U
66			SP		1	Fitzroy A	Agriculture	135	Medium	171209
12			TC		1/2	Fitzroy A	Agriculture	12	Medium	25996U
			TC		1/2					
194			TC		1/2	Fitzroy A	Agriculture	17	Medium	51671U
			TC		1/2					
122	GEMKID PTY LTD ACN 098925127		TTE	TRUSTEE UNDER INSTRUMENT 705338813	1	Fitzroy A	Agriculture	100	Medium	41356U
132			TC		1/2	Fitzroy A	Agriculture	24	Medium	41327U
			TC		1/2					
142			SP		1	Fitzroy A	Agriculture	432	Medium	48495U
4			TC		1/2	Fitzroy A	Any	1	Medium	51628U
			TC		1/2					
900			SP		1	Fitzroy A	Agriculture	20	Medium	174609
901			SP		1	Fitzroy A	Agriculture	20	Medium	174611
902			SP		1	Fitzroy A	Agriculture	10	Medium	174614
162			TC		1/3	Fitzroy A	Agriculture	330	Medium	48505U
			TC		1/3					
			TC		1/3					
173			TC		1/2	Fitzroy A	Agriculture	24	Medium	45341U
			TC		1/2					
97			TC		1/2	Fitzroy A	Agriculture	25	Medium	27385U
			TC		1/2					

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
24			TC		1/2	Fitzroy A	Agriculture	150	Medium	46394U
			TC		1/2					
168			TC		1/2	Fitzroy A	Agriculture	10	Medium	51406U
			TC		1/2					
737			TC		1/2	Fitzroy A	Agriculture	5	Medium	171207
			TC		1/2					
30			TC		1/2	Fitzroy A	Any	1	Medium	101331
			TC		1/2					
25			TC		1/2	Fitzroy A	Any	2	Medium	51492U
			TC		1/2					
111			TC		1/3					
			TC		1/3	Fitzroy A	Agriculture	100	Medium	41199U
			TC		1/3					
161			TC		1/3					
			TC		1/3	Fitzroy A	Agriculture	150	Medium	38838U, 38839U
			TC		1/3					
113			TC		1/2	Fitzroy A	Agriculture	20	Medium	48381U
			TC		1/2					
183			TC		1/2	Fitzroy A	Agriculture	400	Medium	41272U, 46154U
			TC		1/2					
56			TC		1/2	Fitzroy A	Any	1	Medium	57475U
			TC		1/2					
174			TC		1/2	Fitzroy A	Agriculture	25	Medium	26288U
			TC		1/2					
47	KARICROFT PTY LTD ACN 069332369		SP		1	Fitzroy A	Agriculture	150	Medium	45350U
214			SP		1	Fitzroy A	Agriculture	350	Medium	41344U, 48551U

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
131	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	24	Medium	41197U
			TC		1/2					
116	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	158	Medium	48471U, 51538U
			TC		1/2					
221	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	45	Medium	45304U
			TC		1/2					
93	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	24	Medium	38429U
			TC		1/3					
			TC		1/3					
32	[REDACTED]	[REDACTED]	TC		1/11	Fitzroy A	Any	25	Medium	41196U
			TC		1/11					
			TC		1/11					
			TC		1/11					
			TC		1/11					
			TC		1/11					
			TC		1/11					
			TC		1/11					
			TC		1/11					
			TC		1/11					
87	[REDACTED]	[REDACTED]	TC		1/4	Fitzroy A	Any	2	Medium	57463U
			TC		1/4					
			TC		1/4					
			TC		1/4					
94	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	6	Medium	48331U
	[REDACTED]	[REDACTED]	TC		1/2					

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
165			SP		1	Fitzroy A	Agriculture	75	Medium	19740U
191			SP		1	Fitzroy A	Any	5	Medium	19739U
140			TC		1/2	Fitzroy A	Agriculture	25	Medium	38879U
			TC		1/2					
40			TC		1/2	Fitzroy A	Agriculture	20	Medium	38996U
			TC		1/2					
201			TC		1/2	Fitzroy A	Any	2	Medium	48394U
			TC		1/2					
127	M J PURNELL PTY LTD		TC		1/5	Fitzroy A	Agriculture	100	Medium	41270U
	BOWEN PTY LTD		TC		1/5					
	MERTHYR INVESTMENTS PTY LTD		TC		1/5					
	MARIA DONATIU NO 2 PTY LTD		TC		1/5					
	RD DONATIU PTY LTD		TC		1/5					
135			TC		1/2	Fitzroy A	Agriculture	16	Medium	48592U
			TC		1/2					
74			TC		1/2	Fitzroy A	Agriculture	5	Medium	102079
			TC		1/2					
44			TC		1/2	Fitzroy A	Agriculture	200	Medium	41159U
			TC		1/2					
38			TC		1/2	Fitzroy A	Agriculture	30	Medium	51667U
			TC		1/2					
92			TC		1/2	Fitzroy A	Agriculture	24	Medium	45326U
			TC		1/2					
99			TC		1/2	Fitzroy A	Any	1	Medium	51693U
			TC		1/2					

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
28			SP		1	Fitzroy A	Any	1	Medium	51670U
79			SP		1	Fitzroy A	Agriculture	124	Medium	26327U
136	MILBI INCORPORATED		SP		1	Fitzroy A	Agriculture	24	Medium	48449U
904			TC		1/2	Fitzroy A	Any	1	Medium	175241
			TC		1/2					
101			TC		1/2	Fitzroy A	Any	1	Medium	101383
			TC		1/2					
98			TC		1/4	Fitzroy A	Any	2	Medium	51651U
			TC		1/4					
			TC		1/4					
			TC		1/4					
81			TC		1/2	Fitzroy A	Agriculture	30	Medium	46288U
			TC		1/2					
15			SP		1	Fitzroy A	Agriculture	24	Medium	48338U
88			SP		1	Fitzroy A	Agriculture	50	Medium	26371U
83			TC		1/2	Fitzroy A	Agriculture	10	Medium	57441U
			TC		1/2					
106	PEARLBUTTON PTY LTD ACN 081690146		SP		1	Fitzroy A	Agriculture	350	Medium	41223U
37			TC		1/2	Fitzroy A	Any	2	Medium	41386U
			TC		1/2					
95			SP		1	Fitzroy A	Agriculture	10	Medium	51545U
103			TC		1/2	Fitzroy A	Agriculture	24	Medium	48337U
			TC		1/2					
124			SP		1	Fitzroy A	Agriculture	50	Medium	41379U
133	QUEENSLAND CORRECTIVE SERVICES COMMISSION		SP		1	Fitzroy A	Agriculture	600	Medium	45344U

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation		
189	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	24	Medium	51531U		
			TC		1/2							
154			TC		1/2	Fitzroy A	Agriculture	5	Medium	51594U		
			TC		1/2							
903			SP		1	Fitzroy A	Any	1	Medium	175233		
96			TC		1/2	Fitzroy A	Any	2	Medium	51652U		
	TC		1/2									
70	R-KEL PTY LTD		TTE	TRUSTEE UNDER INSTRUMENT 706646594	1	Fitzroy A	Agriculture	18	Medium	41372U		
21	ROCHE PRODUCTS PTY LIMITED		SP		1	Fitzroy A	Agriculture	23	Medium	41329U		
102	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	24	Medium	34180U		
			TC		1/2							
157	S W KELE & CO PTY LTD		SP		1	Fitzroy A	Any	2	Medium	27296U		
171	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	74	Medium	19738U		
			TC		1/2							
176			SP		1	Fitzroy A	Agriculture	54	Medium	48512U		
42			TC		1/2	Fitzroy A	Agriculture	200	Medium	27421U		
			TC		1/2							
36			TC		1/2	Fitzroy A	Agriculture	90	Medium	40197U		
			TC		1/2							
39			TC		1/2	Fitzroy A	Agriculture	50	Medium	57430U		
			TC		1/2							
27			SP		1	Fitzroy A	Agriculture	54	Medium	26062U		
480			SP		1	Fitzroy A	Agriculture	6	Medium	105257		
43			SUPERCOMP NO 36 PTY LTD ACN 068900185		SP		1	Fitzroy A	Agriculture	50	Medium	57429U

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
424	██████████ ██████████	██████████ ██████████	TC		1/2	Fitzroy A	Any	2	Medium	174061
			TC		1/2					
20	██████████ ██████████	██████████ ██████████	TC		1/2	Fitzroy A	Agriculture	36	Medium	51582U
			TC		1/2					
871	██████████ ██████████	██████████ ██████████	TC		1/2	Fitzroy A	Agriculture	75	Medium	104171
			TC		1/2					
2	██████████ ██████████	██████████ ██████████	TC		1/2	Fitzroy A	Any	5	Medium	40157U
			TC		1/2					
31	THE ROCKHAMPTON WATER SKI AND POWER BOAT CLUB INC		SP		1	Fitzroy A	Any	3	Medium	51621U
77	██████████ ██████████ ██████████ ██████████ ██████████ ██████████ ██████████ ██████████ ██████████ ██████████		SP		1	Fitzroy A	Agriculture	20	Medium	48396U
206			TC		1/3	Fitzroy A	Agriculture	32	Medium	33903U
			TC		1/3					
			TC		1/3					
170			TC		1/2	Fitzroy A	Agriculture	24	Medium	45285U
			TC		1/2					
90			TC		1/2	Fitzroy A	Any	1	Medium	101454
			TC		1/2					
227			TC		1/5	Fitzroy A	Agriculture	200	Medium	51533U
			TC		1/5					
	TC		1/5							
	TC		1/5							
	TC		1/5							
167	UNI-FACT PTY LTD ACN 001082891		SP		1	Fitzroy A	Agriculture	1250	Medium	48563U, 48564U
85	██████████ ██████████	██████████ ██████████	TC		1/2	Fitzroy A	Agriculture	40	Medium	57442U
			TC		1/2					

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation	
159	[REDACTED]	[REDACTED]	TC		1/3						
			TC		1/3	Fitzroy A	Any	5	Medium	51623U	
			TC		1/3						
46	VANBROGUE PTY LTD ACN 010881704		SP		1	Fitzroy A	Agriculture	60	Medium	41304U	
75	VANBROGUE PTY LTD ACN 010881704		SP		1	Fitzroy A	Agriculture	60	Medium	41182U	
14	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	40	Medium	48335U	
146			SP		1	Fitzroy A	Agriculture	50	Medium	25847U	
16			SP		1	Fitzroy A	Agriculture	24	Medium	41217U	
153			TC		1/2						
			TC		1/2	Fitzroy A	Any	1	Medium	51620U	
200			TC		1/2						
			TC		1/2	Fitzroy A	Agriculture	24	Medium	48380U	
35			SP		1	Fitzroy A	Agriculture	24	Medium	38900U	
45			TC		1/2						
			TC		1/2	Fitzroy A	Agriculture	85	Medium	101617	
10			TC		1/2						
			TC		1/2	Fitzroy A	Agriculture	13	Medium	26023U	
1			SP		1	Fitzroy A	Agriculture	8	Medium	26063U	
108			SP		1	Fitzroy A	Agriculture	200	Medium	48426U	
33			TC		1/4						
	TC		1/4								
	TC		1/4	Fitzroy A	Any	10	Medium	51550U			
	TC		1/4								
7	TC		1/2								
	TC		1/2	Fitzroy A	Agriculture	12	Medium	29835U			

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location	Purpose	Nominal volume (ML/water year)	Priority	Converting authorisation
179			TC		1/2	Fitzroy A	Agriculture	150	Medium	41237U
			TC		1/2					
186			TC		1/2	Fitzroy A	Agriculture	50	Medium	174527
			TC		1/2					
143			SP		1	Fitzroy A	Agriculture	7	Medium	38481U
100			SP		1	Fitzroy A	Any	1	Medium	57572U
155			TC		1/2					
			TC		1/2	Fitzroy A	Agriculture	2	Medium	51627U

JTI: Joint Tenants Inter se
SP: Sole Proprietor
TC: Tenants in Common

Note that Attachment 4.4A shows details of relevant authorisations supplied through the Fitzroy Barrage Water Supply Scheme as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register.

Attachment 4.4B

Fitzroy Barrage Water Supply Scheme

Rules for conversion to water allocations

1 Locations where existing authorisations are being converted to water allocations

Existing authorisations for supplemented water are being converted to water allocations on:

- The Fitzroy River from the upstream limit of the Fitzroy Barrage to the Fitzroy Barrage; and
- Sections of tributaries of the Fitzroy River that contain water ponded by the Fitzroy Barrage.

2 Rules for conversion of existing authorisations to water allocations

The following rules apply for the conversion of existing authorisations to water allocations to establish the details required for the registration of supplemented water allocations.

2.1 Location

The location from which water may be supplied under a water allocation is specified as a zone according to the position of the existing authorisation. Descriptions of the zones for the Fitzroy River are given in Attachment 2.3.

2.2 Purpose

The purpose for which water may be taken under a water allocation is specified as either 'agriculture' or 'any'. 'Agriculture' is the nominated purpose for those existing authorisations that are primarily used for agricultural purposes. 'Any' is the nominated purpose for all other uses of water.

2.3 Volume

The nominal volume for a water allocation will be the volume stated on existing authorisations subject to the following arrangements for entitlements associated with watering stock normally depastured on the land and domestic purposes.

Under the Water Act, an owner of land adjoining a watercourse, lake or spring may take water for domestic purposes and watering stock that would be normally depastured on the land without a water entitlement. Therefore any existing authorisation that provides for the taking of water for stock and domestic purposes on land adjoining a watercourse will not be converted to a water allocation.

2.3.1 Arrangements for authorisations for irrigation and stock and domestic purposes

- a) For an authorisation for irrigation, stock and domestic purposes, where all the land supplied adjoins a watercourse:
 - If the authorisation states an irrigation volume and a stock and domestic volume, the irrigation volume is the volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- b) For an authorisation for irrigation, stock and domestic purposes, where all the land supplied does not adjoin a watercourse:
 - If the authorisation states an irrigation volume and a stock and domestic volume, the combined irrigation volume and stock and domestic volume is the total volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- c) For an authorisation for irrigation, stock and domestic purposes, where part of the land supplied is not contiguous with the land that adjoins a watercourse:
 - If the authorisation states an irrigation volume and a stock and domestic volume, the combined irrigation volume and the calculated volume for stock and domestic purposes on the non-adjoining land is the volume for the water allocation; or
 - If the authorisation states an irrigation volume but not a stock and domestic volume, the irrigation volume is the volume for the water allocation.
- d) For an authorisation for stock and domestic purposes only, where all the land supplied does not adjoin a watercourse:
 - If the authorisation states a stock and domestic volume, the stock and domestic volume is the volume for the water allocation; or
 - If the authorisation does not state a stock and domestic volume, the annual volume calculated for stock and domestic purposes is the volume for the water allocation.
- e) For Section 2.3.1c) and Section 2.3.1d), the annual volume calculated for domestic purposes is:
 - i) 1 ML; or
 - ii) An alternative volume determined by the chief executive based on consideration of a submission received on this matter on the draft Resource Operations Plan (ROP).
- f) For Section 2.3.1c) and Section 2.3.1d) the annual volume calculated for stock watering is:
 - i) A volume equivalent to 1 ML per 250 ha of land; or
 - ii) An alternative volume determined by the chief executive based on consideration of a submission received on this matter on the draft ROP.

Where an existing authorisation does not state a stock and domestic volume, the annual volume specified for the water allocation is the combined volume calculated using Section 2.3.1e)i) and Section 2.3.1f)i).

2.4 Priority group

The priority group for a water allocation converted from an existing authorisation to take supplemented water is medium priority, except where a product specification or other undertaking associated with the authorisation identifies the authorisation's water supply as being high priority water allocation.

Attachment 4.4C

Fitzroy Barrage Water Supply Scheme

Total volume of supplemented water allocations

Table 1: Total volume of supplemented water allocations at Resource Operations Plan approval

Zone	Medium priority water allocation (ML)	High priority water allocation (ML)
Fitzroy A	12,335 (note 1)	50,000

Note 1: Includes 575 ML granted to Rockhampton City Council under Section 6.2.6 of Chapter 6.

Attachment 4.4D

Fitzroy Barrage Water Supply Scheme Infrastructure details

Storage: Fitzroy Barrage – Fitzroy River AMTD 59.6 km

Description of water infrastructure	
Main embankment	Concrete embankment with vertical lift gates
Full supply level	EL 3.78 m AHD (plus or minus 0.05 metres)
Fixed crest level	EL 0.61 m AHD
Saddle dam(s)	Nil
Fabridams	Nil
Gates	Eighteen vertical lift gates, each 12.2 metres wide and 3.3 metres high
Storage volume and surface area	
Full supply volume	81,300 ML (at EL 3.78 m AHD)
Dead storage volume	21,900 ML (at EL -1.2 m AHD)
Storage volume/surface area/elevation relationship	Natural Resources Drawing No. A3-209321 (March 1998)
Spillway arrangement	
Description of works	<ul style="list-style-type: none"> • 18 gated weir monoliths, 14 metres in length with 12.2 metre wide bays for vertical lift gates, with a concrete crest at EL 0.61 m AHD • Four 12.2 metre wide bays with a concrete crest at EL 3.91 m AHD
Spillway level	EL 0.61 m AHD
Spillway width	As described above
Discharge characteristics	Not available
River inlet/outlet works	
Description of works	18 gated weir monoliths, 14 metres in length with 12.2 metre wide bays for vertical lift gates, with a concrete crest at EL 0.61 m AHD
Multi-level inlet	Works do not accommodate selective withdrawal
Cease to flow level	EL 0.61 m AHD
Discharge characteristics	Not available
Fish transfer system	
Description of works	Vertical slot fish ladder, located on the right bank. Discharge capacity is approximately 18 ML/day at full supply level. Fish ladder operates above EL 3.2 m AHD and is permanently open.

Attachment 4.4E

Fitzroy Barrage Water Supply Scheme

Rules for infrastructure operation and environmental management

1 Operating level of storages and waterholes

1.1 Nominal operating levels of Fitzroy Barrage

The nominal operating level for the Fitzroy Barrage is EL 3.38 m AHD (75,000 ML).

1.2 Minimum operating level of Fitzroy Barrage

The minimum operating level for the Fitzroy Barrage is EL 1.2 m AHD (21,900 ML).

Water must not be supplied from the Fitzroy Barrage if the water level in the Barrage is below its minimum operating level, unless otherwise authorised by the chief executive.

2 Releases of water from storages

2.1 General rules

When determining releases to make from the Fitzroy Barrage, the Resource Operations Licence (ROL) holder must have regard to the following:

- When the Barrage is above its full supply level, releases from the Barrage should mimic, to the maximum extent possible, any inflows;
- The seasonal base flow management strategy; and
- The fishway management strategy.

2.2 Release rate rules

No limits are specified for release rates.

3 First post-winter flow management rules

3.1 Fitzroy Barrage first post-winter flow management strategy

There is no first post-winter flow management strategy.

4 Seasonal base flow management rules

A seasonal base flow equal to the inflow to Eden Bann Weir must pass Fitzroy Barrage if:

- Inflows to Eden Bann Weir are between 220 ML/day and 350 ML/day; and
- The water level in the Barrage is above EL 2.3 m AHD (59,400 ML).

A seasonal base flow of 350 ML/day must pass the Fitzroy Barrage if:

- Inflows to Eden Bann Weir are greater than 350 ML/day; and
- The water level in the Barrage is above EL 2.3 m AHD (59,400 ML).

For the purpose of implementing this strategy:

- The volume passed over a 48-hour period must be within plus 20% and minus 20% of the volume required to be passed under the strategy; and
- The commencement and cessation of any release required under this strategy may be delayed by up to 48 hours.

5 Fishway management strategy

The ROL holder is authorised to operate the Fitzroy Barrage fishway when the level of the water stored in the Barrage is above EL 3.2 m AHD.

6 Quality of water released from the Fitzroy Barrage

There are no specific rules specified by this ROP.

7 Use of watercourses for distribution of water

The ROL holder may use the following watercourses for the purposes of distribution of water:

- The Fitzroy River from the upstream limit of the Fitzroy Barrage to the Fitzroy Barrage; and
- Sections of tributaries of the Fitzroy River that contain water from natural waterholes and infrastructure within the above section of the Fitzroy River.

The ROL holder must not divert water to any watercourse other than those given above for distribution of water.

8 Riparian stock and domestic use

Under Section 20(3) of the Water Act, an owner of land adjoining a watercourse, lake or spring may take water for domestic purposes and watering stock that would be normally depastured on the land without a water entitlement. In this section this is referred to as 'riparian entitlement water'.

This means that riparian entitlement water might also be taken through the same metered water facilities as supplemented water and some users might desire appropriate allowances be made for their riparian entitlement water use. The historical arrangements for accounting for individual riparian use taken through metered facilities will not apply following commencement of the ROP.

8.1 Rules for adjusting metered use for riparian entitlement water use

This section provides arrangements to allow adjustments for riparian entitlement water metered use.

The ROL holder must enter into an arrangement with any water user who requests metered use adjustments for riparian entitlement water use taken through a metered facility. The ROL holder must supply details of the arrangement with each individual user to the chief executive within 5 business days of an agreement.

An arrangement must comply with departmental guidelines for this purpose.

If the ROL holder and a water user are unable to reach agreement on an arrangement, the chief executive will decide the arrangement that will apply in that particular instance.

Attachment 4.4F

Fitzroy Barrage Water Supply Scheme

Water sharing rules

This attachment provides water sharing rules for:

- Announced allocations;
- Critical water supply;
- Transfer of water between water years; and
- Seasonal water assignments.

1 Announced allocation

1.1 General rules

The water year for the Fitzroy Barrage Water Supply Scheme is from 1 July to 30 June in the following year.

1.2 Calculation of announced allocation percentages

1.2.1 Medium priority water allocations

The announced allocation percentage for medium priority water allocations must be 100%.

1.2.2 High priority water allocations

The announced allocation percentage for high priority water allocations must be 100%.

2 Critical water supply water sharing rules

2.1 Critical water supply water sharing rules during the medium priority restriction period

For the Lower Fitzroy and the Fitzroy Barrage water supply schemes, the announced allocation must be 100% for both medium and high priority water. This means that at times the total medium priority allocation cannot be supplied without increasing the risk to high priority supply security.

This risk during critical water supply periods is addressed by preventing the supply of medium priority entitlements when the Fitzroy Barrage is below specified levels. In addition, the maximum allowable distribution of supply of high priority entitlement will be constrained during those periods when medium priority supply is restricted.

2.1.1 Medium priority restriction rule

Medium priority water allocation supply through the Fitzroy Barrage Water Supply Scheme must:

- Cease when the water level in the Fitzroy Barrage falls below EL 0.75 m AHD (40,500 ML); and
- Not recommence unless the water level in the Fitzroy Barrage has risen above EL 0.85 m AHD (41,600 ML).

A period when the water level in the Fitzroy Barrage has fallen below EL 0.75 m AHD and not re-risen to above EL 0.85 m AHD is a ‘medium priority restriction period’.

2.1.2 High priority water use during the medium priority restriction period

During a medium priority restriction period referred to in Section 2.1.1, the holder of a high priority water entitlement must not be supplied more than a specified maximum volume during a specified period as defined by the high priority demand pattern assigned to the entitlement. The high priority demand pattern for water allocations is referred to in Section 2.1.3.

An entitlement may also include a seasonal water assignment of a high priority allocation referred to in Section 4.

2.1.3 High priority demand pattern

The Resource Operations Licence (ROL) holder must assign to each high priority water allocation a ‘high priority demand pattern’.

The high priority demand pattern has effect only when a medium priority restriction period is in effect.

During a medium priority restriction period, the high priority demand pattern defines the maximum amount of water that may be supplied under a high priority water allocation for specified calendar periods (for example, on a specific date, or a specific week, or a specific month). Any specified period must not be greater than 1 month.

The combined total of the high priority demand patterns for high priority water allocations supplied by the Fitzroy Barrage Water Supply Scheme must not exceed the limits in Table 1.

Table 1: Maximum percentage of total high priority water allocation in Fitzroy Barrage Water Supply Scheme that may be assigned to the specified period under the high priority demand pattern

Period	Percentage of total high priority allocation
July to September	31
October to December	34
January to March	34
April to June	31

2.1.4 Other restrictions

During the medium priority restriction period, the ROL holder may implement further restrictions on the supply of high priority water, decided by the ROL holder in conjunction with high priority water allocation holders for the purpose of extending the period that water supplies are available, provided the objectives of the Water Resource Plan (WRP) are not compromised.

3 Transfer of water between water years

The ROL holder may develop and apply scheme practices for forward draw of water entitlements in accordance with the principles and rules in this section.

3.1 Principles for transfer of water between water years

The ROL holder must have regard to the following principles in developing and applying scheme practices for forward draw of water entitlements

Forward draw practices must not have an adverse impact on the objectives of the WRP.

Entitlements must not be:

- Carried over from the current water year to any future year, other than a minor carry over adjustment under Section 3.3; or
- Brought forward from a future water year to the current water year, other than from the next water year.

The volume of individual water allocation brought forward to the current water year must not exceed the announced allocation volume for the allocation at the start of the next water year.

3.2 Rules for transfer of water between water years

The following rule applies for the transfer of water between water years.

The total volume permitted to be brought forward to a water year must not exceed 2% of the total nominal volume.

3.3 End of water year minor adjustments

As an administrative arrangement to account for the timing of the end of water year metered use reading and for the operational convenience of water users, the ROL holder may, in addition to any forward draw permitted under Section 3.1 and Section 3.2, make minor carry over and forward draw adjustments to entitlements. For an individual, the adjustments must not exceed 2% of the individual entitlement at the end of the water year for which the meter reading applies, or 10 ML whichever is the lesser.

4 Seasonal water assignment rules

Under Section 146B of the Water Act, the holder of a water allocation may enter into an arrangement for a seasonal assignment in relation to the allocation. However the allocation holder may enter into the arrangement only with the consent of the ROL holder. The ROL holder may give consent only if the assignment is allowed under the seasonal water assignment rules in the ROP.

High priority water supply during medium priority restriction periods (Refer to Section 2) must comply with specified high priority demand patterns. A seasonal water assignment of a high priority water allocation also requires an assigned demand pattern for the purposes of Section 2.

The ROL holder is required to report (refer Section 4.1.1 Attachment 4.4G) on trends in seasonal assignment and evaluate whether seasonal assignment practices are impacting on supply for individual water users or groups of water users or impacting on the objectives of the WRP.

Chapter 8 of the ROP allows the chief executive to initiate changes to the seasonal assignment rules if considered necessary to protect the objectives of the WRP.

4.1 Principles for seasonal water assignment

The ROL holder must have regard to the following principles in developing scheme practices and for making decisions for consent of seasonal water assignment arrangements.

The effects of an individual seasonal assignment and the cumulative effects of successive or repeated seasonal assignments must not:

- Impact adversely on the WRP objectives;
- Impact adversely on the availability of water to other water users in any part of the scheme; or
- Subject waterholes to an increased potential for environmental harm.

Water with a location zone Fitzroy A must continue to be supplied in zone Fitzroy A.

4.2 Rules for seasonal water assignment

The following rules apply in developing scheme practices and for making decisions for consent of seasonal water assignment arrangements.

Water supplied under a seasonal water assignment may be used for any purpose.

A high priority demand pattern must be assigned to a seasonal water assignment of a high priority water allocation, the 'original entitlement', for the purposes of Section 2. An adjusted high priority demand pattern must be assigned for the 'original allocation' to account for the seasonal assignment. The combined demand patterns for the resultant entitlements must not exceed the demand pattern for the original entitlement.

Attachment 4.4G

Fitzroy Barrage Water Supply Scheme Monitoring program

1 Water quantity

1.1 Height and stream flow

The Resource Operations Licence (ROL) holder must record height and flow data in accordance with Table 1.

Table 1: Locations in the Fitzroy River where height and flow data is required

Location	Height data	Flow data
Fitzroy Barrage inflow*		✓
Fitzroy Barrage storage	✓	
Fitzroy Barrage outflow		✓
Eden Bann Weir inflow		✓

**The inflow to the Fitzroy Barrage is taken to be the flow in the Fitzroy River anywhere from the Fitzroy Barrage storage limit upstream to Wattlebank.*

It is preferred that continuous time series data be collected. However, the chief executive may approve the collection of data in a format and standard other than for continuous time series data.

The methodology for determining height and flow data, including data format and standard, must be approved by the chief executive.

1.1a Operating level of storages

The ROL holder must record under Section 1 of Attachment 4.4E:

- The daily storage height for the Fitzroy Barrage.

For the purposes of this section:

- The methodology for determining the daily storage height must be approved by the chief executive; and
- The data must be real time information upon which operational decisions were based not data that has subsequently changed for example through a verification process.

1.1b Stream flow for the purpose of seasonal base flow management strategies

The ROL holder must record under Section 4 of Attachment 4.4E:

- The daily storage inflow volume for Eden Bann Weir;
- The daily storage height for the Fitzroy Barrage; and
- The daily storage outflow for the Fitzroy Barrage.

For the purposes of this section:

- The methodology for determining the daily storage inflow volume, daily storage height

and daily storage outflow must be approved by the chief executive; and

- The data must be real time information upon which operational decisions for the implementation of the strategy were based not data that has subsequently changed for example through a verification process.

1.2 Releases from storages

The ROL holder must record details of the basis for each release decision for the Fitzroy Barrage under the rules for releases of water from storages given in Section 2 of Attachment 4.4E, including:

- The general rules for releases; and
- The seasonal base flow and fishway management strategies.

The ROL holder must record the daily volume released from the Fitzroy Barrage.

1.3 Announced allocations

The ROL holder must record details of announced allocation determinations referred to in Section 1 of Attachment 4.4F.

1.4 Restrictions on the taking of medium priority water during the medium priority restriction period

The ROL holder must record details of any restrictions on the taking of medium priority water referred to in Section 2.1.1 of Attachment 4.4F, including:

- The date of the restriction;
- The nature of the restriction; and
- The basis for the determination of the restriction.

1.5 Restrictions on the taking of high priority water during medium priority restriction period

The ROL holder must record details of any restrictions on the taking of high priority water referred to in Section 2.1.2 and Section 2.1.3 of Attachment 4.4F, including:

- The date of the restriction;
- The nature of the restriction; and
- The basis for the determination of the restriction.

1.6 Transfer of water between water years

The ROL holder must record details of the movement of water between water years referred to in Section 3 of Attachment 4.4F, including:

- The basis of each decision to adjust the amount of water an individual may be supplied in a water year and the volume of the adjustment;
- The basis of each decision to approve a forward draw for each individual water user; and
- The volume of water brought forward from the next water year to a water year by priority group.

1.7 Seasonal water assignment

The ROL holder must record details of individual seasonal water assignment arrangements,

including assigned high priority demand patterns.

1.8 Water taken by water users

The ROL holder must record the volume of water taken by water users as follows:

- For each individual water user specified for each zone:
 - The total volume of supplemented water taken each quarter;
 - The total volume of supplemented water entitled to be taken at any time;
 - The basis for determining the total volume of supplemented water entitled to be taken at any time, including any adjustments for approved seasonal water assignments and transfers into or out of the water years;
 - The total volume of metered water taken as ‘riparian entitlement water’; and
 - The zone.

1.9 High priority demand pattern

The ROL holder must record details of individual high priority demand patterns, referred to in Section 2.1.3 of Attachment 4.4F.

2 Impact of storage operation on aquatic ecosystems

The ROL holder must undertake the following to establish any impacts on aquatic ecosystems that are potentially related to the operation of storages.

Section 2.1 Bank condition

The ROL holder must inspect banks for evidence of collapse and/or erosion within the ponded area of the Fitzroy Barrage following instances of rapid water level changes or large flows through the Fitzroy Barrage, or other occasions when collapse and/or erosion of banks may be likely.

Any instances of bank slumping or erosion observed must be investigated to determine if the instability was associated with the nature or operation of the infrastructure.

2.2 Water Quality

The ROL holder must monitor water quality in relation to relevant infrastructure in accordance with the department’s Water Monitoring Data Collection Standard.

2.3 This section not required

3 Reporting

There are four levels of reporting for ROL holders:

- Quarterly report for the previous quarter;
- Annual report for the previous water year;
- Operational reports; and
- Emergency reports.

3.1 Quarterly report

The ROL holder must transfer the following data to the chief executive:

- Water quantity all records referred to in Sections 1.1a and 1.1b;
- A summary of bank condition monitoring and incidences of slumping referred to in Section 2.1;
- Water quality all records referred to in Section 2.2; and
- Seasonal water assignments all records referred to in section 1.7.

3.2 Annual report

The annual report must include, but not be limited to, discussion and recommendations with regard to the monitoring results for the previous water year.

3.2.1 Water monitoring

A summary of the implementation of the rules for releases from storages, other than for seasonal base flow and fishway management.

A summary of the implementation of the seasonal base flow management strategy for the Fitzroy Barrage, including:

- Overview of strategy implementation, including the basis of decisions; and
- An evaluation of the seasonal base flow management arrangements and outcomes.

A summary of the implementation of the fishway management strategy for the Fitzroy Barrage, including:

- Overview of strategy implementation;
- Periods of operation of the fishway; and
- Total period of operation of the fishway.

A summary of announced allocation determinations, including:

- An evaluation of the announced allocation procedures and outcomes.

A summary of restrictions on the taking of medium priority water, including:

- An evaluation of the restriction procedures and outcomes; and
- The date and nature of each restriction decision.

A summary of restrictions on the taking of high priority water, including:

- An evaluation of the restriction procedures and outcomes; and
- The date and nature of each restriction decision.

A summary of the transfer of water between water years, including:

- An evaluation of the rules and outcomes;
- The total volume of water brought forward by priority group to the water year from the next water year; and
- The total volume of water brought forward by priority group from the water year to the previous water year.

A summary of the volume of water taken by water users, specified by zone, including:

- The total volume of supplemented water taken;
- The total volume of supplemented water entitled to be taken;

- The basis for determining the total volume of supplemented water entitled to be taken, including any adjustments for approved seasonal water assignments and transfers into or out of the water years;
- The announced allocation volume at the end of the water year;
- The total volume of supplemented water taken during a medium priority restriction period; and
- The total volume of metered water taken as ‘riparian entitlement water’.

A summary of seasonal water assignment arrangements, including:

- An evaluation of the seasonal water assignment rules and outcomes, including:
 - An evaluation of any circumstances of supply difficulties when the supply difficulties were linked to seasonal assignment practices; and
 - Identification of and reporting on any trends in seasonal water assignment;
- The total number of seasonal water assignment arrangements; and
- The total volume of water seasonally assigned.

Details of changes to Fitzroy Barrage or its operation that may have an impact on the implementation of the ROP.

Details of new monitoring devices such as equipment to measure stream flow.

3.2.2 Impact of storage operation on aquatic ecosystems

Bank condition

A summary of bank condition monitoring including:

- Results of investigations of bank slumping or erosion identified in the ponded area of the Fitzroy Barrage; and
- Changes to operation of storages to reduce instances of bank slumping or erosion.

Water quality

Discussion and assessment of the following water quality issues:

- Thermal and chemical stratification in the Fitzroy Barrage;
- Water quality in the Fitzroy Barrage;
- Contribution of the storage and its management to the quality of water released; and
- Cyanobacteria population changes in response to stratification in the Fitzroy Barrage.

3.3 Operational reports

The ROL holder must notify the chief executive within 1 business day of becoming aware of the following operational incidents:

- Noncompliance by the ROL holder with the rules given in the ROP;
- A decision relating to any restrictions on the taking of medium priority water; and
- A decision relating to any restrictions on the taking of high priority water.

The ROL holder must provide an operational report to the chief executive for an incident relating to noncompliance with the rules in the ROP, including details of the incident, conditions under which the incident occurred and any responses or activities carried out as a

result of the incident.

The ROL holder must provide a report to the chief executive within 5 business days of the start of the water year detailing the high priority demand patterns assigned to each high priority water allocation referred to in Section 2.1.3 of Attachment 4.4F. The report should include:

- Water allocation number;
- Holder of water allocation; and
- High priority demand pattern.

The ROL holder must provide a report to the chief executive within 5 business days of a change to the high priority demand pattern associated with a high priority water allocation, or the establishment of a new high priority water allocation. The report should include:

- Water allocation number;
- Holder of water allocation; and
- High priority demand pattern.

3.4 Emergency report

An emergency for the purpose of this ROP includes an occurrence, which by the nature of its severity, extent or timing might be regarded as an emergency (for example, contamination of water supply, structural damage to infrastructure or a danger to human health).

For any emergency, the ROL holder must:

- Notify the chief executive immediately; and
- Provide a report to the chief executive on the emergency including details of the emergency, conditions under which the emergency occurred, any responses or activities carried out as a result of the emergency and any impacts on the ROP.

Attachment 4.4H

Fitzroy Barrage Water Supply Scheme

Water allocation change rules

1 Permitted changes

Application for the following changes to a water allocation will be approved. On approval, a change certificate will be issued by the chief executive, which may be lodged with the registrar of water allocations.

1.1 Purpose

A change to the purpose of a water allocation from 'any' to 'agriculture' or from 'agriculture' to 'any'.

1.2 Priority

A change to the priority of a water allocation from medium to high or from high to medium, provided:

- The conversion rate is 1.5 ML of medium priority water converts to 1 ML of high priority water allocation;
- The maximum volume of high priority water allocation supplied through the scheme is 51,200 ML; and
- The minimum volume of high priority water allocation supplied through the scheme is 48,800 ML.

1.3 Amalgamation or subdivision

A change to subdivide a water allocation provided:

- The sum of the nominal volumes of the new water allocations is equal to the nominal volume of the water allocation that is being subdivided; and
- The location and priority group of the new water allocations is the same as that of the water allocation that is being subdivided.

A change to amalgamate water allocations provided:

- The nominal volume of the new water allocation is equal to the sum of the nominal volumes of the water allocations that are being amalgamated;
- The location and priority group of the water allocations that are being amalgamated are the same; and
- The location and priority group for the new water allocation is the same as that of the water allocations that are being amalgamated.

2 Prohibited changes

The following changes are prohibited changes:

2.1 Location

A change to a location that is not within the extent of the Dawson Valley, Nogoia Mackenzie, Lower Fitzroy or Fitzroy Barrage water supply schemes.

2.2 Priority group

A change to a priority group that is not medium or high.

2.3 Purpose

A change to a purpose that is not 'agriculture' or 'any'.

2.4 Volume

A change to the volume that is not a consequence of a change to another attribute of a water allocation.

2.5 Other

A change that requires an amendment to this ROP.

3 Application for change under Section 130 of the Water Act

If a water allocation holder wishes to apply for a change to a water allocation that is not permitted under Section 1, and not prohibited under Section 2, an application may be made under Section 130 of the Water Act for the change.

The chief executive will deal with applications made under Section 130 of the Water Act, in accordance with the Water Act. That process is as follows:

- Notice of the application is published in local newspapers. The notice includes information about where the application can be inspected and invites submissions from the public on the application;
- The chief executive determines if the application should be approved having regard to the potential impact on a range of interests including other entitlement holders and aquatic ecosystems;
- If the chief executive approves the application, the chief executive will issue a change certificate that may be lodged with the registrar of water allocations; and
- If the chief executive refuses the application, the Water Act provides for an appeal process.

4 Registration of change

If an application to change a water allocation is approved, the chief executive will issue a change certificate. The water allocation holder may lodge the change certificate with the registrar of water allocations who will change the water allocation on the water allocation register.

However, the registrar will not register the change until a supply contract has been entered into between the water allocation holder and the Resource Operations Licence (ROL) holder for supply of the changed water allocation.

Attachment 4.4I

Fitzroy Barrage Water Supply Scheme

Amending critical water supply management arrangements

1 Critical water supply management arrangements

1.4 Introduction

The Resource Operations Plan (ROP) rules for infrastructure operation and environmental management (refer Attachment 4.4E) and for water sharing (refer Attachment 4.4F) include arrangements for dealing with periods of low water availability. These arrangements are referred to as the critical water supply management arrangements.

The critical water supply management arrangements initially specified in the ROP are based on broad-scale basin-wide hydrologic modelling. These initial arrangements may need to be refined and further developed to ensure the arrangements appropriately deal with local issues and circumstances particular to the Fitzroy Barrage Water Supply Scheme.

Over time the arrangements can also be amended to allow adaptation to changing circumstances and refinement through improved knowledge about the operation of the system at times of low water supply.

For example, the critical water supply water sharing rules given in Attachment 4.4F deal with situations when supply to medium priority water allocations must cease to secure high priority water allocations. The initial arrangements for sharing the available supplies may warrant ongoing development to secure supplies for essential water needs.

Variations to the rules associated with the minimum operating levels for storages and to the waterhole drawdown limits given in Attachment 4.4E may also be considered to accommodate local water user and environmental needs under particular circumstances.

1.2 Criteria for critical water supply management arrangements

Critical water supply management arrangements must have regard to the following:

- Provision of water for essential water needs must have first priority;
- The objectives of the Water Resource Plan;
- The effects on water allocation security performance;
- The effects on natural ecosystems and the physical integrity of the watercourse; and
- The public interest.

For the purpose of the critical water supply management arrangements, essential water needs must include that part of a town water supply required for essential services including drinking water and sanitation but excluding lawns and gardens. The Resource Operations Licence (ROL) holder in conjunction with water allocation holders may establish additional essential purposes.

1.3 Initial review of the critical water supply management arrangements

The ROL holder must undertake an initial review of the suitability of the critical water supply management arrangements. A report on the initial review must be provided to the chief executive within 12 months of the commencement of the ROP.

The initial review must include recommendations on whether amendments to the arrangements should be considered.

1.4 Proposals to amend the critical water supply management arrangements

The ROL holder may submit a proposal to amend the critical water supply management arrangements at any time.

The chief executive may require the ROL holder to prepare a proposal to amend the critical water supply management arrangements at any time.

If the initial review of the critical water supply management arrangements under Section 1.3 indicates changes to the arrangements should be considered, the chief executive may require the ROL holder to prepare a proposal to amend the critical water supply management arrangements within a timeframe set by the chief executive.

A proposal to amend the critical water supply management arrangements must include:

- Proposed changes to the rules for infrastructure operation and environmental management (refer Attachment 4.4E) and for water sharing (refer Attachment 4.4F);
- An assessment of the effects of the proposal on natural ecosystems and the physical integrity of the watercourse and the proposed environmental monitoring requirements;
- Details of consultation with stakeholders including water users, local communities and environmental interests; and
- Any other information that will assist the chief executive to decide the proposal.

1.5 Amending the critical water supply management arrangements

The chief executive may amend the rules for infrastructure operation and environmental management (refer Attachment 4.4E) and for water sharing (refer Attachment 4.4F) that apply during periods of low water availability. The chief executive will consider the following in deciding to amend the rules:

- Any proposal to amend the critical water supply management arrangements submitted by the ROL holder; and
- The criteria given in Section 1.2.

1.6 Evaluation of critical water supply management arrangements

The ROL holder must annually evaluate the critical water supply management arrangements in regard to their suitability for periods of low water availability.

Attachment 5.1A

Dawson Valley Water Management Area

Amending waterharvesting authorisations

1 Locations where waterharvesting authorisations will be amended

Waterharvesting licences will be amended on the Dawson River from the upstream limit of Glebe Weir to the Fitzroy River junction.

2 Details for amendment of waterharvesting licences

Amendments will be made to waterharvesting water licences as follows:

2.1 Location

The location from which water may be taken under a water licence will be amended to include a zone according to the position of the existing authorisation. Descriptions of the zones for the Dawson River are given in Attachment 2.1.

2.2 Operating rules

The terms and conditions about the arrangements for the taking of water stated on existing licences will be replaced by reference to the operating rules given in Attachment 5.1B.

Attachment 5.1B

Dawson Valley Water Management Area

Operating rules for water licences for waterharvesting with 15 and 30 cumec flow conditions

These operating rules apply to water licences for waterharvesting with 15 and 30 cumec flow conditions in the Dawson Valley Water Management Area, from the upstream limit of Glebe Weir to the Fitzroy River junction.

1 Water year

The water year is from 1 October to 30 September the following year.

2 Flow conditions under which water may be taken

The flow conditions stated on water licences for waterharvesting is the stream flow nominally required to pass downstream while water is being taken.

The chief executive will determine when the flow conditions exist and when water may be taken under arrangements given in Sections 3 and 4. A period of time during which water may be taken is referred to as an announced period.

3 Announced periods for taking water

The chief executive will notify water licence holders of the start and of the end of an announced period during which water may be taken.

Water may only be taken during announced periods, unless the chief executive has authorised an individual water licence holder to take water outside of an announced period.

In some circumstances a water licence holder may experience difficulty taking water during all or part of an announced period because of the characteristics of the flow event and the flow management location where the passing flow conditions are assessed under Section 4. Under these circumstances the chief executive may authorise a water licence holder to take water outside an announced period under alternative arrangements if the chief executive is satisfied that:

- No significant adverse impacts on other water users are expected; and
- The authorisation given does not exceed the announced period applying to other water licences in the same locality.

4 Determining announced periods for taking water

Subject to the requirements of the first post-winter flow management strategies in Section 5, for each management reach in Table 1 the chief executive will estimate the start and the end of a period during which the stream flow is estimated to exceed the flow conditions for each water licence group. The stream flow will be assessed at the flow management locations in Table 1.

The announced period is subject to the following conditions:

- The chief executive may delay the notification of the start of an announced period up to a maximum of 24 hours from the estimated time when the passing flow conditions exist, provided the notification of the end of the announced period is extended by a similar time;
- The typical duration of an announced period should not vary by more than 12 hours from the total estimated time that the passing flows exist. The chief executive may extend a subsequent announced period to adjust for any variations in excess of 12 hours; and
- The chief executive may use information about stream flow other than at the flow management locations in Table 1 to determine an announced period.

Table 1: Management reaches and flow management locations for water licences with 15 and 30 cumec flow conditions

Management reach	Management reach description	Flow management location
Zones: Dawson A, B.	Don River junction to Fitzroy River junction	Don River junction
Zones: Dawson C, D, E.	Mimosa Creek junction to Don River junction	Neville Hewitt Weir tailwater
Zones: Dawson F, G.	Effective upstream limit of Moura Weir to Mimosa Creek junction	Moura Weir tailwater
Zones: Dawson H, I.	Effective upstream limit of Theodore Weir to effective upstream limit of Moura Weir	Theodore Weir tailwater
Zones: Dawson J.	Orange Ck Weir to effective upstream limit of Theodore Weir	Isla Delusion Crossing
Zones: Dawson K.	Effective upstream limit of Gylanda Weir to Orange Ck Weir	Gylanda Weir tailwater
Zones: Dawson L, M.	Upstream limit of Glebe Weir to effective upstream limit of Gylanda Weir	Glebe Weir tailwater

5 Environmental flow management rules

5.1 First post-winter flow management strategy for waterharvesting upstream of the Mimosa Creek junction (Zones: Dawson F to Dawson M)

The following first post-winter flow management strategy applies to waterharvesting upstream of the Mimosa Creek junction.

The first post-winter flow management strategy commences at the earlier of:

- Activation of the upper Dawson sub-scheme first post-winter flow management strategy for the Dawson Valley Water Supply Scheme; or
- 1 October.

The first post-winter flow management strategy ends at the earlier of:

- 6 days of flow greater than 15 cumec passing any of the flow management locations in Table 1 that are located upstream of the Mimosa Creek junction since the commencement of the strategy; or
- Finalisation of the upper Dawson sub-scheme first post-winter flow management strategy for the Dawson Valley Water Supply Scheme; or
- 30 April.

For the full duration of the first post-winter flow management strategy, the chief executive will apply a 30 cumec flow condition for all announced periods for waterharvesting.

5.2 First post-winter flow management strategy for waterharvesting downstream of the Mimosa Creek junction (Zones: Dawson A to Dawson E)

The following first post-winter flow management strategy applies to waterharvesting downstream of the Mimosa Creek junction.

The first post-winter flow management strategy commences at the earlier of:

- Activation of the lower Dawson sub-scheme first post-winter flow management strategy for the Dawson Valley Water Supply Scheme; or
- 1 October.

The first post-winter flow management strategy ends at the earlier of:

- 6 days of flow greater than 15 cumec passing any of the flow management locations in Table 1 that are located downstream of the Mimosa Creek junction since the commencement of the strategy; or
- Finalisation of the lower Dawson sub-scheme first post-winter flow management strategy for the Dawson Valley Water Supply Scheme; or
- 30 April.

For the full duration of the first post-winter flow management strategy, the chief executive will apply a 30 cumec flow condition for all announced periods for waterharvesting.

6 Assessment of quantity of unsupplemented water taken

For the assessment of the quantity of unsupplemented water taken under a water licence:

- A water licence holder must advise the chief executive prior to taking unsupplemented water;
- A water licence holder must provide recordings of water taken to the chief executive;
- Only water taken during announced periods may be taken as unsupplemented water unless otherwise authorised by the chief executive under Section 3;
- The chief executive will advise the Resource Operations Licence holder for the Dawson Valley Water Supply Scheme of the meter readings and the approved quantities of unsupplemented water taken within 7 business days of the conclusion of announced periods for all management reaches in the Dawson Valley Water Management Area; and
- Any water taken that is not in accordance with these rules for unsupplemented water and taken from within the limits of the Dawson Valley Water Supply Scheme will be treated as supplemented water.

7 Seasonal water assignment rules

The assignment of the benefit of a water licence to another person for a water year for all or part of the water that may be taken under the water licence is referred to as a seasonal water assignment.

Seasonal water assignment of water licences in the Dawson Valley Water Management Area is not permitted.

8 Procedures

Details of procedures associated with the implementation of these operating rules may be obtained from the chief executive.

Attachment 5.2A

Nogoa Mackenzie Water Management Area

Details of conversions to water allocations

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
203	[REDACTED]	[REDACTED]	SP		1	Mackenzie A (311.2)	Agriculture	211	240	40	No flow conditions apply	Class 4C	15650U
205			SP		1	Mackenzie A (311.7)	Agriculture	422	480	80	No flow conditions apply	Class 4C	18877U
228			SP		1	Mackenzie B	Agriculture	89	101	45	2592 ML / Day passing flow	Class 1A	104165
215			SP		1	Mackenzie B	Agriculture	128	146	65	2592 ML / Day passing flow	Class 1A	19249F
791			SP		1	Mackenzie B	Agriculture	495	562	250	2592 ML / Day passing flow	Class 1A	41325F
222			SP		1	Mackenzie B	Agriculture	227	258	115	2592 ML / Day passing flow	Class 1A	46371F
230			TC		1/2	Mackenzie C	Agriculture	850	966	430	2592 ML / Day passing flow	Class 1A	104832
			TC		1/2								
235			TC		1/2	Mackenzie C	Agriculture	495	562	250	2592 ML / Day passing flow	Class 1A	40206F
			TC		1/2								
789			TC		1/2	Mackenzie C	Agriculture	1938	2335	1175	4320 ML / Day passing flow	Class 1B	57484F
			TC		1/2								
869			[REDACTED]	[REDACTED]	TC		1/3	Mackenzie C	Agriculture	227	258	115	2592 ML / Day passing flow
	[REDACTED]	[REDACTED]	TC		1/3								
	[REDACTED]	[REDACTED]	TC		1/3								

Note that Attachment 5.2A shows details of relevant authorisations supplied in the Nogoa Mackenzie Water Management Area as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
242	[REDACTED]	[REDACTED]	SP		1	Mackenzie C	Agriculture	692	786	350	2592 ML / Day passing flow	Class 1A	173701
773	[REDACTED]	[REDACTED]	SP		1	Mackenzie C	Agriculture	2744	3118	1388	2592 ML / Day passing flow	Class 1A	57473WF
880	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie C	Agriculture	227	258	115	2592 ML / Day passing flow	Class 1A	38805F
	[REDACTED]	[REDACTED]	TC	1/3									
	[REDACTED]	[REDACTED]	TC	1/3									
238	[REDACTED]	[REDACTED]	SP		1	Mackenzie C	Agriculture	128	146	65	2592 ML / Day passing flow	Class 1A	103509
271	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie D	Agriculture	366	416	185	2592 ML / Day passing flow	Class 1A	104990
	[REDACTED]	[REDACTED]	TC	1/2									
254	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie D	Agriculture	593	674	300	2592 ML / Day passing flow	Class 1A	104991
	[REDACTED]	[REDACTED]	TC	1/2									
269	[REDACTED]	[REDACTED]	TC		1/6	Mackenzie D	Agriculture	2174	2471	1100	2592 ML / Day passing flow	Class 1A	34432U
	[REDACTED]	[REDACTED]	TC	1/6									
	[REDACTED]	[REDACTED]	TC	1/6									
	[REDACTED]	[REDACTED]	TC	1/6									
	[REDACTED]	[REDACTED]	TC	1/6									
786	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie D	Agriculture	593	674	300	2592 ML / Day passing flow	Class 1A	46374F
	[REDACTED]	[REDACTED]	TC	1/2									

Note that Attachment 5.2A shows details of relevant authorisations supplied in the Nogoia Mackenzie Water Management Area as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
265	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie D	Agriculture	593	674	300	2592 ML / Day passing flow	Class 1A	103928
	[REDACTED]	[REDACTED]	TC	1/4									
	[REDACTED]	[REDACTED]	TC	1/4									
	[REDACTED]	[REDACTED]	TC	1/4									
313	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie D	Agriculture	2174	2471	1100	2592 ML / Day passing flow	Class 1A	41375F
	[REDACTED]	[REDACTED]	TC	1/4									
	[REDACTED]	[REDACTED]	TC	1/4									
	[REDACTED]	[REDACTED]	TC	1/4									
243	LAKE MARY IRRIGATORS PTY LTD		SP		1	Mackenzie D	Agriculture	2174	2471	1100	2592 ML / Day passing flow	Class 1A	41263F
245	[REDACTED]	[REDACTED]	SP		1	Mackenzie D	Agriculture	495	562	250	2592 ML / Day passing flow	Class 1A	41177F
273	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie E	Agriculture	890	1011	450	2592 ML / Day passing flow	Class 1A	51614F
	[REDACTED]	[REDACTED]	TC	1/2									
275	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie E	Agriculture	33	38	17	2592 ML / Day passing flow	Class 1A	104993
	[REDACTED]	[REDACTED]	TC	1/2									
278	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie F	Agriculture	347	475	250	2592 ML / Day passing flow	Class 2A	103515
	[REDACTED]	[REDACTED]	TC	1/2									
280	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie F	Agriculture	91	124	65	2592 ML / Day passing flow	Class 2A	103854
	[REDACTED]	[REDACTED]	TC	1/2									
286	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie G	Agriculture	553	757	398	2592 ML / Day passing flow	Class 2A	104994
	[REDACTED]	[REDACTED]	TC	1/2									

Note that Attachment 5.2A shows details of relevant authorisations supplied in the Nogoia Mackenzie Water Management Area as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
862	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie G	Agriculture	160	219	115	2592 ML / Day passing flow	Class 2A	48344F
			TC		1/2								
288	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie G	Agriculture	125	171	90	2592 ML / Day	Class 2A	103510
299	[REDACTED]	[REDACTED]	SP		1	Mackenzie H	Agriculture	902	1236	650	2592 ML / Day passing flow	Class 2A	104986
291			TC		1/2	Mackenzie H	Agriculture	553	757	398	2592 ML / Day	Class 2A	104985
297	[REDACTED]	[REDACTED]	TC		1/9						2592 ML / Day passing flow	Class 2A	38974F
			TC		1/9								
			TC		1/9								
			TC		1/9								
			TC		1/9	Mackenzie H	Agriculture	257	352	185			
			TC		1/9								
			TC		1/9								
309	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie I	Agriculture	160	219	115	2592 ML / Day passing flow	Class 2A	104029
			TC		1/2								

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation	
301	[REDACTED]	[REDACTED]	TC		1/6									
			TC		1/6									
												2592 ML / Day passing flow	Class 2A	52675F
			TC		1/6	Mackenzie I	Agriculture	416	570	300				
			TC		1/6									
			TC		1/6									
310	[REDACTED]	[REDACTED]	TC		1/6									
			TC		1/6									
			TC		1/6									
												4320 ML / Day passing flow	Class 2B	57830F
			TC		1/6	Mackenzie I	Agriculture	1622	2350	1600				
			TC		1/6									
323	[REDACTED]	[REDACTED]	TC		1/6									
			TC		1/6									
			TC		1/6									
			TC		1/6	Mackenzie I	Agriculture	416	570	300	2592 ML / Day passing flow	Class 2A	105195	
			TC		1/6									

Note that Attachment 5.2A shows details of relevant authorisations supplied in the Nogoia Mackenzie Water Management Area as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation	
327	[REDACTED]	[REDACTED]	TC		1/6									
			TC		1/6									
												4320 ML / Day passing flow	Class 2B	57831F
			TC		1/6	Mackenzie I	Agriculture	1622	2350	1600				
			TC		1/6									
329	[REDACTED]	[REDACTED]	TC		1/6									
			TC		1/6									
			TC		1/6									
												4320 ML / Day passing flow	Class 2B	57832WF
			TC		1/6	Mackenzie I	Agriculture	1622	2350	1600				
333	[REDACTED]	[REDACTED]	TC		1/6									
			TC		1/6									
			TC		1/6									
			TC		1/6	Mackenzie I	Agriculture	1622	2350	1600		4320 ML / Day passing flow	Class 2B	57833WF
312	[REDACTED]	[REDACTED]												
335	[REDACTED]	[REDACTED]	SP		1	Mackenzie I	Agriculture	485	665	350	2592 ML / Day passing flow	Class 2A	52660F	

Note that Attachment 5.2A shows details of relevant authorisations supplied in the Nogoia Mackenzie Water Management Area as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
314	EMERALD RURAL TRAINING SCHOOL BOARD		SP		1	Mackenzie J	Agriculture	347	475	250	2592 ML / Day passing flow	Class 2A	40135F
316			TC		1/2	Mackenzie J	Agriculture	1115	1616	1100	4320 ML / Day passing flow	Class 2B	57874F
			TC		1/2								
850			TC		1/2	Mackenzie K	Agriculture	1526	2091	1100	2592 ML / Day passing flow	Class 2A	171475
			TC		1/2								
362	VANCARD PTY LTD ACN 010660867		TTE	TRUSTEE UNDER NOMINATION OF TRUSTEES NO C693822B	1	Mackenzie K	Agriculture	902	1236	650	2592 ML / Day passing flow	Class 2A	33546F
382	VANCARD PTY LTD ACN 010660867		TTE	TRUSTEE UNDER NOMINATION OF TRUSTEES NO C693822B	1	Mackenzie K	Agriculture	1388	1901	1000	2592 ML / Day passing flow	Class 2A	52700F
848	VANCARD PTY LTD ACN 010660867		TTE	TRUSTEE UNDER NOMINATION OF TRUSTEES NO C693822B	1	Mackenzie K	Agriculture	902	1236	650	2592 ML / Day passing flow	Class 2A	33545F
337			TC		1/3								
			TC		1/3	Mackenzie K	Agriculture	257	352	185	2592 ML / Day passing flow	Class 2A	57730WF
			TTE	AS TRUSTEE UNDER NOMINATION OF TRUSTEES C693819K	1/3								
339			TC		1/3								
			TC		1/3	Mackenzie K	Agriculture	1172	1699	1157	4320 ML / Day passing flow	Class 2B	57861F
	CURRIMUNDI PTY LTD		TTE	AS TRUSTEE UNDER NOMINATION OF TRUSTEES C693819K	1/3								

Note that Attachment 5.2A shows details of relevant authorisations supplied in the Nogoa Mackenzie Water Management Area as at **13 November 2003**. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
452	[REDACTED]	[REDACTED]	TC	AS TRUSTEE UNDER NOMINATION OF TRUSTEES C693819K	1/3	Mackenzie K	Agriculture	416	570	300	2592 ML / Day passing flow	Class 2A	104987
			TC		1/3								
			TTE		1/3								
859	[REDACTED]	[REDACTED]	TC	AS TRUSTEE UNDER NOMINATION OF TRUSTEES C693819K	1/3	Mackenzie K	Agriculture	1216	1763	1200	4320 ML / Day passing flow	Class 2B	057828F
			TC		1/3								
			TTE		1/3								
860	[REDACTED]	[REDACTED]	TC	AS TRUSTEE UNDER NOMINATION OF TRUSTEES C693819K	1/3	Mackenzie K	Agriculture	416	570	300	2592 ML / Day passing flow	Class 2A	46115F
			TC		1/3								
			TTE		1/3								
842	BRAYLAND PTY LTD		SP		1	Mackenzie L	Agriculture	741	1140	1100	2592 ML / Day passing flow	Class 3A	104992
867	BRAYLAND PTY LTD		SP		1	Mackenzie L	Agriculture	741	1140	1100	2592 ML / Day passing flow	Class 3A	45331F
462	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie L	Agriculture	229	353	340	2592 ML / Day passing flow	Class 3A	104988
			TC		1/2								
836	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie L	Agriculture	300	461	445	2592 ML / Day passing flow	Class 3A	57726WF
			TC		1/2								
463	ENSHAM RESOURCES PTY LTD		SP		1	Mackenzie L	Agriculture	77	119	115	2592 ML / Day passing flow	Class 3A	33033F
846	ENSHAM RESOURCES PTY LTD		SP		1	Mackenzie L	Agriculture	202	311	300	2592 ML / Day passing flow	Class 3A	46297F
840	[REDACTED]	[REDACTED]	TC		1/2	Mackenzie L	Agriculture	741	1140	1100	2592 ML / Day passing flow	Class 3A	103787
			TC		1/2								

Note that Attachment 5.2A shows details of relevant authorisations supplied in the Nogoia Mackenzie Water Management Area as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
834	LOCHARBOR HOLDINGS PTY LTD		TTE	TRUSTEES UNDER NOMINATION OF TRUSTEES NO C507566	1	Mackenzie L	Agriculture	741	1140	1100	2592 ML / Day passing flow	Class 3A	104995
443	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie L	Agriculture	741	1140	1100	2592 ML / Day passing flow	Class 3A	172268
	[REDACTED]	[REDACTED]	TC	1/3									
	[REDACTED]	[REDACTED]	TC	1/3									
838	[REDACTED] Y	[REDACTED]	TC		1/3	Mackenzie L	Agriculture	741	1140	1100	2592 ML / Day passing flow	Class 3A	105072
	[REDACTED]	[REDACTED]	TC	1/3									
	[REDACTED]	[REDACTED]	TC	1/3									
866	[REDACTED]	[REDACTED]	TC		1/3	Mackenzie L	Agriculture	202	311	300	2592 ML / Day passing flow	Class 3A	105071
	[REDACTED]	[REDACTED]	TC	1/3									
	[REDACTED]	[REDACTED]	TC	1/3									
831	[REDACTED]	[REDACTED]	TC		1/4	Mackenzie L	Agriculture	741	1140	1100	2592 ML / Day passing flow	Class 3A	171479
	[REDACTED]	[REDACTED]	TC	1/4									
	[REDACTED]	[REDACTED]	TC	1/4									
	[REDACTED]	[REDACTED]	TC	1/4									
844	[REDACTED]	[REDACTED]	SP		1	Mackenzie L	Agriculture	202	311	300	2592 ML / Day passing flow	Class 3A	103720

SP: Sole Proprietor
 TC: Tenants in Common
 TTE: Trustee

Note that Attachment 5.2A shows details of relevant authorisations supplied in the Nogoia Mackenzie Water Management Area as at 13 November 2003. Any changes that occur after 13 November 2003, for example, transfers of a listed authorisation to another person, or from amalgamations or subdivisions of listed authorisations, will be dealt with through standard procedures established to register changes to the water allocation register

Attachment 5.2B

Nogoa Mackenzie Water Management Area

Rules for conversion of existing waterharvesting authorisations to water allocations

1 Locations where existing waterharvesting authorisations are being converted to water allocations

Existing waterharvesting authorisations are being converted to water allocations on:

- The Nogoa River from the Theresa Creek junction to the Comet River junction;
- The Mackenzie River from the Comet River junction to the Dawson River junction; and
- Sections of tributaries of the Nogoa and Mackenzie rivers for which access to flows in the above river sections has been defined.

2 Rules for conversion of existing authorisations to water allocations

The following rules apply for the conversion of existing waterharvesting authorisations to water allocations to establish the details required for the registration of unsupplemented water allocations.

2.1 Location

The location from which water may be taken under a water allocation is specified as a zone according to the position of the existing authorisation. Descriptions of the zones for the Nogoa and Mackenzie rivers are given in Attachment 2.2.

2.2 Purpose

The purpose for which water may be taken under a water allocation is specified as either 'agriculture' or 'any'. 'Agriculture' is the nominated purpose for those existing authorisations that are primarily used for agricultural purposes. 'Any' is the nominated purpose for all other uses of water.

2.3 Maximum rate

With the exception of those authorisations in Table 2 for which the chief executive has previously stated a rate on the existing authorisation as a consequence of the requirements of the Water Resource Plan (WRP), the maximum rate (in litres per second) for taking water is the greater of:

- a) For an authorisation that states a maximum rate, the existing authorised rate; or
- b) For an authorisation that states a pump size, a rate decided by the chief executive using information from Table 1; or

- c) A rate determined by the chief executive based on consideration of a submission on the draft Resource Operations Plan (ROP) about this rate. In consideration of a submission the chief executive will have regard to the existing diversion capacity as at 1 June 2002, and consistency with other authorisations in the same locality. The existing diversion capacity for pumps will be considered at stream flow conditions within 2 metres above the flow conditions for the authorisation.

Table 1: Pump sizes and rates

Nominal pump size (mm)	Rate (L/s)		Nominal pump size (mm)	Rate (L/s)
32	7		200	185
40	12		250	250
50	17		300	300
65	30		350	350
80	45		400	430
100	65		500	650
125	90		600–660	1,100
150	115			

(Note: Multiply litres per second by 0.0864 to convert to megalitres per day)

Table 2: Authorisations for which maximum rates previously established

Authorisation No.	Basis for determining the maximum rate for taking water
51614F	This licence originally authorised a 300 mm submersible pump, which had an operational pumping rate of 450 L/s. An additional 610 mm pump was authorised on the licence on the basis that the licensee agree to the pump rate not exceeding 450 L/s, and only one pump operating at any time.

2.4 Flow conditions

The flow conditions under which water may be taken are specified as a rate of passing flow.

The flow conditions are translated from the flow requirements specified on existing waterharvesting authorisations as follows:

- For an existing authorisation with flow conditions of equal to or less than 30 cumec, the flow condition is '2,592 ML/day passing flow'; and
- For an existing authorisation with flow conditions greater than 30 cumec up to 50 cumec, the flow condition is '4,320 ML/day passing flow'.

2.5 Volume

The volume for a water allocation comprises two elements a volumetric limit and a nominal volume.

2.5.1 Volumetric limit

The volumetric limit (in megalitres) for conversion of a waterharvesting authorisation is calculated by multiplying the maximum rate for taking water (expressed in megalitres per day) determined in Section 2.3 by the 30th percentile water allocation security objective value (expressed in days) given in Table 3.

Table 3: 30th percentile water allocation security objectives and nominal volume conversion factor

Location for water allocation	Zone	Flow conditions	Water allocation security objective in 30% years	Nominal volume conversion factor
Mackenzie River from the Isaac Mackenzie waterharvesting upstream limit to the Dawson River junction	Mackenzie A Mackenzie B Mackenzie C	2,592 ML/day passing flow	26 days	0.88
	Mackenzie D Mackenzie E	4,320 ML/day passing flow	23 days	0.83
Nogoa and Mackenzie rivers from the Comet Mackenzie waterharvesting upstream limit to the Isaac Mackenzie waterharvesting upstream limit	Mackenzie F Mackenzie G Mackenzie H	2,592 ML/day passing flow	22 days	0.73
	Mackenzie I Mackenzie J Mackenzie K	4,320 ML/day passing flow	17 days	0.69
Nogoa River from the Theresa Creek junction to the Comet Mackenzie waterharvesting upstream limit	Mackenzie L	2,592 ML/day passing flow	12 days	0.65

2.5.2 Nominal volume

The nominal volume for a water allocation is determined by sharing the long-term average amount of water expected to be taken by existing authorisations in the relevant water allocation security group.

The nominal volume (in megalitres) for conversion of a waterharvesting authorisation is calculated by multiplying the volumetric limit (in megalitres) determined under Section 2.5.1 by the nominal volume conversion factor given in Table 3.

2.6 Water allocation groups

The water allocation group for a water allocation is specified in Table 4. The water allocation group represents a water allocation security objective group specified in the Water Resource Plan (WRP).

Table 4: Water allocation groups

Location for water allocation	Zone	Water allocation group	Flow conditions for water allocations
Mackenzie River from the Isaac Mackenzie waterharvesting upstream limit to the Dawson River junction	Mackenzie A Mackenzie B Mackenzie C Mackenzie D Mackenzie E	Class 1A	2,592 ML/day passing flow
		Class 1B	4,320 ML/day passing flow
Nogoa and Mackenzie rivers from the Comet Mackenzie waterharvesting upstream limit to the Isaac Mackenzie waterharvesting upstream limit	Mackenzie F Mackenzie G Mackenzie H Mackenzie I Mackenzie J Mackenzie K	Class 2A	2,592 ML/day passing flow
		Class 2B	4,320 ML/day passing flow
Nogoa River from the Theresa Creek junction to the Comet Mackenzie waterharvesting upstream limit	Mackenzie L	Class 3A	2,592 ML/day passing flow

3 Water allocation security objectives

The water allocation security objectives are specified in the WRP.

Attachment 5.2C

Nogoa Mackenzie Water Management Area

Rules for conversion of existing area irrigated authorisations to water allocations

1 Locations where existing area-irrigated authorisations are being converted to water allocations

Existing area irrigated authorisations are being converted to water allocations on the Mackenzie River from the Springton Creek junction to the Dawson River junction.

2 Rules for conversion of existing authorisations to water allocations

The following rules apply for the conversion of existing area irrigated authorisations to water allocations to establish the details required for the registration of unsupplemented water allocations.

2.1 Location

The location from which water may be taken under a water allocation is specified as a zone according to the position of the existing authorisation. Descriptions of the zones for the Nogoa and Mackenzie rivers are given in Attachment 2.2.

2.2 Purpose

The purpose for which water may be taken under a water allocation is specified as either 'agriculture' or 'any'. 'Agriculture' is the nominated purpose for those existing authorisations that are primarily used for agricultural purposes. 'Any' is the nominated purpose for all other uses of water.

2.3 Maximum rate

The maximum rate (in litres per second) for taking water is the greater of:

- a) For an authorisation that states a maximum rate, the existing authorised rate; or
- b) A rate of 1 litre per second per hectare for the area stated on the existing authorisation; or
- c) A rate determined by the chief executive based on consideration of a submission on the draft Resource Operations Plan (ROP) about this rate. In consideration of a submission the chief executive will have regard to the existing diversion capacity as at 1 June 2002, and consistency with other authorisations in the same locality.

2.4 Volume

The volume for a water allocation comprises two elements – a volumetric limit and a nominal volume.

2.4.1 Volumetric limit

The volumetric limit (in megalitres) for conversion of an area-irrigated authorisation is calculated by multiplying the area (in hectares) stated on the existing authorisation by 6.

2.4.2 Nominal volume

The nominal volume for a water allocation is determined by sharing the long-term average annual amount of water expected to be taken by existing authorisations in the relevant water allocation security group.

The nominal volume (in megalitres) for conversion of an area-irrigated authorisation is calculated by multiplying the volumetric limit (in megalitres) determined under Section 2.4.1 by the nominal volume conversion factor given in Table 1.

Table 1: Nominal volume conversion factor

Location for water allocation	Zone	Flow conditions	Nominal volume conversion factor
Mackenzie River from the Springton Creek junction to the Dawson River junction	Mackenzie A	No flow condition, and 9 ML/day passing flow	0.88

2.5 Flow conditions

The flow conditions under which water may be taken are specified as a rate of passing flow translated from the flow requirements specified on the existing authorisation.

2.6 Water allocation groups

The water allocation group for a water allocation is specified in Table 2. The water allocation group represents a water allocation security objective group specified in the Water Resource Plan (WRP).

Table 2: Water allocation group

Location for water allocation	Zone	Water allocation group	Flow conditions for water allocations
Mackenzie River from the Springton Creek junction to the Dawson River junction	Mackenzie A	Class 4C	No flow condition, and 9 ML/day passing flow

3 Water allocation security objectives

The water allocation security objectives are specified in the WRP.

Attachment 5.2D

Nogoa Mackenzie Water Management Area

Amending existing waterharvesting authorisations

Waterharvesting authorisations on the Nogoa River from the Fairbairn Dam pond downstream to the Theresa Creek junction remain as water licences under this Resource Operations Plan (ROP). These licences are not being converted to water allocations because the performance of waterharvesting in this reach does not have a specified water allocation security objective in the Water Resource Plan. Waterharvesting in this reach is permitted only when Fairbairn Dam overflows at greater than 30 cumec, which occurs in fewer than 30 per cent of years.

These waterharvesting licences will be amended for consistency with the operating rules given in Attachment 5.2F and to specify a volumetric limit and a maximum rate for taking water.

1 Locations where existing waterharvesting authorisations will be amended

Existing waterharvesting licences will be amended on the Nogoa River from the upstream limit of Fairbairn Dam to the Theresa Creek junction (Zones Mackenzie N and M).

2 Details for amendment of existing authorisations

Amendments will be made to existing water licences as follows:

2.1 Location

The location from which water may be taken under a water licence will be amended to a zone according to the position of the existing authorisation. Descriptions of the zones for the Nogoa and Mackenzie rivers are given in Attachment 2.2.

2.2 Maximum rate

A maximum rate (in litres per second) for taking water under a water licence will be stated or amended if stated on the existing authorisation. The maximum rate will be the greater of:

- a) For an authorisation that states a maximum rate, the existing authorised rate; or
- b) For an authorisation that states a pump size, a rate decided by the chief executive using information from Table 1; or
- c) A rate determined by the chief executive for an authorisation having regard to the existing diversion capacity as at 1 June 2002, and consistency with other authorisations in the same locality. The existing diversion capacity for pumps will be considered at stream flow conditions within 2 metres above the flow conditions for the authorisation.

Table 1: Pump sizes and rates

Nominal pump size (mm)	Rate (L/s)		Nominal pump size (mm)	Rate (L/s)
32	7		200	185
40	12		250	250
50	17		300	300
65	30		350	350
80	45		400	430
100	65		500	650
125	90		600–660	1,100
150	115			
<i>(Note: Multiply litres per second by 0.0864 to convert to megalitres per day)</i>				

2.3 Volume

The volume for a water licence will state a volumetric limit.

The volumetric limit (in megalitres) is calculated by multiplying the maximum rate for taking water (expressed in megalitres per day) determined in Section 2.2 by 6 days. The performance indicators show that volume would occur in less than the 30th percentile wettest year based on the simulated diversion estimated to occur in this locality.

2.4 Operating rules

The flow conditions for all existing waterharvesting authorisations will be respecified as ‘2,592 ML/day passing flow’ for consistency with the operating rules in the ROP. 2,592 ML/day is equal to 30 cumec, the value stated on existing authorisations.

The terms and conditions about the arrangements for the taking of water stated on existing licences will be replaced by reference to the operating rules given in Attachment 5.2F.

Attachment 5.2E

Nogoa Mackenzie Water Management Area

Total rates and volumes for water allocations

Table 1: Total rates for taking water and volumes for water allocations with 2,592 ML/day passing flow conditions at Resource Operations Plan approval

Zone	For water allocations at Resource Operations Plan approval		
	Total rates for taking water (L/s)	Total volumes	
		Volumetric limit (ML)	Nominal volume (ML)
Mackenzie B	475	1,067	939
Mackenzie C	2,713	6,094	5,363
Mackenzie D	4,635	10,413	9,162
Mackenzie E	467	1,049	923
Mackenzie F	315	599	438
Mackenzie G	603	1,147	838
Mackenzie H	1,233	2,345	1,712
Mackenzie I	1,345	2,556	1,865
Mackenzie J	250	475	347
Mackenzie K	4,185	7,956	5,807
Mackenzie L	9,500	9,846	6,399
Total	25,721	43,547	33,793

Table 2: Total rates for taking water and volumes for water allocations with 4,320 ML/day passing flow conditions at Resource Operations Plan approval

Zone	For water allocations at Resource Operations Plan approval		
	Total rates for taking water (L/s)	Total volumes	
		Volumetric limit (ML)	Nominal volume (ML)
Mackenzie C	1,175	2,335	1,938
Mackenzie I	6,400	9,400	6,488
Mackenzie J	1,100	1,616	1,115
Mackenzie K	2,357	3,462	2,388
Total	11,032	16,813	11,929

Table 3: Total rates for taking water and volumes for water allocations with no passing flow conditions at Resource Operations Plan approval

Zone	For water allocations at Resource Operations Plan approval		
	Total rates for taking water (L/s)	Total volumes	
		Volumetric limit (ML)	Nominal volume (ML)
Mackenzie A	120	720	633

Attachment 5.2F

Nogoa Mackenzie Water Management Area Operating rules for water allocations and water licences with 2,592 and 4,320 ML/day passing flow conditions

These operating rules apply to water allocations and water licences with 2,592 and 4,320 ML/day passing flow conditions in the Nogoa Mackenzie Water Management Area, from the upstream limit of Fairbairn Dam to the Dawson River junction.

1 Water year

The water year is from 1 July to 30 June the following year.

2 Location from which water may be taken

The location from which water may be taken is described on each water allocation and water licence as a zone. Descriptions of zones for the Nogoa and Mackenzie rivers are given in Attachment 2.2.

3 Purpose for which water may be taken

The purpose for which water may be taken is stated on each water allocation or water licence. For the purpose of 'agriculture', water may be taken for agricultural purposes. For the purpose of 'any', water may be taken for any purpose.

4 Maximum volume of water taken

The maximum volume of water taken in any water year must not exceed the volumetric limit stated on a water allocation or water licence.

5 Maximum rate for taking water

The maximum rate that water may be taken is the maximum rate stated on a water allocation or water licence, averaged over any continuous 48-hour period.

Under the provisions of Chapter 8, the chief executive may change the specified continuous period having regard to water sharing between allocation holders and the objectives of the Water Resource Plan.

6 Flow conditions under which water may be taken

The passing flow conditions stated on a water allocation or water licence is the stream flow nominally required to pass downstream while water is being taken under the water allocation or water licence.

The chief executive will determine when the passing flow conditions exist and when water may be taken under arrangements given in Sections 7 and 8. A period of time during which

water may be taken is referred to as an announced period.

7 Announced periods for taking water

The chief executive will notify water allocation and water licence holders and the Resource Operations Licence (ROL) holder of the start and of the end of an announced period during which water may be taken.

Water may only be taken during announced periods, unless the chief executive has authorised an individual water allocation holder to take water outside of an announced period.

In some circumstances a water allocation holder may experience difficulty taking water during all or part of an announced period because of the characteristics of the flow event and the flow management location where the passing flow conditions are assessed under Section 8. Under these circumstances the chief executive may authorise a water allocation holder to take water outside an announced period under alternative arrangements if the chief executive is satisfied that:

- No significant adverse impacts on other water users are expected; and
- The authorisation given does not exceed the announced period applying to other water allocations in the same locality.

8 Determining announced periods for taking water

Subject to the requirements of the first post-winter flow management strategies in Section 9, for each management reach in Table 1 the chief executive will estimate the start and the end of a period during which the stream flow is estimated to exceed the passing flow conditions for each water allocation and water licence group. The stream flow will be assessed at the flow management locations in Table 1.

The announced period is subject to the following conditions:

- The chief executive may delay the notification of the start of an announced period for taking water up to a maximum of 24 hours from the estimated time when the passing flow conditions exist, provided the notification of the end of the announced period is extended by a similar time;
- The typical duration of an announced period should not vary by more than 12 hours from the total estimated time that the passing flows exist. The chief executive may extend a subsequent announced period to adjust for any variations in excess of 12 hours; and
- The chief executive may use information about stream flow other than at the flow measurement locations in Table 1 to determine an announced period.

Table 1: Management reaches and flow management locations for water allocations and water licences with 2,592 and 4,320 ML/day passing flow conditions

Management reach	Management reach description	Flow management location
Zones: Mackenzie A, B.	Coolmaringa Gauging Station to Dawson River junction	Coolmaringa Gauging Station
Zones: Mackenzie C, D, E.	Isaac Mackenzie waterharvesting upstream limit to Coolmaringa Gauging Station	Tartus Weir tailwater
Zones: Mackenzie F, G.	Effective upstream limit of Bingegang Weir to Isaac Mackenzie waterharvesting upstream limit	Bingegang Weir tailwater
Zones: Mackenzie H.	Bedford Weir to effective upstream limit of Bingegang Weir	Bedford Weir tailwater
Zones: Mackenzie I, J, K.	Comet Mackenzie waterharvesting upstream limit to Bedford Weir	Nogoa River and Comet River junction
Zones: Mackenzie L.	Theresa Ck junction to Comet Mackenzie waterharvesting upstream limit	Duckponds Gauging Station
Zones: Mackenzie M, N.	Upstream limit of Fairbairn Dam to Theresa Creek junction	Fairbairn Dam tailwater

9 Environmental flow management rules

9.1 First post-winter flow management strategy for waterharvesting for the Nogoa River upstream of the Comet Mackenzie waterharvesting upstream limit (Zones: Mackenzie L, M, N)

The following first post-winter flow management strategy applies to waterharvesting upstream of the Comet Mackenzie waterharvesting upstream limit (Zones: Mackenzie L, M, N).

The first post-winter flow management strategy commences at the earlier of:

- Activation of the Node 11 (Carnangarra) first post-winter flow management strategy for the Nogoa Mackenzie Water Supply Scheme; or
- 1 October.

The first post-winter flow management strategy ends at the earlier of:

- 4 days of flow greater than 2,592 ML/day passing Duckponds Gauging Station since the commencement of the strategy; or
- Finalisation of the Node 11 (Carnangarra) first post-winter flow management strategy for the Nogoa Mackenzie Water Supply Scheme; or
- 30 April.

For the full duration of the first post-winter flow management strategy, the chief executive will apply a 4,320 ML/day flow condition for all announced periods for waterharvesting.

9.2 First post-winter flow management strategy for waterharvesting for the Nogoia and Mackenzie rivers between the Comet Mackenzie waterharvesting upstream limit and Bedford Weir (Zones: Mackenzie I, J, K)

The following first post-winter flow management strategy applies to waterharvesting between the Comet Mackenzie waterharvesting upstream limit and Bedford Weir (Zones: Mackenzie I, J, K).

The first post-winter flow management strategy commences at the earlier of:

- Activation of the Node 11 (Carnangarra) first post-winter flow management strategy for the Nogoia Mackenzie Water Supply Scheme; or
- 1 October.

The first post-winter flow management strategy ends at the earlier of:

- 6 days of flow greater than 2,592 ML/day passing at the junction of the Nogoia and Comet Rivers since the commencement of the strategy; or
- Finalisation of the Node 11 (Carnangarra) first post-winter flow management strategy for the Nogoia Mackenzie Water Supply Scheme; or
- 30 April.

For the full duration of the first post-winter flow management strategy, the chief executive will apply a 4,320 ML/day flow condition for all announced periods for waterharvesting.

9.3 First post-winter flow management strategy for waterharvesting for the Mackenzie River between Bedford Weir and the Isaac Mackenzie waterharvesting upstream limit (Zones: Mackenzie F, G, H)

The following first post-winter flow management strategy applies to waterharvesting between Bedford Weir and the Isaac Mackenzie waterharvesting upstream limit (Zones: Mackenzie F, G, H).

The first post-winter flow management strategy commences at the earlier of:

- Activation of the Node 10 (Bingegang) first post-winter flow management strategy for the Nogoia Mackenzie Water Supply Scheme; or
- 1 October.

The first post-winter flow management strategy ends at the earlier of:

- 6 days of flow greater than 2,592 ML/day passing Bingegang Weir since the commencement of the strategy; or
- Finalisation of the Node 10 (Bingegang) first post-winter flow management strategy for the Nogoia Mackenzie Water Supply Scheme; or
- 30 April.

For the full duration of the first post-winter flow management strategy, the chief executive will apply a 4,320 ML/day flow condition for all announced periods for waterharvesting.

9.4 First post-winter flow management strategy for waterharvesting for the Mackenzie River between the Isaac Mackenzie waterharvesting upstream limit and the Dawson River junction (Zones: Mackenzie A, B, C, D, E)

The following first post-winter flow management strategy applies to waterharvesting between the Isaac Mackenzie waterharvesting upstream limit and the Dawson River junction (Zones: Mackenzie A, B, C, D, E).

The first post-winter flow management strategy commences at the earlier of:

- Activation of the Node 10 (Bingegang) first post-winter flow management strategy for the Nogoia Mackenzie Water Supply Scheme; or
- 1 October.

The first post-winter flow management strategy ends at the earlier of:

- 8 days of flow greater than 2,592 ML/day passing Coolmaringa Gauging Station since the commencement of the strategy; or
- Finalisation of the Node 10 (Bingegang) first post-winter flow management strategy for the Nogoia Mackenzie Water Supply Scheme; or
- 30 April.

For the full duration of the first post-winter flow management strategy, the chief executive will apply a 4,320 ML/day flow condition for all announced periods for waterharvesting.

10 Assessment of quantity of unsupplemented water taken

For the assessment of the quantity of unsupplemented water taken under a water allocation or water licence:

- A water allocation or water licence holder must advise the chief executive prior to taking unsupplemented water;
- A water allocation or water licence holder must provide recordings of water taken to the chief executive;
- Only water taken during announced periods may be taken as unsupplemented water unless otherwise authorised by the chief executive under Section 7;
- The chief executive will advise the Resource Operations Licence holder for the Nogoia Mackenzie Water Supply Scheme of the meter readings and the approved quantities of unsupplemented water taken within 7 business days of the conclusion of announced periods for all management reaches in the Nogoia Mackenzie Water Management Area; and
- Any water taken that is not in accordance with these rules for unsupplemented water and taken from within the limits of the Nogoia Mackenzie Water Supply Scheme will be treated as supplemented water.

11 Seasonal water assignment rules

A water allocation holder may apply under Section 142 of the Water Act for a seasonal water assignment for the water year in which the application is made.

Seasonal water assignment of water licences in the Nogoia Mackenzie Water Management Area is not permitted.

An application for a seasonal assignment of a water allocation located in zone Mackenzie A, B, C, D, or E will be approved for:

- All or part of that portion of the volumetric limit for the water allocation that has not been taken in the current water year; if
- The water under seasonal assignment is taken from within zone Mackenzie A, B, C, D or E.

An application for a seasonal assignment of a water allocation located in zone Mackenzie F, G, H, I, J or K will be approved for:

- All or part of that portion of the volumetric limit for the water allocation that has not been taken in the current water year; if
- The water under seasonal assignment is taken from within zone Mackenzie F, G, H, I, J or K.

An application for a seasonal assignment of a water allocation located in zone Mackenzie L will be approved for:

- All or part of that portion of the volumetric limit for the water allocation that has not been taken in the current water year; and
- The water under seasonal assignment is taken from within zone Mackenzie L.

On approval the chief executive will issue a water permit for the seasonal assignment. The conditions for the water permit will include:

- A maximum rate for taking water in the same proportion to the seasonal assignment volume as the maximum rate for taking water is to the volumetric limit stated on the water allocation under seasonal assignment; and
- A passing flow condition the same as the water allocation under seasonal assignment.

On approval of the water permit, the chief executive will reduce the volumetric limit for the current water year and the maximum rate for taking water for the remainder of the current water year for the water allocation under seasonal assignment by the volume and maximum rate specified for the water permit.

The holder of the seasonal assignment water permit must be a holder of a development permit for works used to take the seasonally assigned water.

12 Procedures

Details of procedures associated with the implementation of these operating rules may be obtained from the chief executive.

Attachment 5.2G

Nogoa Mackenzie Water Management Area

Operating rules for water allocations with up to 9 ML/day passing flow conditions

These operating rules apply to water allocations with up to 9 ML/day passing flow conditions in the Nogoa Mackenzie Water Management Area, from the Springton Creek junction to the Dawson River junction.

1 Water year

The water year is from 1 July to 30 June the following year.

2 Location from which water may be taken

The location from which water may be taken for a water allocation with a passing flow condition is described on the water allocation as a zone.

The location from which water may be taken for a water allocation without a passing flow condition is specified as two components on a water allocation. The first component is the zone specification. The second component is the position specification, which is the AMTD position along the river within the zone. The holders of these water allocations may take water below the cease to flow level of a waterhole at the AMTD location on the water allocation.

Descriptions of zones for the Nogoa and Mackenzie rivers are given in Attachment 2.2.

3 Purpose for which water may be taken

The purpose for which water may be taken is stated on each water allocation. For the purpose of ‘agriculture’, water may be taken for agricultural purposes. For the purpose of ‘any’, water may be taken for any purpose.

4 Maximum volume of water taken

The maximum volume of water taken in any water year must not exceed the volumetric limit stated on a water allocation.

5 Maximum rate for taking water

The maximum rate that water may be taken is the maximum rate stated on a water allocation, averaged over any continuous 48-hour period.

Under the provisions of Chapter 8, the chief executive may amend the specified continuous period having regard to water sharing between allocation holders and the objectives of the Water Resource Plan.

6 Flow conditions under which water may be taken

The passing flow conditions stated on a water allocation is the stream flow nominally required to pass downstream while water is being taken under the water allocation.

For water allocations with stated passing flow conditions, the chief executive will determine those periods when the passing flow conditions exist and when water may be taken by assessment of stream flows at the locations in Table 1. The chief executive will notify water allocation holders when the taking of water is permitted.

For water allocations without stated passing flow conditions, the limitations for taking water from waterholes given in Section 7 apply.

Table 1: Management reaches and flow management locations for water allocations with 9 ML/day passing flow conditions

Management reach	Flow management location
Zones: Mackenzie A	Mackenzie River at the Springton Creek junction

7 Drawdown conditions for waterholes

The following conditions apply to holders of water allocations without passing flow conditions who may take water below the cease to flow level of a waterhole:

- A water allocation holder must advise the chief executive prior to taking water from a waterhole more than 0.5 metres below the cease to flow level;
- A water allocation holder must keep a daily record of the level of a waterhole below cease to flow level when taking water from a waterhole more than 0.5 metres below the cease to flow level;
- The chief executive may limit the water that may be taken under a water allocation from a waterhole by notifying the holder of a water allocation if the chief executive is satisfied that limitations are necessary for protection of the natural ecosystem, or sharing the available water at times of water shortage. Limits on the water that may be taken may include any one or more of the following:
 - The times when water may be taken by a water allocation holder;
 - The purpose for which water may be taken; and
 - The volume of water that may be taken by a water allocation holder.

8 First post-winter flow management strategy

First post-winter flow management strategies do not apply.

9 Water allocation holder to record quantity of water taken

Each water allocation holder must record the quantity of water taken and provide the chief executive with those records.

10 Seasonal water assignment rules

A water allocation holder may apply under Section 142 of the Water Act for a seasonal water assignment for the water year in which the application is made.

10.1 Water allocations with 9 ML/day passing flow conditions

An application for a seasonal assignment of a water allocation with a 9 ML/day passing flow condition will be approved for:

- All or part of that portion of the volumetric limit for the water allocation that has not been taken in the current water year; if
- The water under seasonal assignment is taken from within zone Mackenzie A.

On approval the chief executive will issue a water permit for the seasonal assignment. The conditions for the water permit will include:

- A maximum rate for taking water in the same proportion to the seasonal assignment volume as the maximum rate for taking water is to the volumetric limit stated on the water allocation under seasonal assignment; and
- A passing flow condition of 9 ML/day.

On approval of the water permit, the chief executive will reduce the volumetric limit for the current water year and the maximum rate for taking water for the remainder of the current water year for the water allocation under seasonal assignment by the volume and maximum rate specified for the water permit.

The holder of the seasonal assignment water permit must be a holder of a development permit for works used to take the seasonally assigned water.

10.2 Water allocations with no passing flow conditions

An application for a seasonal assignment for a water allocation with no passing flow conditions will be approved for:

- All or part of the portion of the volumetric limit for the water allocation that has not been taken in the current water year; if
- The water under seasonal assignment will be taken from the same waterhole indicated by the AMTD position specified on the water allocation.

On approval the chief executive will issue a water permit for the seasonal assignment. The conditions specified for the water permit will include:

- A maximum rate for taking water in the same proportion to the seasonal assignment volume as the maximum rate for taking water is to the volumetric limit stated on the water allocation under seasonal assignment; and
- No passing flow condition.

On approval of the water permit, the chief executive will reduce the volumetric limit for the current water year and the maximum rate for taking water for the remainder of the current water year for the water allocation under seasonal assignment by the volume and maximum rate specified for the water permit.

The holder of the seasonal assignment water permit must be a holder of a development permit for works used to take the seasonally assigned water.

11 Procedures

Details of procedures associated with the implementation of these operating rules are

available from the chief executive.

Attachment 5.2H

Nogoa Mackenzie Water Management Area

Water allocation change rules

1 Permitted changes

Applications for the following changes to a water allocation will be approved. On approval a change certificate will be issued by the chief executive, which may be lodged with the registrar of water allocations.

1.1 Location

1.1.1 Water allocations with 2,592 or 4,320 ML/day passing flow conditions

A change to the location of a water allocation with a 2,592 or 4,320 ML/day passing flow condition from any one of the following zones to any other of those zones:

- Mackenzie A;
- Mackenzie B;
- Mackenzie C;
- Mackenzie D; or
- Mackenzie E.

A change to the location of a water allocation with a 2,592 or 4,320 ML/day passing flow condition from any one of the following zones to any other of those zones:

- Mackenzie F;
- Mackenzie G;
- Mackenzie H;
- Mackenzie I;
- Mackenzie J; or
- Mackenzie K.

1.1.2 Water allocations with no flow conditions

A change to the AMTD position specification for the location of a water allocation with no flow conditions to a new AMTD position on the same waterhole that applies to the allocation being changed.

A change to remove the AMTD specification of the location of a water allocation with no flow conditions. A passing flow condition of 9 ML/day will be set for the changed water allocation.

1.2 Purpose

A change to the purpose of a water allocation from 'any' to 'agriculture' or from 'agriculture' to 'any'.

1.3 Amalgamation or subdivision

A change to subdivide a water allocation into two or more water allocations, provided:

- The volumes and the maximum rates for each of the new water allocations are in the same proportion as the volumes and the maximum rates for the original water allocation; and
- The sum of the volumes and the maximum rates for the new water allocations is the same as the volumes and the maximum rate for the original allocation.

A change to amalgamate two or more water allocations with the same location and the same flow condition specifications, provided:

- The volumes and the maximum rate for the new water allocation are the combined volumes and the combined maximum rates specified for the original water allocations.

A change to amalgamate two or more water allocations with AMTD position specifications that apply to the same waterhole, provided:

- The volumes and rate for the new water allocation are the combined volumes and the combined rates of the original water allocations; and
- The AMTD specification for the new water allocation applies to the same waterhole as the original water allocations.

2 Prohibited changes

The following changes are prohibited changes.

2.1 Location

For a water allocation with a 2,592 ML/day or 4,320 ML/day passing flow condition, a change to a location that is not:

- Zone Mackenzie A, B, C, D, E, F, G, H, I, J, K, or L in the Nogoia Mackenzie Water Management Area; or
- Zone Fitzroy A, B, C, D, or E in the Fitzroy Water Management Area.

For a water allocation with a 9 ML/day passing flow condition or no flow condition, a change to a location that is not:

- Zone Mackenzie A in the Nogoia Mackenzie Water Management Area; or
- Zone Fitzroy D or Fitzroy E in the Fitzroy Water Management Area.

2.2 Purpose

A change to a purpose that is not 'agriculture' or 'any'.

2.3 Volume

A change to the volume of a water allocation that is not a consequence of a change to another attribute of a water allocation.

2.4 Rate

A change to the maximum rate of a water allocation that is not a consequence of a change to another attribute of a water allocation.

2.5 Supply of water under a resource operations licence

A change to a water allocation that would result in a water allocation being managed under a Resource Operations Licence.

2.6 Other

A change to a water allocation that requires an amendment to this ROP, other than an amendment provided for in Chapter 8.

3 Application for change under Section 130 of the Water Act

If a water allocation holder wishes to apply for a change to a water allocation that is not permitted under Section 1 above, and not prohibited under Section 2 above, then application may be made under Section 130 of the Water Act for the change.

The chief executive will deal with applications made under Section 130 of the Water Act, in accordance with the Water Act. That process is as follows:

- Notice of the application is published in local newspapers. The notice includes information about where the application can be inspected and invites submissions from the public on the application.
- The chief executive determines if the application should be approved having regard to the potential impact on a range of interests including other entitlement holders and aquatic ecosystems.
- If the chief executive approves the application, the chief executive will issue a change certificate that may be lodged with the registrar of water allocations.
- If the chief executive refuses the application, the Water Act provides for an appeal process.

4 Registration of change

If an application to change a water allocation is approved, the chief executive will issue a change certificate. The water allocation holder may lodge the change certificate with the registrar of water allocations who will change the water allocation on the water allocation register.

Attachment 5.3A

Fitzroy Water Management Area

Details of conversions to water allocations

Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
130	AGFORCE QUEENSLAND INDUSTRIAL UNION OF EMPLOYERS		SP		1	Fitzroy A	Agriculture	420	560	90	2592 ML / Day passing flow	Class 5A	173002
73			TC		1/2	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	41383U
			TC		1/2								
55	ANNCORP PTY LTD ACN 056637028		SP		1	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	46370U
172	ANNCORP PTY LTD ACN 056637328		SP		1	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	57462U
115			TC		1/2	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	38878WU
			TC		1/2								
181			TC		1/2	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	48414U
			TC		1/2								
426			TC		1/2	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	48415U
			TC		1/2								
6			SP		1	Fitzroy A	Agriculture	33	44	7	2592 ML / Day passing flow	Class 5A	27268U
150			TC		1/2	Fitzroy A	Agriculture	56	75	12	2592 ML / Day passing flow	Class 5A	35633U
			TC		1/2								
393			SP		1	Fitzroy A	Agriculture	80	106	17	2592 ML / Day passing flow	Class 5A	25936U
121			TC		1/2	Fitzroy A	Agriculture	56	75	12	2592 ML / Day passing flow	Class 5A	57480U
			TC		1/2								
284	BURNETT ASPHALTS PTY LTD ACN 010130177		SP		1	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	48572U
69			SP		1	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	41214U
139	CAPRICORN COUNTRY CLUB INC		SP		1	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	45314U
210			SP		1	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	28644U

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
156	[REDACTED]	[REDACTED]	TC		1/4	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	48496U
			TC		1/4								
			TC		1/4								
			TC		1/4								
384	[REDACTED]	[REDACTED]	TC		1/4	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	48497U
			TC		1/4								
			TC		1/4								
			TC		1/4								
389	[REDACTED]	[REDACTED]	TC		1/4	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	48498U
			TC		1/4								
			TC		1/4								
			TC		1/4								
204	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	80	106	17	2592 ML / Day passing flow	Class 5A	48517U
			TC		1/2								
105	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	26060U
49	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	80	106	17	2592 ML / Day passing flow	Class 5A	48333U
396	[REDACTED]	[REDACTED]											51579U
53	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	48598U
			TC		1/3								
			TC		1/3								
406	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	56	75	12	2592 ML / Day passing flow	Class 5A	48599U
			TC		1/3								
			TC		1/3								
414	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	56	75	12	2592 ML / Day passing flow	Class 5A	48600U
			TC		1/3								
			TC		1/3								
416	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	51401U
			TC		1/3								
			TC		1/3								
65	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	45399U
			TC		1/2								

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
148	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	26403U
	[REDACTED]	[REDACTED]	TC		1/2								
119	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	56	75	12	2592 ML / Day passing flow	Class 5A	57479U
	[REDACTED]	[REDACTED]	TC		1/2								
177	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	863	1151	185	2592 ML / Day passing flow	Class 5A	57498U
	[REDACTED]	[REDACTED]	TC		1/2								
67	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	171209
123	GEMKID PTY LTD ACN 098925127		TTE	TRUSTEE UNDER INSTRUMENT 705338813	1	Fitzroy A	Agriculture	80	106	17	2592 ML / Day passing flow	Class 5A	41356U
144	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	48495U
187	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	174609
164	[REDACTED]	[REDACTED]	TC		1/3								
	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	48505U
	[REDACTED]	[REDACTED]	TC		1/3								
54	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	46394U
	[REDACTED]	[REDACTED]	TC		1/2								
112	[REDACTED]	[REDACTED]	TC		1/3								
	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	41199U
	[REDACTED]	[REDACTED]	TC		1/3								
163	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	38838U
	[REDACTED]	[REDACTED]	TC		1/3								
428	[REDACTED]	[REDACTED]	TC		1/3	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	38839U
	[REDACTED]	[REDACTED]	TC		1/3								
430	[REDACTED]	[REDACTED]	TC		1/2								
	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	46154U
	[REDACTED]	[REDACTED]	TC		1/2								
184	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	41272U
	[REDACTED]	[REDACTED]	TC		1/2								
64	KARICROFT PTY LTD ACN 069332369		SP		1	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	45350U

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
218			SP		1	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	41344U
721			SP		1	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	48551U
117			TC		1/2	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	48471U
			TC		1/2								
224			TC		1/2	Fitzroy A	Agriculture	420	560	90	2592 ML / Day passing flow	Class 5A	45304U
			TC		1/2								
166			SP		1	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	19740U
128	M J PURNELL PTY LTD		TC		1/5	Fitzroy A	Agriculture	1166	1555	250	2592 ML / Day passing flow	Class 5A	41270U
	BOWEN PTY LTD		TC		1/5								
	MERTHYR INVESTMENTS PTY LTD		TC		1/5								
	MARIA DONATIU NO 2 PTY LTD		TC		1/5								
	RD DONATIU PTY LTD		TC		1/5								
63			TC		1/2	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	41159U
			TC		1/2								
59			TC		1/2	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	51667U
			TC		1/2								
80			SP		1	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	26327U
433	MJ PURNELL P/L		TC		1/5	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	45346U
	BOWEN P/L		TC		1/5								
	MERTHYR INV. P/L		TC		1/5								
	MARIA DONATIU NO 2 P/L		TC		1/5								
	R D DONATIU P/L		TC		1/5								
82			TC		1/2	Fitzroy A	Agriculture	1166	1555	250	2592 ML / Day passing flow	Class 5A	46288U
			TC		1/2								
91			SP		1	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	26371U
84			TC		1/2	Fitzroy A	Agriculture	56	75	12	2592 ML / Day passing flow	Class 5A	57441U
			TC		1/2								

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
107	PEARLBUTTON PTY LTD ACN 081690146		SP		1	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	41223U
418	PEARLBUTTON PTY LTD ACN 081690146		SP		1	Fitzroy A	Agriculture	80	106	17	2592 ML / Day passing flow	Class 5A	45357U
125			SP		1	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	41379U
134	QUEENSLAND CORRECTIVE SERVICES COMMISSION		SP		1	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	45344U
71	R-KEL PTY LTD ACN 060682331		TTE	TRUSTEE UNDER INSTRUMENT 706646594	1	Fitzroy A	Agriculture	140	187	30	2592 ML / Day passing flow	Class 5A	41372U
178			SP		1	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	48512U
61			TC		1/2	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	27421U
			TC		1/2								
58			TC		1/2	Fitzroy A	Agriculture	80	106	17	2592 ML / Day passing flow	Class 5A	40197U
			TC		1/2								
60			TC		1/2	Fitzroy A	Agriculture	80	106	17	2592 ML / Day passing flow	Class 5A	57430U
			TC		1/2								
57			SP		1	Fitzroy A	Agriculture	863	1151	185	2592 ML / Day passing flow	Class 5A	26062U
62	SUPERCOMP NO 36 PTY LTD ACN 068900185		SP		1	Fitzroy A	Agriculture	80	106	17	2592 ML / Day passing flow	Class 5A	57429U
			TC		1/5								
			TC		1/5								
232			TC		1/5	Fitzroy A	Agriculture	1400	1866	300	2592 ML / Day passing flow	Class 5A	51533U
			TC		1/5								
			TC		1/5								
			TC		1/5								
438			TC		1/5	Fitzroy A	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	48518U
			TC		1/5								
			TC		1/5								

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
441	[REDACTED]	[REDACTED]	TC		1/5	Fitzroy A	Agriculture	1400	1866	300	2592 ML / Day passing flow	Class 5A	48481U
			TC		1/5								
			TC		1/5								
			TC		1/5								
			TC		1/5								
169	UNI-FACT PTY LTD ACN 001082891		SP		1	Fitzroy A	Agriculture	1166	1555	250	2592 ML / Day passing flow	Class 5A	48563U, 48564U
391	UNI-FACT PTY LTD ACN 001082891		SP		1	Fitzroy A	Agriculture	420	560	90	2592 ML / Day passing flow	Class 5A	48564U
86	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	56	75	12	2592 ML / Day passing flow	Class 5A	57442U
			TC		1/2								
76	VANBROGUE PTY LTD ACN 010881704		SP		1	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	41182U
51	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	48335U
147	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	56	75	12	2592 ML / Day passing flow	Class 5A	25847U
109	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	210	280	45	2592 ML / Day passing flow	Class 5A	48426U
435	[REDACTED]	[REDACTED]	SP		1	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	48427U
182	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy A	Agriculture	303	404	65	2592 ML / Day passing flow	Class 5A	41237U
			TC		1/2								
197	[REDACTED]	[REDACTED]	TC		1/2	Fitzroy B	Agriculture	1166	1555	250	2592 ML / Day passing flow	Class 5A	57407U
			TC		1/2								
193	PETER O'BRIEN PTY LTD ACN 069166874		SP		1	Fitzroy B	Agriculture	1166	1555	250	2592 ML / Day passing flow	Class 5A	103535
213	[REDACTED]	[REDACTED]	SP		1	Fitzroy C	Agriculture	536	715	115	2592 ML / Day passing flow	Class 5A	103536
216	[REDACTED]	[REDACTED]	TC		1/20	Fitzroy C	Agriculture	2006	2675	430	2592 ML / Day passing flow	Class 5A	57500U
			TC		1/20								
			TC		9/20								
			TC		9/20								
231	BUTCROFT PTY LTD		SP		1	Fitzroy D (213.8)	Any	43	45	8	No flow conditions apply	Class 6C	48364U

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation
246			TC		1/2	Fitzroy D	Agriculture	63	72	12	9 ML / Day passing flow	Class 6C	51666U
			TC		1/2								
237			SP		1	Fitzroy D	Agriculture	131	180	30	260 ML / Day passing flow	Class 7D	57461U
223			SP		1	Fitzroy D (203.3)	Agriculture	346	360	60	No flow conditions apply	Class 6C	41239U
234			SP		1	Fitzroy D (220)	Agriculture	864	900	150	No flow conditions apply	Class 6C	35466U
239			SP		1	Fitzroy D	Agriculture	898	1032	172	9 ML / Day passing flow	Class 6C	51673U
			SP		1								
247			SP		1	Fitzroy D	Agriculture	753	1032	172	260 ML / Day passing flow	Class 7D	57459U
			SP		1								
253			SP		1	Fitzroy D (267.9)	Agriculture	317	330	55	No flow conditions apply	Class 6C	48351U
217			TC		1/2	Fitzroy D (185.2)	Agriculture	230	240	40	No flow conditions apply	Class 6C	17943U
			TC		1/2								
487			TC		1/2	Fitzroy D	Agriculture	88	120	20	260 ML / Day passing flow	Class 7D	17943U
			TC		1/2								
250			SP		1	Fitzroy D	Agriculture	209	240	40	9 ML / Day passing flow	Class 6C	51690U
255			TC		1/2	Fitzroy D (274.2)	Agriculture	576	600	130	No flow conditions apply	Class 6C	46272U, 57506U, 57507U
			TC		1/2								
251			TC		1/2	Fitzroy D	Agriculture	350	480	80	260 ML / Day passing flow	Class 7D	57474U
			TC		1/2								
252			TC		1/2	Fitzroy D	Agriculture	1166	1555	250	2592 ML / Day passing flow	Class 5A	57474U
			TC		1/2								
225			SP		1	Fitzroy D (211.3)	Agriculture	230	240	40	No flow conditions apply	Class 6C	41392U
219			TC		1/2	Fitzroy D	Agriculture	307	420	70	260 ML / Day passing flow	Class 7D	57468U
			TC		1/2								
268			TC		1/2	Fitzroy E (298.7)	Agriculture	369	384	64	No flow conditions apply	Class 6C	100025
			TC		1/2								

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Water allocation number	Family name/ Company	Given names	Tenancy type	Tenancy comments	Share of water allocation	Location (AMTD km)	Purpose	Nominal volume (ML/water year)	Volumetric limit (ML/ water year)	Maximum rate (L/s)	Flow conditions	Water allocation group	Converting authorisation	
267	[REDACTED]	[REDACTED]	SP		1	Fitzroy E	Agriculture	835	960	160	9 ML / Day passing flow	Class 6C	40209U	
259			TC		1/7		Fitzroy E	Agriculture	88	120	30	260 ML / Day passing flow	Class 7D	101493
			TC		1/7									
			TC		1/7									
			TC		1/7									
			TC		1/7									
			TC		1/7									
			TC		1/7									
257			TC		1/2		Fitzroy E (277.5)	Agriculture	144	150	25	No flow conditions apply	Class 6C	38820U
			TC		1/2									
898	TC		1/2		Fitzroy E (277.5)	Agriculture	720	750	125	No flow conditions apply	Class 6C	51590U		
	TC		1/2											
256	THE POCKET PTY LTD ACN 065951801		SP		1	Fitzroy E (277)	Agriculture	35	36	6	No flow conditions apply	Class 6C	51546U	
258	THE POCKET PTY LTD ACN 065951801		SP		1	Fitzroy E	Agriculture	548	750	125	260 ML / Day passing flow	Class 7D	101491	
260	THE POCKET PTY LTD ACN 065951801		SP		1	Fitzroy E (287.4)	Agriculture	720	750	125	No flow conditions apply	Class 6C	101492	
261	THE POCKET PTY LTD ACN 065951801		SP		1	Fitzroy E (290.2)	Agriculture	922	960	160	No flow conditions apply	Class 6C	48425U	
263	THE POCKET PTY LTD ACN 065951801		SP		1	Fitzroy E	Agriculture	863	1151	185	2592 ML / Day passing flow	Class 5A	48425U	
264	THE POCKET PTY LTD ACN 065951801		SP		1	Fitzroy E	Agriculture	876	1200	200	260 ML / Day passing flow	Class 7D	101490	
266	THE POCKET PTY LTD ACN 065951801		SP		1	Fitzroy E	Agriculture	1400	1866	300	2592 ML / Day passing flow	Class 5A	51412U	

SP: Sole Proprietor
TC: Tenants in Common
TTE: Trustee

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Attachment 5.3B

Fitzroy Water Management Area

Rules for conversion of existing waterharvesting authorisations to water allocations

1 Locations where existing waterharvesting authorisations are being converted to water allocations

Existing waterharvesting authorisations are being converted to water allocations on:

- The Fitzroy River from the Dawson River junction to the Fitzroy Barrage; and
- Sections of tributaries of the Fitzroy River for which access to flows in the above river section has been defined.

2 Rules for conversion of existing authorisations to water allocations

The following rules apply for the conversion of existing waterharvesting authorisations to water allocations to establish the details required for the registration of unsupplemented water allocations.

2.1 Location

The location from which water may be taken under a water allocation is specified as a zone according to the position of the existing authorisation. Descriptions of the zones for the Fitzroy River are given in Attachment 2.3.

2.2 Purpose

The purpose for which water may be taken under a water allocation is specified as either 'agriculture' or 'any'. 'Agriculture' is the nominated purpose for those existing authorisations that are primarily used for agricultural production. 'Any' is the nominated purpose for all other uses of water.

2.3 Maximum rate

With the exception of those authorisations in Table 2 for which the chief executive has previously stated a rate on the existing authorisation as a consequence of the requirements of the Water Resource Plan (WRP), the maximum rate (in litres per second) for taking water is the greater of:

- a) For an authorisation that states a maximum rate, the existing authorised rate; or
- b) For an authorisation that states a pump size, a rate decided by the chief executive using information from Table 1; or
- c) A rate determined by the chief executive based on consideration of a submission on the draft Resource Operations Plan (ROP) about this rate. In consideration of a submission the chief executive will have regard to the existing diversion capacity as at 1 June 2002, and consistency with other authorisations in the same locality. The existing diversion capacity for pumps will be considered at stream flow conditions within 2 metres above the flow conditions for the authorisation.

Table 1: Pump sizes and rates

Nominal pump size (mm)	Rate (L/s)		Nominal pump size (mm)	Rate (L/s)
32	7		200	185
40	12		250	250
50	17		300	300
65	30		350	350
80	45		400	430
100	65		500	650
125	90		600–660	1,100
150	115			

(Note: Multiply litres per second by 0.0864 to convert to megalitres per day)

Table 2: Authorisations for which maximum rates previously established

Authorisation No.	Basis for determining the maximum rate for taking water
57500U	This licence originally authorised a 400 mm turbine pump with a maximum pumping rate of 350 L/s. The authorised pump size was increased to 600 mm in 2002 on the basis the licensee agree to a maximum pumping rate of 430 L/s, which is consistent with the rate in Table 1.

2.4 Flow conditions

The flow conditions under which water may be taken are specified as a rate of passing flow.

The flow conditions are translated from the flow requirements specified on existing waterharvesting authorisations. For existing authorisations with flow conditions of equal to or less than 30 cumec, the flow condition is ‘2,592 ML/day passing flow’.

2.5 Volume

The volume for a water allocation comprises two elements – a volumetric limit and a nominal volume.

2.5.1 Volumetric limit

The volumetric limit (in megalitres) for conversion of a waterharvesting authorisation is calculated by multiplying the maximum rate for taking water (expressed in megalitres per day) determined in Section 2.3 by the 30th percentile water allocation security objective value (expressed in days) given in Table 3.

Table 3: 30th percentile water allocation security objectives and nominal volume conversion factor

Location for water allocation	Zone	Flow conditions	Water allocation security objective in 30% years	Nominal volume conversion factor
Fitzroy River from the Dawson River junction to the Fitzroy Barrage	Fitzroy A Fitzroy B Fitzroy C Fitzroy D Fitzroy E	2,592 ML/day passing flow	72 days	0.75

2.5.2 Nominal volume

The nominal volume for a water allocation is determined by sharing the long-term average amount of water expected to be taken by existing authorisations in the relevant water allocation security group.

The nominal volume (in megalitres) for conversion of a waterharvesting authorisation is calculated by multiplying the volumetric limit (in megalitres) determined under Section 2.5.1 by the nominal volume conversion factor given in Table 3.

2.6 Water allocation groups

The water allocation group for a water allocation is specified in Table 4. The water allocation group represents a water allocation security objective group specified in the Water Resource Plan (WRP).

Table 4: Water allocation groups

Location for water allocation	Zone	Water allocation group	Flow conditions for water allocations
Fitzroy River from the Dawson River junction to the Fitzroy Barrage	Fitzroy A Fitzroy B Fitzroy C Fitzroy D Fitzroy E	Class 5A	2,592 ML/day passing flow

3 Water allocation security objectives

The water allocation security objectives are specified in the WRP.

Attachment 5.3C

Fitzroy Water Management Area

Rules for conversion of existing authorisations other than waterharvesting to water allocations

1 Locations where existing authorisations are being converted to water allocations

Existing authorisations other than for waterharvesting are being converted to water allocations on the Fitzroy River from the Dawson River junction to the upstream limit of Eden Bann Weir.

2 Rules for conversion of existing authorisations to water allocations

The following rules apply for the conversion of existing authorisations other than for waterharvesting to water allocations to establish the details required for the registration of unsupplemented water allocations. The conversion details for each existing authorisation are given in Attachment 5.3A.

2.1 Location

The location from which water may be taken under a water allocation is specified as a zone according to the position of the existing authorisation. Descriptions of the zones for the Fitzroy River are given in Attachment 2.3.

2.2 Purpose

The purpose for which water may be taken under a water allocation is specified as either 'agriculture' or 'any'. 'Agriculture' is the nominated purpose for those existing authorisations that are primarily used for agricultural purposes. 'Any' is the nominated purpose for all other uses of water.

2.3 Maximum rate

The maximum rate (in litres per second) for taking water for conversion of existing area irrigated authorisations is the greater of:

- For an authorisation that states a maximum rate, the existing authorised rate; or
- A rate of 1 litre per second per hectare for the area stated on the existing authorisation; or
- A rate determined by the chief executive based on consideration of a submission on the draft Resource Operations Plan (ROP) about this rate. In consideration of a submission the chief executive will have regard to the existing diversion capacity as at 1 June 2002, and consistency with other authorisations in the same locality.

The maximum rate for taking water in converting existing water licence number 48364U (for industrial and mining purposes) has been set at 8 litres per second.

2.4 Volume

The volume for a water allocation comprises two elements a volumetric limit and a nominal

volume.

2.4.1 Volumetric limit

The volumetric limit (in megalitres) for conversion of an area irrigated authorisation is calculated by multiplying the area (in hectares) stated on the existing authorisation by 6.

The volumetric limit for the water allocation converted from existing water licence number 48364U (for industrial and mining purposes) is 45 megalitres, the same value as stated on the existing authorisation.

2.4.2 Nominal volume

The nominal volume for a water allocation is determined by sharing the long-term average annual amount of water expected to be taken by existing authorisations in the relevant water allocation security group.

The nominal volume (in megalitres) for conversion of an area-irrigated authorisation is calculated by multiplying the volumetric limit (in megalitres) determined under Section 2.4.1 by the nominal volume conversion factor given in Table 1.

Table 1: Nominal volume conversion factors

Location for water allocation	Zone	Flow conditions	Nominal volume conversion factor
Fitzroy River from the Dawson River junction to the upstream limit of Eden Bann Weir	Fitzroy D Fitzroy E	No flow condition	0.96
		9 ML/day passing flow	0.87
		260 ML/day passing flow	0.73

2.5 Flow conditions

The flow conditions under which water may be taken are specified as a rate of passing flow.

The flow conditions are translated from the flow requirements specified on existing authorisations as follows:

- For an existing authorisation with no stated flow conditions, a flow condition is not specified; or
- For an existing authorisation with a flow condition of up to 250 litres per second, the flow condition is '9 megalitres per day passing flow'; or
- For an existing authorisation with a flow condition of 3 cumec, the flow condition will be '260 megalitres per day passing flow'.

2.6 Water allocation groups

The water allocation group for a water allocation is specified in Table 2. The water allocation group represents a water allocation security objective group specified in the Water Resource Plan (WRP).

Table 2: Water allocation groups

Location for water allocation	Zone	Water	Flow conditions for
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		allocation group	water allocations
Fitzroy River from the Dawson River junction to the upstream limit of Eden Bann Weir	Fitzroy D Fitzroy E	Class 6C	No flow condition, and 9 ML/day passing flow
Fitzroy River from the Dawson River junction to the upstream limit of Eden Bann Weir	Fitzroy D Fitzroy E	Class 7D	260 ML/day passing flow

3 Water allocation security objectives

The water allocation security objectives are specified in the WRP.

Attachment 5.3D

Fitzroy Water Management Area

Total rates and volumes of water allocations

Table 1: Total rates for taking water and volumes for water allocations with 2,592 ML/day passing flow conditions at Resource Operations Plan approval

Zone	For water allocations at Resource Operations Plan approval		
	Total rates for taking water (L/s)	Volume	
		Volumetric limit (ML)	Nominal volume (ML)
Fitzroy A	5,274	32,811	24,604
Fitzroy B	500	3,110	2,332
Fitzroy C	545	3,390	2,542
Fitzroy D	685	4,261	3,195
Fitzroy E	485	3,017	2,263
Total	7,489	46,589	34,936

Table 2: Total rates for taking water and volumes for water allocations with 260 ML/day passing flow conditions at Resource Operations Plan approval

Zone	For water allocations at Resource Operations Plan approval		
	Total rates for taking water (L/s)	Volume	
		Volumetric limit (ML)	Nominal volume (ML)
Fitzroy D	372	2,232	1,629
Fitzroy E	355	2,070	1,512
Total	727	4,302	3,141

Table 3: Total rates for taking water and volumes for water allocations with 9 ML/day passing flow conditions at Resource Operations Plan approval

Zone	For water allocations at Resource Operations Plan approval		
	Total rates for taking water (L/s)	Volume	
		Volumetric limit (ML)	Nominal volume (ML)
Fitzroy D	224	1,344	1,170
Fitzroy E	160	960	835
Total	384	2,304	2,005

Table 4: Total rates for taking water and volumes for water allocations with no passing flow conditions at Resource Operations Plan approval

Zone	For water allocations at Resource Operations Plan approval		
	Total rates for taking water (L/s)	Volume	
		Volumetric limit (ML)	Nominal volume (ML)
Fitzroy D	483	2,715	2,606
Fitzroy E	505	3,030	2,910
Total	988	5,745	5,516

Attachment 5.3E

Fitzroy Water Management Area

Operating rules for water allocations with 2,592 and 4,320 ML/day passing flow conditions

These operating rules apply to water allocations with 2,592 and 4,320 ML/day passing flow conditions in the Fitzroy Water Management Area, from the Dawson River junction to the Fitzroy Barrage.

1 Water year

The water year is from 1 July to 30 June the following year.

2 Location from which water may be taken

The location from which water may be taken is described on each water allocation as a zone. Descriptions of the zones for the Fitzroy River are given in Attachment 2.3.

3 Purpose for which water may be taken

The purpose for which water may be taken is stated on each water allocation. For the purpose of ‘agriculture’, water may be taken for agricultural purposes. For the purpose of ‘any’, water may be taken for any purpose.

4 Maximum volume of water taken

The maximum volume of water taken in any water year must not exceed the volumetric limit stated on a water allocation.

5 Maximum rate for taking water

The maximum rate that water may be taken is the maximum rate stated on a water allocation, averaged over any continuous 72-hour period.

Under the provisions of Chapter 8, the chief executive may amend the specified continuous period having regard to water sharing between allocation holders and the objectives of the Water Resource Plan.

6 Flow conditions under which water may be taken

The passing flow conditions stated on a water allocation is the stream flow nominally required to pass downstream while water is being taken under the water allocation.

The chief executive will determine when the passing flow conditions exist and when water may only be taken under arrangements given in Sections 7 and 8. A period of time during which water may be taken is referred to as an announced period.

7 Announced periods for taking water

The chief executive will notify water allocation holders and the Resource Operations Licence (ROL) holders of the start and of the end of an announced period during which water may be taken.

Water may be taken only during announced periods.

8 Determining announced periods for taking water

Subject to the requirements of the first post-winter flow management strategies in Section 9, for each management reach in Table 1 the chief executive will estimate the start and the end of a period during which the stream flow is estimated to exceed the passing flow conditions for each water allocation group. The stream flow will be assessed at the flow management location in Table 1.

The announced period is subject to the following conditions:

- The chief executive may delay the notification of the start of an announced period for taking water up to a maximum of 72 hours from the estimated time when the passing flow conditions exist, provided the notification of the end of the announced period is extended by a similar time;
- The typical duration of an announced period should not vary by more than 48 hours from the total estimated time that the passing flows exist. The chief executive may extend a subsequent announced period to adjust for any variations in excess of 48 hours; and
- The chief executive may use information about stream flow other than at the flow measurement location in Table 1 to determine an announced period.

Table 1: Management reaches and flow management locations for water allocations with 2,592 and 4,320 ML/day passing flow conditions

Management reach	Management reach description	Flow management location
Zones: Fitzroy A, B, C, D, E	Dawson River junction to Fitzroy Barrage	Eden Bann Weir tailwater

9 Environmental flow management rules

9.1 First post-winter flow management strategy for waterharvesting in the Fitzroy Water Management Area (Zones: Fitzroy A, B, C, D, E.)

The following first post-winter flow management strategy applies to waterharvesting in the Fitzroy Water Management Area (Zones: Fitzroy A, B, C, D, E).

The first post-winter flow management strategy commences on 1 October.

The first post-winter flow management strategy ends at the earlier of:

- A total volume of 90,000 ML has passed Eden Bann Weir since the flow first exceeded 4,320 ML/day (50 cumec) at the waterharvesting flow management location given in Table 1; or
- 30 April.

For the full duration of the first post-winter flow management strategy, the chief executive will apply a 6,000 ML/day (approximately 70 cumec) flow condition for all announced periods for waterharvesting.

10 Assessment of quantity of unsupplemented water taken

For the assessment of the quantity of unsupplemented water taken under a water allocation:

- A water allocation holder must advise the chief executive prior to taking unsupplemented water;
- A water allocation holder must provide recordings of water taken to the chief executive;
- Only water taken during announced periods may be taken as unsupplemented water;
- The chief executive will advise the Resource Operations Licence holders for the Lower Fitzroy Water Supply Scheme and the Fitzroy Barrage Water Supply Scheme of the meter readings and the approved quantities of unsupplemented water taken within 7 business days of the conclusion of all announced periods for the Fitzroy Water Management Area; and
- Any water taken that is not in accordance with these rules for unsupplemented water and taken from within the limits of the Lower Fitzroy Water Supply Scheme or the Fitzroy Barrage Water Supply Scheme will be treated as supplemented water.

11 Seasonal water assignment rules

A water allocation holder may apply under Section 142 of the Water Act for a seasonal water assignment for the water year in which the application is made.

An application for a seasonal assignment of a water allocation located in zone Fitzroy A, B, C, D, or E will be approved for:

- All or part of that portion of the volumetric limit for the water allocation that has not been taken in the current water year; if
- The water under seasonal assignment is taken from within zone Fitzroy A, B, C, D or E.

On approval the chief executive will issue a water permit for the seasonal assignment. The conditions for the water permit will include:

- A maximum rate for taking water in the same proportion to the seasonal assignment volume as the maximum rate for taking water is to the volumetric limit stated on the water allocation under seasonal assignment; and
- A passing flow condition the same as the water allocation under seasonal assignment.

On approval of the water permit, the chief executive will reduce the volumetric limit for the current water year and the maximum rate for taking water for the remainder of the current water year for the water allocation under seasonal assignment by the volume and maximum rate specified for the water permit.

The holder of the seasonal assignment water permit must be a holder of a development permit for works used to take the seasonally assigned water.

12 Procedures

Details of procedures associated with the implementation of these operating rules may be obtained from the chief executive.

Attachment 5.3F

Fitzroy Water Management Area

Operating rules for water allocations with up to 260 ML/day passing flow conditions

These operating rules apply to water allocations with up to 260 ML/day passing flow conditions in the Fitzroy Water Management Area, from the Dawson River junction to the upstream limit of Eden Bann Weir.

1 Water year

The water year shall be from 1 July to 30 June the following year.

2 Location from which water may be taken

The location from which water may be taken for a water allocation with a passing flow condition is described on the water allocation as a zone.

The location from which water may be taken for a water allocation without a passing flow condition is specified as two components on a water allocation. The first component is the zone specification. The second component is the position specification, which is the AMTD position along the river within the zone. The holders of these water allocations may take water below the cease to flow level of a waterhole at the AMTD location on the water allocation.

Descriptions of the zones for the Fitzroy River are given in Attachment 2.3.

3 Purpose for which water may be taken

The purpose for which water may be taken is stated on each water allocation. For the purpose of 'agriculture', water may be taken for agricultural purposes. For the purpose of 'any', water may be taken for any purpose.

4 Maximum volume of water taken

The maximum volume of water taken in any water year must not exceed the volumetric limit stated on a water allocation.

5 Maximum rate for taking water

The maximum rate that water may be taken is the maximum rate stated on a water allocation, averaged over any continuous 72-hour period.

Under the provisions of Chapter 8, the chief executive may amend the specified continuous period having regard to water sharing between allocation holders and the objectives of the Water Resource Plan.

6 Flow conditions under which water may be taken

The passing flow conditions stated on a water allocation is the stream flow nominally required to pass downstream while water is being taken under the water allocation.

For water allocations with stated passing flow conditions, the chief executive will determine those periods when the passing flow conditions exist and when water may be taken by assessment of stream flows at the flow management location in Table 1. The chief executive will notify water allocation holders when the taking of water is permitted.

For water allocations without stated passing flow conditions the limitations for taking water from waterholes given in Section 7 apply.

Table 1: Management reaches and flow management locations for water allocations with up to 260 ML/day passing flow conditions

Management reach	Management reach description	Flow management location
Zones: Fitzroy D, E	Dawson River junction to upstream limit of Eden Bann Weir	Riverslea Gauging Station

7 Drawdown conditions for waterholes

The following conditions apply to holders of water allocations without passing flow conditions who may take water below the cease to flow level of a waterhole:

- A water allocation holder must advise the chief executive prior to taking water from a waterhole more than 0.5 metres below the cease to flow level;
- A water allocation holder must keep a daily record of the level of a waterhole below cease to flow level when taking water from a waterhole more than 0.5 metres below the cease to flow level;
- The chief executive may limit the water that may be taken under a water allocation from a waterhole by notifying the holder of a water allocation if the chief executive is satisfied that limitations are necessary for protection of the natural ecosystem, or sharing the available water at times of water shortage. Limits on the water that may be taken may include any one or more of the following:
 - The times when water may be taken by a water allocation holder;
 - The purpose for which water may be taken; and
 - The volume of water that may be taken by a water allocation holder.

8 First post-winter flow management strategy

First post-winter flow management strategies do not apply.

9 Water allocation holder to record quantity of water taken

Each water allocation holder must record the quantity of water taken and provide the chief executive with those records.

10 Seasonal water assignment rules

A water allocation holder may apply under Section 142 of the Water Act for a seasonal water

assignment for the water year in which the application is made.

10.1 Water allocations with 9 and 260 ML/day passing flow conditions

An application for a seasonal assignment of a water allocation with a 9 or 260 ML/day passing flow condition will be approved for:

- All or part of that portion of the volumetric limit for the water allocation that has not been taken in the current water year; if
- The water under seasonal assignment is taken from within either zone Fitzroy D or E.

On approval the chief executive will issue a water permit for the seasonal assignment. The conditions for the water permit will include:

- A maximum rate for taking water in the same proportion to the seasonal assignment volume as the maximum rate for taking water is to the volumetric limit stated on the water allocation under seasonal assignment; and
- A passing flow condition the same as the water allocation under seasonal assignment.

On approval of the water permit, the chief executive will reduce the volumetric limit for the current water year and the maximum rate for taking water for the remainder of the current water year for the water allocation under seasonal assignment by the volume and maximum rate specified for the water permit.

The holder of the seasonal assignment water permit must be a holder of a development permit for works used to take the seasonally assigned water.

10.2 Water allocations with no passing flow conditions

An application for a seasonal assignment of a water allocation with no passing flow conditions will be approved for:

- All or part of the portion of the volumetric limit for the water allocation that has not been taken in the current water year; if
- The water under seasonal assignment will be taken from the same waterhole indicated by the AMTD position specified on the water allocation.

On approval the chief executive will issue a water permit for the seasonal assignment. The conditions specified for the water permit will include:

- A maximum rate for taking water in the same proportion to the seasonal assignment volume as the maximum rate for taking water is to the volumetric limit stated on the water allocation under seasonal assignment; and
- No passing flow condition.

On approval of the water permit, the chief executive will reduce the volumetric limit for the current water year and the maximum rate for taking water for the remainder of the current water year for the water allocation under seasonal assignment by the volume and maximum rate specified for the water permit.

The holder of the seasonal assignment water permit must be a holder of a development permit for works used to take the seasonally assigned water.

11 Procedures

Details of procedures associated with the implementation of these operating rules can be obtained from the chief executive.

Attachment 5.3G

Fitzroy Water Management Area

Water allocation change rules

1 Permitted changes

Applications for the following changes to a water allocation will be approved. On approval a change certificate will be issued by the chief executive, which may be lodged with the registrar of water allocations.

1.1 Location

1.1.1 Water allocations with 2,592 or 4,320 ML/day passing flow conditions

A change to the location of a water allocation with a 2,592 or 4,320 ML/day passing flow condition from any one of the following zones to any other of those zones:

- Fitzroy A;
- Fitzroy B;
- Fitzroy C;
- Fitzroy D; or
- Fitzroy E.

1.1.2 Water allocations with 9 or 260 ML/day passing flow conditions

A change to the location of a water allocation with a 9 or 260 ML/day passing flow condition from any one of the following zones to any other of those zones:

- Fitzroy D; or
- Fitzroy E.

1.1.3 Water allocations with no flow conditions

A change to the AMTD position specification for the location of a water allocation with no flow conditions to a new AMTD position on the same waterhole that applied to the allocation being changed.

A change to remove the AMTD specification of the location of a water allocation with no flow conditions. A passing flow condition of 9 ML/day will be set for the changed water allocation.

1.2 Purpose

A water allocation holder may apply to change the purpose from 'any' to 'agriculture' or from 'agriculture' to 'any'.

1.3 Amalgamation or subdivision

A change to subdivide a water allocation into two or more water allocations, provided:

- The volumes and the maximum rates for each of the new water allocations are in the same proportion as the volumes and the maximum rates for the original water allocation; and
- The sum of the volumes and the maximum rates for the new water allocations is the same as the volumes and the maximum rates for the original allocation.

A change to amalgamate two or more water allocations with the same location and the same flow condition specifications, provided:

- The volumes and the maximum rate for the new water allocation are the combined volumes and the combined maximum rates specified for the original water allocations.

A change to amalgamate two or more water allocations with AMTD position specifications that apply to the same waterhole, provided:

- The volumes and rate for the new water allocation are the combined volumes and the combined rates of the original water allocations; and
- The AMTD specification for the new water allocation applies to the same waterhole as the original water allocations.

2 Prohibited changes

The following changes are prohibited changes.

2.1 Location

For a water allocation with a 2,592 ML/day or 4,320 ML/day passing flow condition, a change to a location that is not:

- Zone Fitzroy A, B, C, D, or E in the Fitzroy Water Management Area; or
- Zone Mackenzie A, B, C, D, E, F, G, H, I, J, K, or L in the Nogo Mackenzie Water Management Area.

For a water allocation with a 9 ML/day or 260 ML/day passing flow condition or no flow condition, a change to a location that is not:

- Zone Mackenzie A in the Nogo Mackenzie Water Management Area; or
- Zone Fitzroy D or Fitzroy E in the Fitzroy Water Management Area.

2.2 Purpose

A change to a purpose that is not 'agriculture' or 'any'.

2.3 Volume

A change to the volume of a water allocation that is not a consequence of a change to another attribute of a water allocation.

2.4 Rate

A change to the maximum rate of a water allocation that is not a consequence of a change to another attribute of a water allocation.

2.5 Supply of water under a resource operations licence

A change to a water allocation that would result in a water allocation being managed under a Resource Operations Licence.

2.6 Other

A change to a water allocation that requires an amendment to this ROP, other than an amendment provided for in Chapter 8.

3 Application for change under Section 130 of the Water Act

If a water allocation holder wishes to apply for a change to a water allocation that is not permitted under Section 1 above, and not prohibited under Section 2 above, then application may be made under Section 130 of the Water Act for the change.

The chief executive will deal with applications made under Section 130 of the Water Act, in accordance with the Water Act. That process is as follows:

- Notice of the application is published in local newspapers. The notice includes information about where the application can be inspected and invites submissions from the public on the application.
- The chief executive determines if the application should be approved having regard to the potential impact on a range of interests including other entitlement holders and aquatic ecosystems.
- If the chief executive approves the application, the chief executive will issue a change certificate that may be lodged with the registrar of water allocations.
- If the chief executive refuses the application, the Water Act provides for an appeal process.

4 Registration of change

If an application to change a water allocation is approved, the chief executive will issue a change certificate. The water allocation holder may lodge the change certificate with the registrar of water allocations who will change the water allocation on the water allocation register.

Attachment 5.4

Seasonal water assignment areas

1 Teviot Creek Dam and Burton Gorge Dam

1.1 Area

Seasonal water assignments of water licences are, subject to the rules in Section 1.2, allowed in the following areas:

- The ponded area of Teviot Creek Dam located on Teviot Creek at AMTD 31.0 km; and
- The ponded area of Burton Gorge Dam located on the Isaac River at AMTD 280.7 km.

1.2 Rules for seasonal water assignment

The following rules apply for seasonal water assignment of water licences for the area given in Section 1.1.

A water licence holder may apply under Section 142 of the Water Act for a seasonal water assignment.

Seasonal water assignments are permitted only for water licences that:

- Take water from the ponded area of Teviot Creek Dam and the ponded area of Burton Gorge Dam;
- Specify the amount of water to be taken; and
- Are metered.

The amount of water that may be seasonally assigned under a water licence in a water year may not exceed the unused portion of water for that water licence.

The water year is from 1 July to 30 June the following year.

Attachment 9.1

Implementation schedule

The Fitzroy Basin ROP 2003 was approved by the Governor in Council on 18 December 2003 and came into effect on 9 January 2004.

The ROP amendment (Revision 2) takes effect from the date approval of the amendment is notified in the Government Gazette. The ROP amendment (Revision 2) commences on the first business day after the amendment takes effect.

The following specifies requirements for ROP implementation.

1 Water supply schemes

1.1 Dawson Valley Water Supply Scheme

The operational arrangements for the Dawson Valley Water Supply Scheme commenced on 1 October 2004.

The ROL holder for the Dawson Valley Water Supply Scheme may, where the ROL holder is unable to meet the water quality monitoring requirements under the ROP amendment (Revision 2), continue to operate under the provisions of the ROP 2006 until 30 June 2010.

1.2 Nogoia Mackenzie Water Supply Scheme

The operational arrangements for the Nogoia Mackenzie Water Supply Scheme commenced on 1 July 2004.

The Fairbairn Dam river outlet must be capable of discharging to the river between 1,500 and 1,600 ML/day when the water level in Fairbairn Dam is at EL 199.0 m AHD within 3 years after the approval of the ROP 2003, unless otherwise authorised by the chief executive. In the interim the ROL holder for the Nogoia Mackenzie Water Supply Scheme may operate the scheme with the Fairbairn Dam river outlet having a discharge capacity of not less than that of the existing outlet works.

The ROL holder for the Nogoia Mackenzie Water Supply Scheme may, where the ROL holder is unable to meet the water quality monitoring requirements under the ROP amendment (Revision 2), continue to operate under the provisions of the ROP 2006 until 30 June 2010.

1.3 Lower Fitzroy Water Supply Scheme

The operational arrangements for the Lower Fitzroy Water Supply Scheme commenced on 1 July 2004.

The ROL holder for the Lower Fitzroy Water Supply Scheme may, where the ROL holder is unable to meet the water quality monitoring requirements under the ROP amendment

(Revision 2), continue to operate under the provisions of the ROP 2006 until 30 June 2010.

1.4 Fitzroy Barrage Water Supply Scheme

The operational arrangements for the Fitzroy Barrage Water Supply Scheme commenced on 1 July 2004.

The ROL holder for the Fitzroy Barrage Water Supply Scheme may, where the ROL holder is unable to meet the water quality monitoring requirements under the ROP amendment (Revision 2), continue to operate under the provisions of the ROP 2006 until 30 June 2010.

2 Water management areas

2.1 Dawson Valley Water Management Area

The operational arrangements for the Dawson Valley Water Management Area commenced on 1 October 2004.

2.2 Nogo Mackenzie Water Management Area

The operational arrangements for the Nogo Mackenzie Water Management Area commenced on 1 July 2004.

2.3 Fitzroy Water Management Area

The operational arrangements for the Fitzroy Water Management Area commenced on 1 July 2004.

3 Interim arrangements

The chief executive may approve interim administrative arrangements for the implementation of matters not specifically referred to in this implementation schedule.

Attachment 9.2 Amendment history

The Fitzroy Basin ROP 2003 was approved by the Governor in Council on 18 December 2003 and came into effect on 9 January 2004.

The ROP has been amended as follows:

Revision 1 (April 2006) under section 106 of the *Water Act 2000*

Revision 2 (July 2009) under sections 105 and 106 of the *Water Act 2000*



Queensland

Water Resource (Fitzroy Basin) Plan 2010

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made under the

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Chapter 1 Preliminary

1 Short title

This plan may be cited as the *Water Resource (Fitzroy Basin) Plan 2010*.

2 Purposes of plan

The following are the purposes of this plan—

- (a) to define the availability of water in the plan area;
- (b) to provide a framework for sustainably managing water and the taking of water;
- (c) to identify priorities and mechanisms for dealing with future water requirements;
- (d) to provide a framework for establishing water allocations;
- (e) to provide a framework for minimising, where practicable, degradation in natural ecosystems;
- (f) to regulate the taking of overland flow water;
- (g) to regulate the taking of groundwater.

3 Definitions

The dictionary in schedule 13 defines particular words used in this plan.

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Chapter 2 Plan area and water to which plan applies

4 Plan area

This plan applies to the area shown as the plan area on the map in schedule 1.

5 Subcatchment areas

Each part of the plan area that is within a subcatchment area shown on the map in schedule 2 is a subcatchment area for this plan.

6 Groundwater management areas

Each part of the plan area that is within a groundwater management area shown on the map in schedule 3 is a groundwater management area for this plan.

7 Groundwater units and groundwater sub-areas

- (1) The Callide groundwater management area consists of the following (each a *groundwater unit*)—
 - (a) Callide Groundwater Unit 1, containing the aquifers of the quaternary alluvium;
 - (b) Callide Groundwater Unit 2, containing all subartesian aquifers within the Callide groundwater management area other than the aquifers included in Callide Groundwater Unit 1.
- (2) Each of the following areas of the Callide Groundwater Unit 1 shown on maps A to D in schedule 4 is a groundwater sub-area for this plan—
 - (a) Upper Callide groundwater sub-area;
 - (b) Lower Callide groundwater sub-area;

- (c) Prospect Creek groundwater sub-area;
- (d) Don and Dee groundwater sub-area.
- (3) The Isaac Connors groundwater management area consists of the following (also each a ***groundwater unit***)—
 - (a) Isaac Connors Groundwater Unit 1, containing the aquifers of the quaternary alluvium;
 - (b) Isaac Connors Groundwater Unit 2, containing all subartesian aquifers within the Isaac Connors groundwater management area other than the aquifers included in Isaac Connors Groundwater Unit 1.
- (4) The area of Isaac Connors Groundwater Unit 1 shown on map E in schedule 4 is the Isaac Connors Alluvium groundwater sub-area for this plan.
- (5) The Highlands groundwater management area consists of the following (also each a ***groundwater unit***)—
 - (a) Highlands Groundwater Unit 1, containing the aquifers of the quaternary alluvium;
 - (b) Highlands Groundwater Unit 2, containing all subartesian aquifers within the Highlands groundwater management area other than the aquifers included in Highlands Groundwater Unit 1.
- (6) The area of Highlands Groundwater Unit 1 shown on map F in schedule 4 is the Sandy Creek Alluvium groundwater sub-area for this plan.
- (7) The Fitzroy groundwater management area consists of the following (also each a ***groundwater unit***)—
 - (a) Fitzroy Groundwater Unit 1, containing the aquifers of the modern coastal deposits;
 - (b) Fitzroy Groundwater Unit 2, containing all subartesian aquifers within the Fitzroy groundwater management area other than the aquifers included in Fitzroy Groundwater Unit 1.

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8 Information about areas

- (1) The exact location of the boundaries of the plan area, subcatchment areas, groundwater management areas and groundwater sub-areas is held in digital electronic form by the department.
- (2) The information held in digital electronic form can be reduced or enlarged to show the details of the boundaries.

9 Nodes

- (1) A node mentioned in this plan is a place—
 - (a) on a watercourse in the plan area; or
 - (b) in a groundwater management area in the plan area.
- (2) The location of each node is—
 - (a) shown on the map in schedule 5, part 1 or schedule 5, part 2; and
 - (b) described in schedule 5, part 3 or schedule 5, part 4.
- (3) Each node is identified on the map by a number.

10 Water to which plan applies

- (1) This plan applies to the following water (*surface water*) in the plan area—
 - (a) water in a watercourse or lake;
 - (b) water in a spring not connected to—
 - (i) artesian water; or
 - (ii) subartesian water connected to artesian water;
 - (c) overland flow water other than water in a spring connected to—
 - (i) artesian water; or
 - (ii) subartesian water connected to artesian water.
- (2) This plan also applies to groundwater in the plan area.

Chapter 3 Outcomes for sustainable management of water

11 Outcomes for water in plan area

Water is to be allocated and sustainably managed in a way that—

- (a) recognises the natural state of watercourses, lakes, springs and aquifers has changed because of the taking of, and interfering with, water; and
- (b) seeks to achieve a balance in the following outcomes—
 - (i) the general outcomes mentioned in section 12;
 - (ii) the specific surface water and groundwater outcomes mentioned in section 13;
 - (iii) the general ecological outcomes mentioned in section 14;
 - (iv) the specific ecological outcomes mentioned in section 15.

12 General outcomes

Each of the following is a general outcome for water in the plan area—

- (a) to provide for the use of water entitlements and other authorisations in the plan area;
- (b) to provide for the continued use of existing overland flow works;
- (c) to provide for the continued use of existing groundwater works;
- (d) to protect the probability of being able to take water under a water allocation;
- (e) to support water-related cultural values including the values of the traditional owners in the plan area;

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- (f) to provide mechanisms that support water being made available for the following—
 - (i) population growth in towns and communities dependent on water resources in the plan area;
 - (ii) growth in industries dependent on water resources in the plan area;
 - (iii) stock or domestic purposes in the plan area;
 - (iv) Indigenous communities dependent on water resources in the plan area to achieve their economic and social aspirations;
- (g) to support flexible and diverse water supply arrangements for consumptive water users;
- (h) to maintain flows that support water-related aesthetic, economic and recreational values in the plan area, including, for example, tourism;
- (i) to encourage continual improvement in the efficient use of water;
- (j) to provide a flow regime that supports the quality of water for human and ecological use.

13 Specific surface water and groundwater outcomes

- (1) Each of the following is a specific outcome for surface water in the plan area—
 - (a) to make water available in the Isaac Connors subcatchment to support—
 - (i) water supplies for mining; and
 - (ii) growth in the population of towns and communities, industry and agriculture;
 - (b) to make water available in the Upper Dawson and Lower Dawson subcatchments to support—
 - (i) water supplies for mining and industry; and

-
- (ii) growth in the population of towns and communities and agriculture;
 - (c) to make water available in the Fitzroy subcatchment to support urban, industrial and other uses.
 - (2) Each of the following is a specific outcome for groundwater in the Upper Callide, Lower Callide and Prospect Creek groundwater sub-areas and the Callide Valley Water Supply Scheme—
 - (a) to provide for the use of groundwater that can be sustained in the long term;
 - (b) to provide for increased security for town water supplies and rural water supply boards that rely on groundwater;
 - (c) to provide security of supply for existing enterprises that rely on groundwater.

14 General ecological outcomes

Each of the following is a general ecological outcome for water in the plan area—

- (a) to minimise changes to the natural variability of flows that support aquatic ecosystems;
- (b) to provide for the continued capability of 1 part of the river system to be connected to another, including by maintaining flows that—
 - (i) allow for the movement of native aquatic fauna between riverine, floodplain, wetland, estuarine and marine environments; and
 - (ii) support water-related ecosystems; and
 - (iii) support river-forming processes;
- (c) to provide a flow regime that—
 - (i) maintains delivery of fresh water to the estuaries of watercourses and the Great Barrier Reef Lagoon; and

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- (ii) supports productivity in the receiving waters of the Great Barrier Reef and inshore reefs;
- (d) to improve understanding of the matters affecting the flow-related health of ecosystems in the plan area;
- (e) to minimise the impact of the taking of water on aquatic ecosystems, including ecological assets;
- (f) to protect and maintain refugia associated with waterholes, lakes and wetlands;
- (g) to support surface water and groundwater interactions;
- (h) to support ecosystems dependent on groundwater including, for example, riparian vegetation and wetlands.

15 Specific ecological outcomes

Each of the following is a specific ecological outcome for water in the plan area—

- (a) to protect flows and water quality for flow-spawning fish and endemic species, including, for example, the Fitzroy golden perch (*Macquaria ambigua orientalis*);
- (b) to provide for flows necessary for estuarine ecosystem functions, including flows for—
 - (i) barramundi (*Lates calcarifer*) and king threadfin salmon (*Polydactylus macrochir*) recruitment; and
 - (ii) banana prawn (*Penaeus merguensis*) growth;
- (c) to provide for groundwater levels to support relevant groundwater-dependent ecosystems and wetlands that rely on groundwater in—
 - (i) the Upper Callide groundwater sub-area; and
 - (ii) the Lower Callide groundwater sub-area; and
 - (iii) the Prospect Creek groundwater sub-area; and
 - (iv) the Callide Valley Water Supply Scheme;

-
- (d) to maintain groundwater discharge to watercourses in the Isaac Connors groundwater management area.

Chapter 4 Performance indicators and objectives

Part 1 Environmental flow objectives

Division 1 Surface water

16 Performance indicators for environmental flow objectives

The performance indicators for the environmental flow objectives are—

- (a) for assessing periods of low flow—the base flow; and
- (b) for assessing periods of medium to high flow, the following—
 - (i) mean annual flow;
 - (ii) median annual flow ratio;
 - (iii) annual proportional flow deviation;
 - (iv) mean wet season flow;
 - (v) 4% daily exceedance duration flow;
 - (vi) 10% daily exceedance duration flow;
 - (vii) 2 year daily flow volume;
 - (viii) 5 year daily flow volume;
 - (ix) 20 year daily flow volume; and

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- (c) for assessing the first post-winter flow event—the performance indicators listed in schedule 6, part 3.

17 Environmental flow objectives

The environmental flow objectives for surface water for this plan are stated in schedule 6, parts 1 to 3.

Division 2 Groundwater

18 Performance indicators for environmental flow objectives—relevant groundwater-dependent ecosystems

The performance indicator for the environmental flow objectives for assessing groundwater levels to support relevant groundwater-dependent ecosystems is the drawdown duration.

19 Environmental flow objectives

The environmental flow objectives for groundwater for this plan are stated in schedule 6, part 4.

Part 2 Water allocation security objectives

20 Performance indicators for water allocation security objectives

The performance indicators for the water allocation security objectives are—

- (a) for taking supplemented surface water, the following—
 - (i) annual supplemented water sharing index;

- (ii) monthly supplemented water sharing index; and
- (b) for taking unsupplemented surface water—the annual volume probability; and
- (c) for taking supplemented groundwater—the annual supplemented water sharing index; and
- (d) for taking unsupplemented groundwater—the annual volume probability.

21 Water allocation security objectives

The water allocation security objectives for this plan are stated in—

- (a) for water allocations to take supplemented water—schedule 7, part 1; and
- (b) for water allocations to take unsupplemented surface water—schedule 7, part 2; and
- (c) for water allocations to take unsupplemented groundwater—schedule 7, part 3.

Chapter 5 Strategies for achieving outcomes

Part 1 Strategies for both surface water and groundwater

Division 1 General provisions

22 Application of pt 1

This part applies to surface water and groundwater.

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23 Decisions to be consistent with objectives

Decisions about the allocation or management of water in the plan area, other than a decision about a water permit, must be consistent with—

- (a) the environmental flow objectives stated in schedule 6; and
- (b) the water allocation security objectives stated in schedule 7.

24 Assessing impact of decisions about surface water

- (1) The IQQM computer program’s simulation for the simulation period is used to assess consistency with the environmental flow objectives and the water allocation security objectives for surface water.
- (2) If it is not practicable to use the IQQM computer program, another assessment method approved by the chief executive may be used.
- (3) The chief executive may approve an assessment method for subsection (2) only if the chief executive is satisfied the method will assess consistency with the objectives at least as accurately as the IQQM computer program.

25 Assessing impact of decisions about groundwater

- (1) The Callide Valley groundwater computer program’s simulation for the simulation period is used to assess consistency with the environmental flow objectives and the water allocation security objectives for groundwater.
- (2) If it is not practicable to use the Callide Valley groundwater computer program, another assessment method approved by the chief executive may be used.
- (3) The chief executive may approve an assessment method for subsection (2) only if the chief executive is satisfied the method will assess consistency with the objectives at least as

accurately as the Callide Valley groundwater computer program.

26 Measuring devices

A measuring device is to be used to measure the volume of water taken under the following water entitlements in the plan area—

- (a) an interim water allocation;
- (b) a water allocation;
- (c) a water licence for taking water.

Note—

For the compulsory use of meters for taking water in the State, see the *Water Regulation 2002*, part 7.

27 Matters to be considered for environmental management rules

- (1) In deciding the environmental management rules to be included in the resource operations plan, the chief executive is to consider—
 - (a) the streamflows required to maintain the following—
 - (i) the longitudinal connectivity of low flow habitats throughout river systems in the plan area;
 - (ii) the wetted habitats at riffles and other streambed features;
 - (iii) the natural seasonality of flows;
 - (iv) the replenishment of refuge pools that enable movement of instream biota;
 - (v) the lateral connectivity between rivers in the plan area and their adjacent riverine environments including floodplains;

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- (vi) the connectivity, through the flow of water, between a watercourse, lake or spring and groundwater to replenish aquifers;
- (vii) the first post-winter flow event at nodes downstream of supplemented water infrastructure; and
- (b) the distance of a water bore from a watercourse, lake, spring or area of ecological value; and
- (c) the groundwater levels required to maintain the following—
 - (i) habitats needed by aquatic biota in hyporheic zones;
 - (ii) relevant groundwater-dependent ecosystems;
 - (iii) the connectivity through the flow of water between an aquifer and an adjacent watercourse, lake or spring to replenish instream pools and enable movement of instream aquatic biota;
 - (iv) the natural seasonality of low flows; and
- (d) the impact the taking of, or interfering with, water may have on the following—
 - (i) instream water levels;
 - (ii) water quality;
 - (iii) baseflow;
 - (iv) groundwater levels;
 - (v) the natural movement of sediment;
 - (vi) the bed and banks of a watercourse or lake;
 - (vii) riparian vegetation;
 - (viii) habitats for native plants and animals;
 - (ix) the contribution from aquifers to the flow of water in watercourses;
 - (x) the inundation of habitats;

- (xi) the movement of fish and other aquatic animals;
 - (xii) the ecological values of waterholes, lakes, springs, relevant groundwater-dependent ecosystems or hyporheic zones;
 - (xiii) the recreation and aesthetic values of the plan area;
 - (xiv) cultural values including, for example, cultural values of traditional owners of an area.
- (2) Subsection (1) does not limit the matters the chief executive may consider.

28 Matters to be considered for water sharing rules

- (1) In deciding the water sharing rules to be included in the resource operations plan, for authorisations to take water in a part of the plan area, the chief executive is to consider—
- (a) for rules relating to supplemented surface water, the following—
 - (i) any existing water sharing arrangements;
 - (ii) the extent to which any existing water supply arrangements are linked to the natural occurrence of streamflows;
 - (iii) the frequency, duration, magnitude and timing of limited water availability;
 - (iv) the impact of the rules on authorisations to take water in the plan area;
 - (v) the impact of the rules on unsupplemented water allocations, particularly as assessed under—
 - (A) the 30% unsupplemented water sharing index; and
 - (B) the 50% unsupplemented water sharing index; and
 - (C) the 70% unsupplemented water sharing index; and

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- (b) for rules relating to unsupplemented surface water, the following—
 - (i) any existing water sharing arrangements;
 - (ii) the local availability of water that may be taken from streamflows, waterholes or bedsands;
 - (iii) the conditions for taking water;
 - (iv) the volumetric limits for the water entitlements;
 - (v) the impact of the rules on authorisations to take water in the plan area;
 - (vi) the impact of the rules on unsupplemented water allocations, particularly as assessed under—
 - (A) the 30% unsupplemented water sharing index; and
 - (B) the 50% unsupplemented water sharing index; and
 - (C) the 70% unsupplemented water sharing index; and
- (c) for rules relating to groundwater in the Upper Callide, Lower Callide and Prospect Creek groundwater sub-areas and the Callide Valley Water Supply Scheme—
 - (i) the matters mentioned in paragraph (e); and
 - (ii) the range of historical water levels in the groundwater sub-areas and Callide Valley Water Supply Scheme from 1970 to 2007; and
- (d) for rules relating to groundwater in Isaac Connors Groundwater Unit 1—
 - (i) the matters mentioned in paragraph (e); and
 - (ii) the range of historical water levels and extraction in the Braeside Borefield; and
- (e) for rules relating to other groundwater, the following—

- (i) any existing water sharing arrangements;
 - (ii) the local availability of water that may be taken from aquifers;
 - (iii) the connectivity of surface water and groundwater;
 - (iv) the impact of the taking of groundwater on authorisations in the groundwater management areas;
 - (v) the operating arrangements and supply requirements for any water infrastructure;
 - (vi) the volumetric limits for water entitlements.
- (2) Subsection (1) does not limit the matters the chief executive may consider.
- (3) In this section—
- existing water sharing arrangements* means water sharing rules specified in the following on the day this plan is notified—
- (a) the Fitzroy Basin Resource Operations Plan 2004;
 - (b) the *Water Regulation 2002*;
 - (c) the Callide Valley Water Supply Scheme interim resource operations licence (IROL);
 - (d) the Department of Environment and Resource Management's policy no. WMU/2005/2209 for the Callide Valley groundwater management area.

29 Matters to be considered for water allocation change rules

- (1) In deciding the water allocation change rules to be included in the resource operations plan for authorisations to take surface water in a part of the plan area, the chief executive is to consider—

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- (a) the implications for the availability of water under water allocations of changes to the frequency, duration, magnitude and timing of limited water availability; and
 - (b) the impact of the rules on unsupplemented water allocations, particularly as assessed under—
 - (i) the 30% unsupplemented water sharing index; and
 - (ii) the 50% unsupplemented water sharing index; and
 - (iii) the 70% unsupplemented water sharing index.
- (2) In deciding the water allocation change rules to be included in the resource operations plan for authorisations to take groundwater, the chief executive is to consider—
- (a) the volume density for a locality in part of the groundwater management area relative to the availability of water in that part; and
 - (b) the impact the proposed taking of groundwater would have on the following—
 - (i) watercourses, lakes, springs, baseflows, waterholes, groundwater levels or areas of ecological value;
 - (ii) the ecological values of relevant groundwater-dependent ecosystems;
 - (iii) water quality;
 - (iv) other authorisations in the area of the proposed taking; and
 - (c) existing management zones; and
 - (d) for water allocations to take water in the Callide Valley Water Supply Scheme—the ability of an allocation holder to change the priority group of water allocations from medium to high B.
- (3) Subsections (1) and (2) do not limit the matters the chief executive may consider.

30 Matters to be considered for infrastructure operating rules

- (1) In deciding the infrastructure operating rules to be included in the resource operations plan for water infrastructure or proposed infrastructure for supplemented water, the chief executive is to consider the following—
 - (a) the impact of the infrastructure's or proposed infrastructure's operation on the following—
 - (i) water quality;
 - (ii) instream water levels;
 - (iii) groundwater levels;
 - (iv) beds and banks of watercourses;
 - (v) riparian vegetation;
 - (b) the extent to which artificial variations in instream water levels and flows may adversely affect natural ecosystems;
 - (c) the impact of the transfer of water between watercourses;
 - (d) the likelihood of aquatic fauna deaths caused by the operation of the infrastructure;
 - (e) the matters mentioned in section 27(1)(a) and (d).
- (2) Subsection (1) does not limit the matters the chief executive may consider.

[s 31]

Division 2 Continued effect of moratorium and interim arrangements for applications

31 Continued effect of moratorium notice published on 13 September 2001—Act, s 46(3)

- (1) This section amends and continues, in part, the effect of the moratorium notice published on 13 September 2001 and amended on 29 October 2001, 10 December 2003 and 17 May 2004 and continued under the previous water resource plan.
- (2) Until an amendment to the resource operations plan, in relation to overland flow water, is approved—
 - (a) new works must not be physically started; and
 - (b) completed, or partly completed, works in existence must not be raised, enlarged or deepened.
- (3) Subsection (2) applies only to works for taking or storing water from a watercourse, lake or spring that may increase the taking of overland flow water, if the works are for taking or storing water from the following watercourses—
 - (a) Theresa Creek from its junction with Retreat Creek at AMTD 15.0km to its junction with the Nogoia River;
 - (b) Retreat Creek, including anabranes, from its junction with Kettle Creek at AMTD 23.6km to its junction with Theresa Creek;
 - (c) Comet River, including anabranes, from Lake Brown gauging station AMTD 199.2km to its junction with the Nogoia River.
- (4) This section does not apply to works for taking—
 - (a) water under an authorisation that states an area that may be irrigated; or
 - (b) only supplemented water; or
 - (c) water under a water permit; or

- (d) water under section 20(2), (3), (4) or (5) of the Act.
- (5) However, this section applies to works for storing water taken under an authorisation mentioned in subsection (4)(a).
- (6) In this section—
previous water resource plan means the repealed *Water Resource (Fitzroy Basin) Plan 1999*.

32 Continued effect of moratorium notice published in December 2010—Act, s 46(3)

- (1) This section continues, in part, the effect of the moratorium notice published in December 2010.
- (2) This section applies to—
 - (a) groundwater in a groundwater management area; and
 - (b) water in a watercourse, lake or spring in the Downstream of Fitzroy Barrage subcatchment area.
- (3) Until an amendment to the resource operations plan to deal with the water mentioned in subsection (2) is approved, an application made under the Act for or about a water licence will not be accepted if granting the application would increase the amount of water that may be taken from the water mentioned in subsection (2).
- (4) This section does not apply to an application—
 - (a) mentioned in section 36; or
 - (b) to take groundwater, other than from Callide Groundwater Unit 1, for mine dewatering purposes; or
 - (c) to reinstate, under section 221 of the Act, an expired water licence; or
 - (d) to replace, under section 229 of the Act, an expired licence with 1 or more licences.

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33 Particular applications made before commencement of plan

- (1) This section applies to an application made under the Act, or repealed Act, before the 2010 moratorium publication day and not finally decided before the commencement of this plan—
 - (a) for a water licence to take groundwater from a groundwater management area; or
 - (b) for a water licence to take water from a watercourse, lake or spring in the Downstream of Fitzroy Barrage subcatchment area shown on the map in schedule 2; or
 - (c) for a water licence to interfere with the flow of water by impounding water in the plan area.
- (2) The application must be refused if granting the application would have 1 or more of the following effects on water to which this plan applies—
 - (a) increase the amount of water that may be taken;
 - (b) increase or change the interference with the water.
- (3) This section does not apply to an application to—
 - (a) take groundwater for stock or domestic purposes; or
 - (b) take groundwater from an area other than Callide Groundwater Unit 1—
 - (i) for mine dewatering purposes; or
 - (ii) for town water supply purposes; or
 - (iii) for a project declared under the *State Development and Public Works Organisation Act 1971*, section 26 to be a significant project; or
 - (iv) for the construction, operation or maintenance of public utilities; or
 - (v) if there is a current development permit authorising construction of works to take the water to which the application relates; or

- (c) take water from a watercourse, lake or spring in the Downstream of Fitzroy Barrage subcatchment area—
 - (i) for town water supply purposes; or
 - (ii) for stock or domestic purposes; or
 - (iii) for a project declared under the *State Development and Public Works Organisation Act 1971*, section 26 to be a significant project; or
- (d) interfere with water by impoundment—
 - (i) for town water supply purposes; or
 - (ii) for stock or domestic purposes; or
 - (iii) for a project declared under the *State Development and Public Works Organisation Act 1971*, section 26 to be a significant project; or
 - (iv) to meet the requirements of an environmental authority issued under the *Environmental Protection Act 1994*; or
- (e) reinstate, under section 221 of the Act, an expired water licence; or
- (f) replace, under section 229 of the Act, an expired licence with 1 or more licences.

34 Particular provisions of the resource operations plan cease to have effect—Act, s 106A

On the commencement of this water resource plan, chapter 6, sections 6.1 to 6.7 of the Fitzroy Basin Resource Operations Plan 2004 cease to have effect for the plan area to which this plan applies.

35 Interim arrangements for particular applications

- (1) This section applies—
 - (a) to an application for a water licence, made under section 206 of the Act, to take water from a watercourse, lake or

[s 36]

spring in the plan area other than in the Downstream of the Fitzroy Barrage subcatchment area; and

- (b) until an amendment to the resource operations plan is approved to state a new process for deciding the applications mentioned in paragraph (a).
- (2) The application must be refused if granting the application would increase the amount of water that may be taken.
- (3) This section does not apply to an application—
 - (a) mentioned in section 36; or
 - (b) to reinstate, under section 221 of the Act, an expired water licence; or
 - (c) to replace, under section 229 of the Act, an expired licence with 1 or more licences.

36 Interim arrangements for applications about unallocated water—Act, s 106A(3)

- (1) This section applies until an amendment to the resource operations plan is approved to state a new process for deciding an application relating to the use of unallocated water for—
 - (a) a State purpose; or
 - (b) stock or domestic purposes; or
 - (c) an Indigenous purpose.
- (2) Any volume of water allocated to a successful application mentioned in subsection (1) must be granted from—
 - (a) for water to be used for a State purpose—the strategic reserve, strategic water infrastructure reserve or general reserve; or
 - (b) for water to be used for stock or domestic purposes—the general reserve; or
 - (c) for water to be used for an Indigenous purpose—the strategic reserve.

Division 3 Unallocated water reserves

Subdivision 1 Preliminary

37 Application of div 3

This division applies to unallocated water.

Subdivision 2 Strategic reserve, strategic water infrastructure reserve and general reserve

38 Unallocated water held as strategic reserve, strategic water infrastructure reserve and general reserve

Unallocated water in the plan area is divided into a strategic reserve, strategic water infrastructure reserve and general reserve.

Subdivision 3 Unallocated water held as strategic reserve

39 Purpose for which unallocated water held as strategic reserve may be granted

Unallocated water held as a strategic reserve may be granted only if the water is to be taken for a State purpose or an Indigenous purpose.

40 Reserve volumes

- (1) The total of the nominal entitlements for all water licences to take unallocated surface water for a State purpose granted from the strategic reserve in a subcatchment area mentioned

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in schedule 8, part 1, column 1 is stated in schedule 8, part 1, column 2 opposite the area.

- (2) The total of the nominal entitlements for all water licences to take unallocated surface water for an Indigenous purpose granted from the strategic reserve in a subcatchment area mentioned in schedule 8, part 1, column 1 is stated in schedule 8, part 1, column 3 opposite the area.
- (3) The total of the nominal entitlements for all water licences to take unallocated groundwater from the strategic reserve in a groundwater management area, groundwater unit or groundwater sub-area mentioned in schedule 8, part 2, column 1 is stated in schedule 8, part 2, column 2 opposite the area.

41 Period for which water is granted for particular State purpose

- (1) This section applies to the volume of water granted from the strategic reserve for either of the following State purposes—
 - (a) a project of State significance;
 - (b) a project of regional significance.
- (2) The volume of water is granted only for the life of the project and on conclusion of the project the volume of water returns to the strategic reserve.

42 Projects that may be considered to be of regional significance

The chief executive may consider a particular project to be a project of regional significance for the plan area only if the chief executive considers the project is significant for a region in the plan area having regard to the following—

- (a) the outcomes stated in chapter 3;
- (b) the economic or social impact the project will have on the region;

- (c) the public interest and the welfare of people in the region;
- (d) any other relevant consideration.

43 Period for which water is granted for particular Indigenous purpose

- (1) This section applies to the volume of water granted from the strategic reserve for an Indigenous purpose.
- (2) The volume of water is granted only for the life of the project and on conclusion of the project the volume of water returns to the strategic reserve.

Subdivision 4 Unallocated water held as strategic water infrastructure reserve

44 Purpose for which unallocated water held as strategic water infrastructure reserve may be granted

Unallocated water held as a strategic water infrastructure reserve may only be granted for water infrastructure mentioned in section 45.

45 Reserve volumes

The total of the nominal volumes for all supplemented water allocations to take unallocated water granted from the strategic water infrastructure reserve is the following—

- (a) for water infrastructure on the Dawson River—90000ML;
- (b) for water infrastructure on the Connors River—56400ML;
- (c) for water infrastructure on the Fitzroy River—76000ML.

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Subdivision 5 Unallocated water held as general reserve

46 Purpose for which unallocated water held as general reserve may be granted

Unallocated water held as a general reserve may be granted for any purpose.

47 Reserve volumes

- (1) The total of the mean annual diversions for all water licences or water allocations to take unallocated surface water granted from the general reserve in a subcatchment area mentioned in schedule 8, part 3, column 1 is stated in schedule 8, part 3, column 2 opposite the area.
- (2) The total of the nominal volume for all water allocations to take unallocated surface water granted from the general reserve in a subcatchment area mentioned in schedule 8, part 4, column 1 is stated in schedule 8, part 4, column 2 opposite the area.
- (3) The total of the nominal entitlement for all water licences to take unallocated groundwater from the general reserve in a groundwater management area, groundwater unit or groundwater sub-area mentioned in schedule 8, part 5, column 1 is stated in schedule 8, part 5, column 2 opposite the area.

Subdivision 6 Dealing with unallocated water under the resource operations plan

48 Process for dealing with unallocated water

- (1) The resource operations plan is to be amended to include the process for dealing with unallocated water specified in this plan.

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- (2) In preparing and implementing the process, the chief executive is to consider the following—
- (a) the purpose for which the water is required;
 - (b) the efficiency of existing and proposed water use practices;
 - (c) the extent to which water is being taken under existing authorisations in the plan area;
 - (d) the availability of an alternative water supply for the purpose for which the water is required;
 - (e) the impact the proposed taking of, or interfering with, the water may have on existing water users and the operations of resource operations licence holders and interim resource operations licence holders in the plan area;
 - (f) the matters mentioned in section 27(1)(a) to (d);
 - (g) for the taking of groundwater, the availability of water within a given aquifer.
- (3) Subsection (2) does not limit the matters the chief executive may consider.

Division 4 Callide Valley Water Supply Scheme

Subdivision 1 Resource operations licence

49 Water allocations to be managed under a resource operations licence

Water allocations converted from interim water allocations to take supplemented water from the Callide Valley Water Supply Scheme are managed under a resource operations licence.

[s 50]

Subdivision 2 Converting authorisations to water allocations to take supplemented water

50 Purpose of sdiv 2

This subdivision states strategies for interim water allocations for the Callide Valley Water Supply Scheme to be converted, under section 121 of the Act, to water allocations to take supplemented water under the resource operations plan.

51 Converting interim water allocations to take water from Callide Valley Water Supply Scheme

Interim water allocations to take water from the Callide Valley Water Supply Scheme are to be converted under the resource operations plan to a water allocation to take supplemented water.

52 Elements of water allocations

A water allocation to take supplemented water is to state the following—

- (a) the location from which water may be taken under the allocation;
- (b) the purpose for which water may be taken under the allocation;
- (c) the nominal volume for the allocation;
- (d) the priority group to which the allocation belongs;
- (e) the conditions, if any, that apply for the allocation.

53 Location for taking water under a water allocation

The location for taking water to be stated on a water allocation to take supplemented water is to include the place at which

water could have been taken under the authorisation from which the allocation was converted.

54 Purpose to be stated on a water allocation

The purpose to be stated on a water allocation to take supplemented water is to be—

- (a) if the purpose stated on the authorisation is stock, domestic, irrigation, stock intensive, agriculture or a similar purpose—‘agriculture’; or
- (b) otherwise—‘any’.

55 Nominal volume for a water allocation

The nominal volume for a water allocation to take supplemented water is to be—

- (a) for water allocations converted from interim water allocations that belong to the risk or high priority groups—the volume stated on the interim water allocation; or
- (b) for all other water allocations converted from interim water allocations—the volume calculated under section 139.

56 Priority groups for water allocations

- (1) In the Callide Valley Water Supply Scheme, a water allocation to take supplemented water belongs to—
 - (a) for an authorisation identified by an interim resource operations licence as high priority—the high A priority group; or
 - (b) for an authorisation identified by an interim resource operations licence as medium priority—the medium priority group; or

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- (c) for an authorisation identified by an interim resource operations licence as risk priority—the risk priority group.
- (2) However, water allocations converted from interim water allocations 35687D and 47297D belong to the high B priority group.

57 Conditions for water allocations

In deciding the conditions under which water may be taken under a water allocation to take supplemented water, the chief executive must consider any conditions stated on the authorisation from which the allocation was converted.

Part 2 Additional strategies for surface water

Division 1 Preliminary

58 Application of pt 2

The strategies stated in this part apply to surface water in addition to the strategies stated in part 1.

59 Restrictions on taking water from waterholes or lakes

- (1) This section applies to the chief executive in making a decision about—
 - (a) a water licence to take unsupplemented water; or
 - (b) converting an authorisation to take unsupplemented water into a water allocation; or

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- (c) the management of water under a resource operations licence, a distribution operations licence or an interim resource operations licence.
 - (2) If the water licence, water allocation, resource operations licence, distribution operations licence or interim resource operations licence allows the taking of water from a waterhole or lake, the chief executive must—
 - (a) consider the impact the taking may have on the cultural or ecological values of the waterhole or lake; and
 - (b) impose a condition on the water licence, water allocation, resource operations licence, distribution operations licence or interim resource operations licence about maintaining the cultural or ecological values of the waterhole or lake.

Example for paragraph (b)—

a condition that the water may be taken only if the water level in the waterhole or lake is above the level that is 0.5m below the level at which it naturally overflows

- (3) However, the chief executive need not impose a condition mentioned in subsection (2)(b) if the chief executive is satisfied—
 - (a) the taking of water from the waterhole or lake will not adversely affect its cultural or ecological values; or
 - (b) for a water licence or water allocation that replaces an authorisation in force immediately before the commencement of this plan—the holder of the authorisation would suffer economic hardship if the condition were imposed.

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Division 2 Dawson Valley Water Supply Scheme

60 Water allocation to be managed under a resource operations licence

The water allocation converted from interim water allocation 102930 to take water from the Dawson Valley Water Supply Scheme is managed under a resource operations licence.

61 Conversion of interim water allocation 102930

A water allocation converted, under the resource operations plan, from interim water allocation 102930 is to state the following—

- (a) a location decided by considering the authorised activity stated on interim water allocation 102930;
- (b) a purpose of agriculture;
- (c) a nominal volume of 105ML;
- (d) a priority group of medium.

Division 3 Process for granting and amending interim resource operations licences

Subdivision 1 Preliminary

62 Application and purpose of div 3

This division—

- (a) states a process for granting an interim resource operations licence to meet future water requirements under section 176 of the Act; and

- (b) states a process for amending an interim resource operations licence to meet future water requirements under section 184A of the Act; and
- (c) applies only to the granting or amendment of an interim resource operations licence for a project declared under the *State Development and Public Works Organisation Act 1971*, section 26 to be a significant project; and
- (d) applies until an amendment to the resource operations plan is approved to state a process mentioned in paragraphs (a) and (b).

Subdivision 2 Interim resource operations licence for particular infrastructure

63 Applying for, or to amend, interim resource operations licence

- (1) This section applies to the proposed owner of infrastructure for a project declared under the *State Development and Public Works Organisation Act 1971*, section 26 to be a significant project.
- (2) The chief executive may give notice to the proposed owner that the proposed owner must apply for—
 - (a) an interim resource operations licence to operate the infrastructure; or
 - (b) an amendment of an interim resource operations licence, already held by the proposed owner, to operate the infrastructure.
- (3) If the chief executive gives the proposed owner notice under subsection (2)—
 - (a) the proposed owner must apply in the approved form; and
 - (b) the application must include the following—

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- (i) details of the proposed infrastructure;
 - (ii) an assessment of the impact of constructing the infrastructure on—
 - (A) the supply of water managed under the interim resource operations licences for the water supply schemes; and
 - (B) existing water entitlements to take unsupplemented water from the areas of the water supply schemes; and
 - (C) the operating arrangements and supply arrangements under the interim resource operations licences for the water supply schemes; and
 - (D) other existing authorisations, other than water permits, that may be affected by the proposed infrastructure;
 - (iii) the applicant’s proposal for minimising the impact assessed and mentioned in subparagraph (ii);
 - (iv) proposed operating arrangements for the infrastructure;
 - (v) the entities to whom the applicant proposes to supply water;
 - (vi) the applicant’s proposal about the total interim water allocation to be managed under the proposed interim resource operations licence or proposed amended interim resource operations licence; and
- (c) the application must be accompanied by the fee prescribed under a regulation.
- (4) In addition to the information mentioned in subsection (3), the applicant may give the chief executive any other information the applicant considers will help the chief executive to decide the application.

- (5) To help the chief executive decide the application, the chief executive may give a copy of the application to any entity the chief executive considers appropriate.
- (6) In this section—
water supply scheme means a supplemented scheme managed under an interim resource operations licence.

64 Additional information may be required

- (1) The chief executive may, by notice given to the applicant, require—
 - (a) the applicant to give additional information about the application; or
 - (b) any information included in the application, or any additional information required under paragraph (a), to be verified by statutory declaration.
- (2) If the applicant does not comply with the requirement within the reasonable time stated in the notice, the application lapses.

65 Matters chief executive must consider

- (1) For deciding the application, the chief executive must consider—
 - (a) the application and any additional information given about the application under section 64; and
 - (b) the public interest.
- (2) Subsection (1) does not limit the matters the chief executive may consider.

66 Deciding application for, or to amend, interim resource operations licence

- (1) If, after deciding the application, the chief executive is satisfied the application should be approved, or approved in

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part, the chief executive must approve all or part of the application, with or without conditions.

- (2) If the chief executive grants or amends the interim resource operations licence, the chief executive must reserve, from the strategic water infrastructure reserve, unallocated water required for any interim water allocations to which the approval applies.

Subdivision 3 Amendment by chief executive

67 Amending interim resource operations licence by chief executive—Act, s 184A

- (1) The chief executive may—
 - (a) amend an interim resource operations licence, granted or amended under section 66, to the extent the chief executive considers necessary to meet future water requirements; or
 - (b) amend any other interim resource operations licence, to the extent the chief executive considers necessary as a consequence of—
 - (i) the granting or amendment of an interim resource operations licence under section 66; or
 - (ii) the amendment of an interim resource operations licence under section 73.
- (2) Before the chief executive acts under subsection (1), the chief executive must give the interim resource operations licence holder notice of the proposed amendment.
- (3) The notice must—
 - (a) state the following—
 - (i) a summary of the proposed amendment;
 - (ii) the reasons for the proposed amendment;

- (iii) that written submissions may be made by the holder about the proposed amendment;
- (iv) the day by which, the person to whom, and the place where, the submissions must be made; and
- (b) include a copy of the proposed amendment.
- (4) The day for written submissions must be at least 30 business days after the day the notice is given.

68 Matters chief executive must consider

- (1) In deciding whether to amend an interim resource operations licence under section 67, the chief executive must consider—
 - (a) the following—
 - (i) for an amendment mentioned in section 67 (1)(a)—the original application under section 63 for, or to amend, the licence and any additional information given to the chief executive about the application under section 63(4);
 - (ii) for an amendment mentioned in section 67(1)(b)(i) as a consequence of the granting or amendment of an interim resource operations licence under section 66—the application made under section 63 for the granting or amendment and any additional information given to the chief executive about the application under section 63(4);
 - (iii) for an amendment mentioned in section 67 (1)(b)(ii) as a consequence of the amendment of an interim resource operations licence under section 73—the application made under section 70 for the amendment and any additional information given to the chief executive about the application under section 71(1)(a); and
 - (b) any written submissions made by the interim resource operations licence holder about the proposed amendment; and

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- (c) the public interest.
- (2) Subsection (1) does not limit the matters the chief executive may consider.

69 Deciding whether to amend interim resource operations licence

After considering the matters mentioned in section 68, the chief executive may amend the interim resource operations licence to the extent the chief executive considers necessary.

Subdivision 4 Amendment on application by holder

70 Amending interim resource operations licence on application by holder—Act, s 184A

- (1) The holder of an interim resource operations licence, granted or amended under section 66, may apply to the chief executive to amend the licence.
- (2) The application must—
 - (a) be in the approved form; and
 - (b) include a summary of the amendment required and the reasons for the amendment; and
 - (c) be accompanied by the fee prescribed under a regulation.
- (3) To help the chief executive decide the application, the chief executive may give a copy of the application to any entity the chief executive considers appropriate.

71 Additional information may be required

- (1) The chief executive may, by notice given to the applicant, require—

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- (a) the applicant to give the chief executive additional information about the application; or
 - (b) any information included in the application, or any additional information required under paragraph (a), to be verified by statutory declaration.
- (2) If the applicant does not comply with the requirement within the reasonable time stated in the notice, the application lapses.

72 Matters chief executive must consider

- (1) In deciding the application, the chief executive must consider—
 - (a) the application and any additional information given under section 71; and
 - (b) the public interest.
- (2) Subsection (1) does not limit the matters the chief executive may consider.

73 Deciding application to amend interim resource operations licence

If, after deciding the application, the chief executive is satisfied the application should be approved, or approved in part, the chief executive must approve all or part of the application, with or without conditions.

Subdivision 5 Granting interim water allocations

74 Granting interim water allocations—Act, s 189

- (1) This section applies if, at the time an interim resource operations licence is amended under section 66, 69 or 73, the chief executive is satisfied—
 - (a) construction of the infrastructure to which the interim resource operations licence relates is substantially

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- complete and the infrastructure may be regarded as operational; and
 - (b) the operation of the infrastructure is, or will be, consistent with the outcomes and objectives of this plan; and
 - (c) the holder of the interim resource operations licence has complied with the conditions of the licence in relation to the infrastructure.
- (2) The chief executive may, by notice given to the holder of the interim resource operations licence, require the holder to give the chief executive the following information—
- (a) the number of interim water allocations to which the interim resource operations licence is to relate;
 - (b) the volume of water that may be taken under each allocation;
 - (c) the purpose for which the water may be taken;
 - (d) the priority group to which each allocation is to belong;
 - (e) the water sharing rules that are to apply.
- (3) After considering the information mentioned in subsection (2), the chief executive may grant the interim water allocations to which the interim resource operations licence relates.
- (4) This section does not apply to the amendment of another interim resource operations licence under section 69 as a consequence of—
- (a) the granting or amendment of an interim resource operations licence under section 66; or
 - (b) the amendment of an interim resource operations licence under section 73.

**Division 4 Interference with water in a
 watercourse, lake or spring**

75 Application of div 4

This division applies to applications, made under section 206 of the Act, for a water licence to interfere with water in a watercourse, lake or spring by impounding the flow of water.

76 Limitations on interference with water

- (1) The water licence may be granted if the purpose of the proposed impoundment is only 1 or more of the following—
 - (a) to store water for stock or domestic purposes;
 - (b) to provide a pumping pool to enable water to be taken under an authorisation;
 - (c) to provide improved security for town water supplies taken under an authorisation;
 - (d) to satisfy the requirements of an environmental authority issued under the *Environmental Protection Act 1994*.
- (2) However, the water licence may also be granted if—
 - (a) the proposed impoundment is related to a proposed water licence to take water that is allocated under section 36 or the process mentioned in section 48(1); or
 - (b) the impoundment was in existence immediately before 31 December 1999.

77 Interference with water for stock or domestic purposes

- (1) This section applies if the proposed interference with water is to store water for stock or domestic purposes.
- (2) In deciding the application the chief executive must consider the following—

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- (a) existing water supplies on the property to which the application relates, including existing weirs, groundwater and storages taking overland flow water and the availability of water at the proposed site;
- (b) the matters mentioned in section 27(1)(d)(i) to (xiv).
- (3) However, the storage capacity must not be greater than is necessary for stock or domestic purposes.
- (4) Subsection (2) does not limit the matters the chief executive may consider.

78 Interference with water for the provision of a pumping pool

- (1) This section applies if the proposed interference with water is to provide a pumping pool to enable water to be taken under an authorisation.
- (2) The proposed storage capacity of the pumping pool must not be greater than the capacity required to enable the pump to function properly while minimising the impact the proposed interference may have on the matters mentioned in section 27(1)(d)(i) to (xiv).
- (3) However, the storage capacity of the pumping pool must not be greater than 5ML.
- (4) In deciding the application the chief executive must also consider any alternative methods for providing for the operation of the pump that may minimise the impact mentioned in section 27(1)(d)(i) to (xiv).

Example—

a pump well constructed in bedsand

79 Interference with water for town water supply under an authorisation

- (1) This section applies if the proposed interference with water is to provide improved security for town water supplies taken under an authorisation.
- (2) The chief executive must not grant the application unless the chief executive is satisfied—
 - (a) the town has appropriate water supply security strategies, such as demand and drought management strategies, in place; and
 - (b) there is a demonstrated need for an increased reliability of the water supply.
- (3) In deciding the application the chief executive must consider the matters mentioned in section 27(1)(d)(i) to (xiv).
- (4) Subsection (3) does not limit the matters the chief executive may consider.

80 Interference with water to satisfy the requirements of an environmental authority

- (1) This section applies if the proposed interference with water is to satisfy the requirements of an environmental authority issued under the *Environmental Protection Act 1994*.
- (2) In deciding the application the chief executive must consider the matters mentioned in section 27(1)(d)(i) to (xiv).
- (3) Subsection (2) does not limit the matters the chief executive may consider.

81 Interference with water related to the granting of unallocated water

- (1) This section applies if the proposed interference with water is related to the granting of unallocated water.
- (2) The interference must not be greater than is necessary for the purpose of taking the unallocated water.

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- (3) In deciding the application, the chief executive must consider the matters mentioned in section 27(1)(d)(i) to (xiv).
- (4) A water licence to interfere with water, granted in association with a water entitlement to take water granted from the release of unallocated water, may include flow conditions.

Division 5 Granting particular water licences

82 Granting particular water licences

- (1) The chief executive may allocate water under a water licence to take water that could have been taken under an authority issued under the *Water Act 1926–1983*, section 4.
- (2) However, a grant of water under subsection (1) to the State of Queensland, represented by the Department of Education, to take water from Gogango Creek, is subject to the limitations—
 - (a) mentioned in schedule 9, item 1, column 2; and
 - (b) imposed by the chief executive in granting a water licence for taking water under section 212 of the Act.

83 Granting particular water licences to holder of mining lease 1804

- (1) The holder of mining lease 1804 is allocated water under a water licence to take water from an impoundment created by prescribed existing works if the holder gives the chief executive—
 - (a) notice, in the approved form, of any prescribed existing works after the commencement of this plan; and
 - (b) if the chief executive asks for additional information about the prescribed existing works—the additional information requested by the chief executive within a reasonable period of time as stated in the request.

- (2) However, a grant of water under subsection (1) is subject to the limitations—
- (a) mentioned in schedule 9, item 2, column 2; and
 - (b) imposed by the chief executive in granting a water licence for taking water under section 212 of the Act.
- (3) In this section—
- prescribed existing works* means works authorised under water licence number 38931F.

Division 6 Existing water allocations to take supplemented and unsupplemented water

84 Purpose of div 6

This division states strategies for water allocations established under the repealed *Water Resource (Fitzroy Basin) Plan 1999* to take supplemented or unsupplemented water.

85 Existing water allocations to take supplemented water

On the commencement of this plan, a water allocation established under the repealed *Water Resource (Fitzroy Basin) Plan 1999* to take supplemented water—

- (a) is to be transitioned, without amendment, to a water allocation under this plan; and
- (b) continues to be—
 - (i) managed under the allocation’s respective resource operations licence; and
 - (ii) subject to the water sharing rules, water allocation change rules and seasonal water assignment arrangements in the resource operations plan.

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86 Existing water allocations to take unsupplemented water

- (1) On the commencement of this plan, a water allocation established under the repealed *Water Resource (Fitzroy Basin) Plan 1999* to take unsupplemented water—
 - (a) is to be transitioned, with the amendments mentioned in subsection (2), to a water allocation under this plan; and
 - (b) continues to be subject to the water sharing rules, water allocation change rules and seasonal water assignment arrangements in the resource operations plan.
- (2) A water allocation established under the repealed *Water Resource (Fitzroy Basin) Plan 1999* to take unsupplemented water is to be amended under the resource operations plan as follows—
 - (a) to state a maximum rate for the amended water allocation equal to the rate, expressed in litres per second, stated on the existing water allocation multiplied by 1.3;
 - (b) to state a daily volumetric limit, expressed in megalitres, for the amended water allocation equal to the rate, expressed in litres per second, stated on the existing water allocation multiplied by 0.0864.

Division 7 Converting authorisations to water allocations to take unsupplemented water

87 Purpose of div 7

This division states strategies for authorisations to be converted, under section 121 of the Act, to water allocations to take unsupplemented water under the resource operations plan.

88 Authorisations to be converted to water allocations

The authorisations to be converted to water allocations to take unsupplemented water are water licences for taking unsupplemented water from—

- (a) the Nogoia River from the upstream limit of Fairbairn Dam at AMTD 737.5km to its junction with Theresa Creek; and
- (b) Theresa Creek from its junction with Retreat Creek at AMTD 15.0km to its junction with the Nogoia River; and
- (c) Retreat Creek, including anabranches, from its junction with Kettle Creek at AMTD 23.6km to its junction with Theresa Creek; and
- (d) the Comet River, including anabranches, from Lake Brown gauging station AMTD 199.2km to its junction with the Nogoia River; and
- (e) the Dawson River from the upstream limit of Glebe Weir at AMTD 356.5km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible; and
- (f) the Dawson River from Utopia Downs Gauging Station at AMTD 453.5km to the upstream limit of Glebe Weir at AMTD 356.5km, including sections of tributaries where Dawson River flows are accessible.

89 Elements of water allocations

- (1) A water allocation to take unsupplemented water is to state the following—
 - (a) the location from which water may be taken under the allocation;
 - (b) the purpose for which water may be taken under the allocation;
 - (c) the nominal volume for the allocation;

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- (d) the maximum rate at which water may be taken under the allocation;
 - (e) the daily volumetric limit for the allocation;
 - (f) the annual volumetric limit for the allocation;
 - (g) the flow conditions for the allocation;
 - (h) the water allocation group to which the allocation belongs;
 - (i) the water management area, as defined in the resource operations plan, that includes the location from which water may be taken under the allocation.
- (2) A water allocation may also state a monthly volumetric limit.

90 Water allocation groups

- (1) This section applies to an authorisation converted to a water allocation to take unsupplemented water (the *resulting water allocation*) mentioned in section 88.
- (2) The water allocation group for the resulting water allocation is stated in schedule 11, table, column 3 opposite the location used for taking water stated in schedule 11, table, column 1 and the flow condition stated in schedule 11, table, column 2.

91 Location for taking water under a water allocation

The location for taking water to be stated on a water allocation to take unsupplemented water is to include the place at which water could have been taken under the authorisation from which the allocation was converted.

92 Purpose to be stated on a water allocation

The purpose to be stated on a water allocation to take unsupplemented water is to be—

- (a) if the purpose stated on the authorisation is stock, domestic, irrigation, stock intensive, agriculture or a similar purpose—‘agriculture’; or
- (b) otherwise—‘any’.

93 Nominal volume for a water allocation

In deciding the nominal volume for a water allocation to take unsupplemented water, the chief executive must have regard to the following—

- (a) the local availability of water;
- (b) the conditions under which water may be taken under the authorisation;
- (c) for an authorisation that states any volumetric limits—the stated volumetric limits;
- (d) the simulated mean annual diversion for the proposed water allocation.

94 Maximum rate for taking water

- (1) The maximum rate at which water may be taken under a water allocation is—
 - (a) for an authorisation that states an authorised activity referring to the capability of a particular pump size to take water—
 - (i) for a pump size mentioned in schedule 10, column 1—the rate stated in schedule 10, column 2 for the pump size; or
 - (ii) for a pump size other than a pump size mentioned in schedule 10, column 1—the rate decided by the chief executive having regard to the rates stated for similar pump sizes in schedule 10, column 2; and
 - (b) for an authorisation that does not state an authorised activity referring to the capability of a particular pump

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- size to take water, but for which a related development permit—
- (i) states a pump size mentioned in schedule 10, column 1—the rate stated in schedule 10, column 2 for the pump size; or
 - (ii) states a pump size other than a pump size mentioned in schedule 10, column 1—the rate decided by the chief executive having regard to the rates stated for similar pump sizes in schedule 10, column 2; and
- (c) for another authorisation—the rate decided by the chief executive having regard to—
- (i) the type of authorisation; and
 - (ii) an estimate or measurement of the rate at which water can be taken under the authorisation.
- (2) However, for subsection (1)(a) and (b), if the authorisation holder satisfies the chief executive that the maximum rate at which water can be taken is different from the rate under the subsection, the maximum rate is the rate decided by the chief executive having regard to the following—
- (a) the conditions under which the water may be taken;
 - (b) the water-taking capacity of the pump to which the authorised activity or development permit relates (the *existing pump*);
 - (c) the irrigation or water distribution system related to the existing pump during the period of not more than 10 years immediately before the commencement of this plan;
 - (d) the efficiency of the water use associated with the existing pump or the system mentioned in paragraph (c).
- (3) The chief executive must ensure that the total volume that can be taken in a day at the maximum rate for the allocation is not less than the daily volumetric limit under section 95.

95 Daily volumetric limit for a water allocation

- (1) The daily volumetric limit for a water allocation to take unsupplemented water is—
 - (a) for an authorisation that states a maximum rate, expressed in litres per second—the volume, expressed in megalitres, calculated by multiplying the stated rate by 0.0864; or
 - (b) for an authorisation that does not state a maximum rate but states an authorised activity referring to the capability of a particular pump size to take water—
 - (i) for a pump size mentioned in schedule 10, column 1—the volume stated in schedule 10, column 3 for the pump size; or
 - (ii) for a pump size other than a pump size mentioned in schedule 10, column 1—the volume decided by the chief executive having regard to the volumes stated for similar pump sizes in schedule 10, column 3; or
 - (c) for an authorisation that does not state a maximum rate or an authorised activity referring to the capability of a particular pump size to take water, but for which a related development permit—
 - (i) states a pump size mentioned in schedule 10, column 1—the volume stated in schedule 10, column 3 for the pump size; or
 - (ii) states a pump size other than a pump size mentioned in schedule 10, column 1—the volume decided by the chief executive having regard to the volumes stated for similar pump sizes in schedule 10, column 3; or
 - (d) for another authorisation—the volume decided by the chief executive having regard to—
 - (i) the type of authorisation; and

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- (ii) an estimate or measurement of the daily rate at which water can be taken under the authorisation.
- (2) However, for subsection (1)(b) and (c), if the authorisation holder satisfies the chief executive that the water-taking capacity of the pump is different from the daily volumetric limit under the subsection, the daily volumetric limit is the volume decided by the chief executive having regard to the following—
 - (a) the conditions under which the water may be taken;
 - (b) the water-taking capacity of the pump to which the authorised activity or development permit relates (the *existing pump*) under normal operating conditions;
 - (c) the irrigation or water distribution system related to the existing pump during the period of not more than 10 years immediately before the commencement of this plan;
 - (d) the efficiency of the water use associated with the existing pump or the system mentioned in paragraph (c).

96 Annual volumetric limit for a water allocation

The annual volumetric limit for a water allocation to take unsupplemented water is—

- (a) for an authorisation converted to a water allocation belonging to water allocation group Class 0A—the stated volume; or
- (b) for an authorisation converted to a water allocation belonging to water allocation group Class 9A, Class 9B, Class 10A, Class 10B, Class 11A, Class 11B, Class 12A or Class 13A—the volume, expressed in megalitres, calculated by multiplying the daily volumetric limit under section 95, by the number of days stated in schedule 11, column 4 for the water allocation group; or

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- (c) for an authorisation converted to a water allocation belonging to water allocation group Class 8A, Class 10C or Class 13C—
 - (i) for an authorisation that states the area that may be irrigated—the volume, expressed in megalitres, calculated by multiplying the area, in hectares, by 6; or
 - (ii) for another authorisation—the volume, expressed in megalitres, calculated by multiplying the daily volumetric limit under section 95, by the number of days stated in schedule 11, column 4 for the water allocation group.

97 Conditions for water allocations

- (1) The chief executive may impose on a water allocation to take unsupplemented water any condition the chief executive is satisfied is necessary to ensure the outcomes of this plan are achieved.
- (2) In deciding the flow conditions under which water may be taken under the allocation, the chief executive must have regard to the conditions stated on the authorisation from which the allocation was converted.

98 Monthly volumetric limit for a water allocation

- (1) A water allocation converted from an authorisation that states an area that may be irrigated may also state a monthly volumetric limit.
- (2) The monthly volumetric limit for the water allocation is the volume decided by the chief executive having regard to the volume of water required for the allocation's intended purpose, but not more than the volume, expressed in megalitres, calculated by multiplying the area, in hectares, by 2.

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99 Storing water taken under a water allocation

- (1) This section applies if the chief executive decides to impose a condition on a water allocation that states works that may be used to store the water taken under the allocation.
- (2) In deciding to impose the condition, the chief executive must consider the capacity of any existing overland flow works being used to store the water.

Division 8 Water licences to take water from watercourse, lake or spring

Subdivision 1 Form of water licences to take water from watercourse, lake or spring

100 Elements of water licences to take water from a watercourse, lake or spring

A water licence to take water from a watercourse, lake or spring in the plan area is to state—

- (a) 1 of the following purposes for which the water may be taken under the licence—
 - (i) stock and domestic;
 - (ii) agriculture;
 - (iii) any; and
- (b) the maximum rate at which the water may be taken under the licence; and
- (c) the daily volumetric limit for the licence; and
- (d) the nominal entitlement for the licence; and
- (e) the monthly volumetric limit, if any, for the licence; and

- (f) the conditions, if any, for the licence, including flow conditions and conditions for storing water taken under the licence.

Subdivision 2 Criteria for amending water entitlements to achieve plan outcomes

101 Definition for sdiv 2

In this subdivision—

amended water licence means a water licence to take unsupplemented water from a watercourse, lake or spring and amended under section 217 of the Act.

102 Purpose to be stated on a water licence

The purpose stated on an amended water licence is to be—

- (a) if the purpose stated on the water licence before the amendment is stock or domestic—‘stock and domestic’; or
- (b) if the purpose stated on the water licence before the amendment is agriculture, irrigation, stock intensive or a similar purpose—‘agriculture’; or
- (c) otherwise—‘any’.

103 Maximum rate for a water licence

- (1) The maximum rate at which unsupplemented water may be taken under an amended water licence is—
 - (a) for an amended water licence that, before the amendment, stated both a maximum rate, expressed in litres per second, and a daily volumetric limit—the maximum rate stated on the licence before the amendment; or

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- (b) for an amended water licence that, before the amendment, did not state a maximum rate and a daily volumetric limit but stated an authorised activity referring to the capability of a particular pump size to take water—
 - (i) for a pump size mentioned in schedule 10, column 1—the rate stated in schedule 10, column 2 for the pump size; or
 - (ii) for a pump size other than a pump size mentioned in schedule 10, column 1—the rate decided by the chief executive having regard to the rates stated for similar pump sizes in schedule 10, column 2; and
 - (c) for an amended water licence that, before the amendment, did not state a maximum rate and a daily volumetric limit or an authorised activity referring to the capability of a particular pump size to take water, but for which a related development permit—
 - (i) stated a pump size mentioned in schedule 10, column 1—the rate stated in schedule 10, column 2 for the pump size; or
 - (ii) stated a pump size other than a pump size mentioned in schedule 10, column 1—the rate decided by the chief executive having regard to the rates stated for similar pump sizes in schedule 10, column 2; and
 - (d) for another amended water licence—the rate decided by the chief executive having regard to—
 - (i) the type of licence; and
 - (ii) an estimate or measurement of the rate at which water can be taken under the licence.
- (2) However, for subsection (1)(b) and (c), if the licence holder satisfies the chief executive that the maximum rate at which water can be taken is different from the rate under the subsection, the maximum rate is the rate decided by the chief executive having regard to the following—

- (a) the conditions under which the water may be taken;
 - (b) the water-taking capacity of the pump (the *existing pump*) to which the authorised activity or development permit relates;
 - (c) the irrigation or water distribution system related to the existing pump during the period of not more than 10 years immediately before the commencement of this plan;
 - (d) the efficiency of the water use associated with the existing pump or the system mentioned in paragraph (c).
- (3) The chief executive must ensure that the total volume that could be taken in a day at the maximum rate for the amended water licence is not less than the daily volumetric limit under section 104.

104 Daily volumetric limit for a water licence

- (1) The daily volumetric limit for an amended water licence to take unsupplemented water is—
- (a) for an amended water licence that, before the amendment, stated the volume of water that may be taken in a day—the daily volume stated on the licence before the amendment; or
 - (b) for an amended water licence that, before the amendment, did not state a volume of water that may be taken in a day but stated a maximum rate, expressed in litres per second—the volume, expressed in megalitres, calculated by multiplying the stated maximum rate by 0.0864; or
 - (c) for an amended water licence that, before the amendment, did not state a volume of water that may be taken in a day or a maximum rate but stated an authorised activity referring to the capability of a particular pump size to take water—

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- (i) for a pump size mentioned in schedule 10, column 1—the volume stated in schedule 10, column 3 for the pump size; or
 - (ii) for a pump size other than a pump size mentioned in schedule 10, column 1—the volume decided by the chief executive having regard to the volumes stated for similar pump sizes in schedule 10, column 3; or
- (d) for an amended water licence that, before the amendment, did not state a volume of water that may be taken in a day or a maximum rate or an authorised activity referring to the capability of a particular pump size to take water, but for which a related development permit—
- (i) stated a pump size mentioned in schedule 10, column 1—the volume stated in schedule 10, column 3 for the pump size; or
 - (ii) stated a pump size other than a pump size mentioned in schedule 10, column 1—the volume decided by the chief executive having regard to the volumes stated for similar pump sizes in schedule 10, column 3; or
- (e) for another amended water licence—the volume decided by the chief executive having regard to—
- (i) the type of licence; and
 - (ii) an estimate or measurement of the daily rate at which water can be taken under the licence.
- (2) However, for subsection (1)(c) and (d), if the licence holder satisfies the chief executive that the water-taking capacity of the pump is different from the daily volumetric limit under the subsection, the daily volumetric limit is the volume decided by the chief executive having regard to the following—
- (a) the conditions under which the water may be taken;

- (b) the water-taking capacity of the pump (the *existing pump*) to which the authorised activity or development permit relates under normal operating conditions;
- (c) the irrigation or water distribution system related to the existing pump during the period of not more than 10 years immediately before the commencement of this plan;
- (d) the efficiency of the water use associated with the existing pump or the system mentioned in paragraph (c).

105 Nominal entitlement for a water licence

The nominal entitlement for an amended water licence to take unsupplemented water is—

- (a) for an amended water licence that, before the amendment, stated the volume of water that may be taken in a 12-month period—the stated volume; or
- (b) for an amended water licence that, before the amendment, stated an area that may be irrigated—
 - (i) the volume decided by the chief executive having regard to the volume of water required for the licence’s intended purpose, but not more than the volume, expressed in megalitres, calculated by multiplying the area, expressed in hectares, by 6; or
 - (ii) if the chief executive is satisfied that the amount under subparagraph (i) is not sufficient, the volume decided by the chief executive having regard to the following—
 - (A) the volume required for the licence’s intended purpose;
 - (B) the annual volumes of water estimated by the chief executive to have been taken under the licence during the period, of not more than

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10 years, immediately before the commencement of this plan;

(C) the efficiency of the use of the water mentioned in sub-subparagraph (B); or

(c) otherwise—the volume decided by the chief executive having regard to the following—

(i) the conditions under which water may be taken under the licence;

(ii) the water-taking capacity of any works for taking water under the licence;

(iii) the volume required for the licence’s intended purpose;

(iv) the annual volumes of water estimated by the chief executive to have been taken under the licence during the period, of not more than 10 years, immediately before the commencement of this plan;

(v) the efficiency of the use of the water mentioned in subparagraph (iv).

106 Monthly volumetric limit for a water licence

(1) This section applies to an amended water licence that, before the amendment, stated an area that may be irrigated.

(2) The monthly volumetric limit for the amended water licence is the volume decided by the chief executive having regard to the volume of water required for the licence’s intended purpose, but not more than the volume, expressed in megalitres, calculated by multiplying the area, expressed in hectares, by 2.

107 Conditions for water licences

In deciding the conditions, including flow conditions under which water may be taken under an amended water licence,

the chief executive must consider the conditions stated on the water licence being amended.

108 Storing water taken under a water licence

- (1) This section applies if the chief executive decides to impose a condition on an amended water licence that states the works that may be used to store the water taken under the licence.
- (2) In deciding to impose the condition, the chief executive must consider the capacity of any existing overland flow works being used to store the water.

Division 9 Regulating overland flow water

109 Limitation on taking overland flow water—Act, s 20(6)

- (1) This section limits the overland flow water that may be taken under section 20(6) of the Act.
- (2) A person may only take overland flow water—
 - (a) for stock or domestic purposes; or
 - (b) for another purpose, other than ponded pasture and water spreading, if the works that allow the taking of overland flow water have a capacity of not more than 50ML; or
 - (c) under a water licence; or
 - (d) of not more than the amount necessary to satisfy the requirements of the following—
 - (i) an environmental authority issued under the *Environmental Protection Act 1994*;
 - (ii) a development permit for carrying out an environmentally relevant activity, other than a mining or petroleum activity, under the *Environmental Protection Act 1994*; or

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- (e) that is contaminated agricultural runoff water; or
- (f) of a volume that is incidental to the operation of a storage constructed to store coal seam gas water for which an entity holds an approval under the *Environmental Protection (Waste Management) Regulation 2000*, part 6A; or
- (g) under section 110.

(3) In this section—

coal seam gas water see the *Environmental Protection Act 1994*, section 310D(7).

contaminated agricultural runoff water means overland flow water that contains, or is likely to contain, excess nutrients or farm chemicals at levels potentially harmful to the quality of water in a watercourse.

ponded pasture means a permanent or periodic pondage of water in which the dominant plant species are pasture species used for grazing or harvesting.

water spreading means diverting or collecting runoff from natural channels, gullies or streams, with a system of banks, ditches or other means, and spreading it over a relatively flat area.

110 Taking water using particular existing overland flow works authorised

- (1) This section applies to the following—
 - (a) a person who—
 - (i) is the owner of land on which existing overland flow works are situated, other than works for taking only the overland flow water that may be taken under section 109(2)(a) to (f); and
 - (ii) did not give the chief executive notice of the existing overland flow works mentioned in subparagraph (i) under previous section 28D;

- (b) the holder of a mining lease for land on which existing overland flow works are situated, other than works for taking only the overland flow water that may be taken under section 109(2)(a) to (f).
- (2) The holder of a mining lease mentioned in subsection (1)(b) may continue to use the existing overland flow works to take overland flow water for 1 year after the commencement of this plan.
- (3) If the person, or the holder of a mining lease, gives the chief executive notice of the existing overland flow works, in the approved form, and any further information reasonably required by the chief executive about the works, the person, or holder, may continue to use the works to take overland flow water after the notice and information are given.
- (4) In this section—
previous section 28D means section 28D of the repealed *Water Resource (Fitzroy Basin) Plan 1999*.

111 Granting water licences under the resource operations plan

- (1) This section applies if the resource operations plan states a process for granting, under section 212 of the Act, a water licence to replace an authority under section 110.
- (2) Under the process, the chief executive—
 - (a) must consider—
 - (i) the average annual volume of overland flow water that could have been taken, immediately before the commencement of this plan, using the existing overland flow works to which the authority relates; and
 - (ii) the annual volumes of overland flow water estimated by the chief executive to have been taken using the works during the period, of not more than

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10 years, immediately before the commencement of this plan; and

- (b) may consider the extent to which the works, immediately before the commencement of this plan, allowed—
 - (i) the taking of other water under another authorisation; or
 - (ii) the storage of other water taken under another authorisation.
- (3) Subsection (2) does not limit the matters the chief executive may consider.
- (4) The process may require the authority or licence holder to give the chief executive a certificate, from a registered professional engineer, stating information about the works including the capacity of the works and the rate at which the works may take water.
- (5) In this section—

registered professional engineer means a person registered as a registered professional engineer under the *Professional Engineers Act 2002*.

112 Water licences to take overland flow water

A water licence to take overland flow water is to state—

- (a) 1 of the following purposes for which water may be taken under the licence—
 - (i) agriculture;
 - (ii) any; and
- (b) at least 1 of the following—
 - (i) the maximum rate at which water may be taken under the licence;
 - (ii) the daily volumetric limit for the licence;

- (iii) the nominal entitlement for the licence;
- (iv) the maximum volume of water that may be stored under the licence; and
- (c) the conditions, if any, for the licence.

113 Relationship with Sustainable Planning Act 2009

- (1) Works that allow the taking of overland flow water are assessable development for the *Sustainable Planning Regulation 2009*, schedule 3, part 1, table 4, item 3(c)(i).
- (2) Subsection (1) does not apply to—
 - (a) works mentioned in subsection (3); or
 - (b) the repair or maintenance of either of the following works if the repair or maintenance does not alter the design of the works—
 - (i) existing overland flow works mentioned in section 110;
 - (ii) works constructed under a development permit.
- (3) The following works that allow the taking of overland flow water are self-assessable development for the *Sustainable Planning Regulation 2009*, schedule 3, part 2, table 4, item 1(b)(ii)—
 - (a) works for taking overland flow water only for stock or domestic purposes;
 - (b) works mentioned in section 109(2)(b);
 - (c) works for taking only the overland flow water mentioned in section 109(2)(d).

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Part 3 Additional strategies for groundwater

Division 1 Preliminary

114 Application and purpose of pt 3

This part—

- (a) applies only to groundwater in a groundwater management area; and
- (b) states the strategies for achieving the outcomes mentioned in chapter 3.

115 Limitation on taking or interfering with groundwater—Act, s 20(6)

- (1) This section limits the groundwater that may be taken or interfered with under section 20(6) of the Act.
- (2) A person may only take or interfere with groundwater in a groundwater management area—
 - (a) under a water permit; or
 - (b) under a water licence; or
 - (c) under an interim water allocation; or
 - (d) under a water allocation; or
 - (e) under section 123; or
 - (f) for stock or domestic purposes.

116 Relationship with Sustainable Planning Act 2009

- (1) In the Carnarvon groundwater management area, all works for taking groundwater are assessable development for the *Sustainable Planning Regulation 2009*, schedule 3, part 1, table 4, item 3(c)(ii).

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- (2) In a groundwater management area other than the Carnarvon groundwater management area—
 - (a) works for taking groundwater for other than stock or domestic purposes are assessable development for the *Sustainable Planning Regulation 2009*, schedule 3, part 1, table 4, item 3(c)(ii); and
 - (b) works for taking groundwater for stock or domestic purposes are self-assessable development for the *Sustainable Planning Regulation 2009*, schedule 3, part 2, table 4, item 1(b)(iii).

Division 2 Water licences to take groundwater

Subdivision 1 General

117 Elements of water licences

- (1) A water licence to take groundwater is to state the following—
 - (a) 1 of the following purposes for which the water may be taken under the licence—
 - (i) agriculture;
 - (ii) any;
 - (b) the nominal entitlement for the licence;
 - (c) the conditions, if any, for the licence.
- (2) However, subsection (1) does not apply to a licence for mine dewatering granted under section 206 of the Act.

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Subdivision 2 Criteria for amending water entitlements to achieve plan outcomes

118 Definition for sdiv 2

In this subdivision—

amended water licence means a water licence to take groundwater and amended under section 217 of the Act.

119 Purpose to be stated on a water licence

The purpose stated on an amended water licence is to be—

- (a) if the purpose stated on the water licence is agriculture, irrigation, stock intensive or a similar purpose—‘agriculture’; or
- (b) otherwise—‘any’.

120 Nominal entitlement for a water licence

The nominal entitlement for an amended water licence is—

- (a) for a water licence that, before the amendment, states the volume of water that may be taken in a 12-month period—the stated volume; and
- (b) otherwise—the volume decided by the chief executive having regard to the following—
 - (i) the conditions under which water may be taken under the licence;
 - (ii) the water-taking capacity of any works for taking water under the licence;
 - (iii) the volume required for the licence’s intended purpose;
 - (iv) the annual volumes of water estimated by the chief executive to have been taken under the licence

during the period, of not more than 10 years, immediately before the commencement of this plan;

- (v) the efficiency of the use of the water mentioned in subparagraph (iv).

121 Conditions for water licences

In deciding the conditions under which water may be taken under an amended water licence, the chief executive must consider the conditions stated on the water licence being amended.

Subdivision 3 Dealing with particular existing groundwater works

122 Definition for sdiv 3

In this subdivision—

prescribed existing groundwater works means works the chief executive is satisfied were used or capable of being used to take groundwater for a purpose, other than stock or domestic purposes, from the—

- (a) Isaac Connors Groundwater Unit 1 in the Isaac Connors groundwater notification area and the works were in existence on 15 December 2006; or
- (b) Isaac Connors Groundwater Unit 2 in the Isaac Connors groundwater notification area and the works were in existence on the 2010 moratorium publication day; or
- (c) Callide groundwater notification area and the works were in existence on the 2010 moratorium publication day.

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123 Taking groundwater using prescribed existing groundwater works

- (1) This section applies to an owner of land on which there are prescribed existing groundwater works.
- (2) The owner may continue to take groundwater using the works for 1 year after the commencement of this plan.
- (3) If the owner gives the chief executive notice in the approved form of the works within 1 year after the commencement of this plan, the owner may continue to take groundwater using the works.
- (4) However, an authorisation under this section ceases to apply to an owner in relation to prescribed existing groundwater works if the owner is granted a water licence relating to the works.

124 Granting water licences for using prescribed existing groundwater works

- (1) The chief executive may, under section 212 of the Act, grant a water licence to a person authorised under section 123(2) to continue taking groundwater.
- (2) The licence must be consistent with this part.

125 Nominal entitlements for authorisations

- (1) This section applies if the chief executive decides the nominal entitlement for a water licence mentioned in section 124.
- (2) The nominal entitlement is to be the estimated volume to take groundwater for the entitlement.
- (3) However, if the chief executive is satisfied the volume (a *higher volume*) of groundwater taken during the relevant period is more than the estimated volume, having regard to the following, the chief executive may decide a nominal entitlement that is more than the estimated volume—

- (a) the efficiency of the use of the groundwater mentioned in paragraph (c) or (d);
 - (b) the availability of groundwater in the aquifer to which the works relate;
 - (c) the availability of other water sources in the area to which the entitlement relates;
 - (d) the density of water bores for taking groundwater in the area to which the entitlement relates.
- (4) In considering whether a higher volume of groundwater was taken during the relevant period, the chief executive must consider each of the following—
- (a) the water-taking capacity of the prescribed existing groundwater works as at the commencement of this plan;
 - (b) the number of hours the works were operated during the relevant period;
 - (c) for works for irrigation purposes—the volume of groundwater estimated by the chief executive to have been taken during the relevant period for irrigating crops grown during the period;
 - (d) for works for a purpose other than irrigation purposes—the volume of groundwater estimated by the chief executive to have been taken during the relevant period for the purpose.
- (5) Subsections (3) and (4) do not limit the matters the chief executive may consider.
- (6) In this section—
- capacity**, of prescribed existing groundwater works, means—
- (a) if the water bore for the works has a design pumping rate only—the design pumping rate for the bore; or
 - (b) if the works have an equipped rate only—the equipped rate for the works; or

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- (c) if the works have a design pumping rate and an equipped rate—the lesser of the design pumping rate and the equipped rate.

design pumping rate, for a water bore, means the pumping rate—

- (a) at which the bore can be pumped without causing the bore’s pump to break suction; and
- (b) estimated from an analysis of a pumping test based on the drawdown available in the bore above the pump inlet that would sustain pumping for 70 consecutive days.

equipped rate, for prescribed existing groundwater works, means the rate at which pumping equipment installed on the works can be pumped for the purposes for which the works are used.

estimated volume, to take groundwater for a water entitlement, means the lesser of the following—

- (a) the volume worked out by multiplying the capacity of the prescribed existing groundwater works by the number of hours, that must not be more than 2000 hours, the chief executive decides having regard to—
 - (i) the efficiency of the use of groundwater using the works during the relevant period; and
 - (ii) the availability of other water sources in the area to which the entitlement relates;
- (b) the volume of groundwater taken using the prescribed existing groundwater works for irrigation purposes during the relevant period, if the volume is not more than 6ML of water for each hectare of property.

relevant period means each 1 year during the period of not more than 10 years immediately before the commencement of this plan.

Division 3 Converting authorisations to water allocations to take unsupplemented groundwater

126 Purpose of div 3

This division states strategies for authorisations to be converted, under section 121 of the Act, to water allocations to take unsupplemented groundwater under the resource operations plan.

127 Definition for div 3

In this division—

previous authorisation means an authorisation mentioned in section 126.

128 Authorisations to be converted to water allocations

The authorisations to be converted to water allocations to take unsupplemented groundwater are water licences for taking groundwater, other than for the purpose of stock, from the following sub-areas—

- (a) Upper Callide groundwater sub-area;
- (b) Lower Callide groundwater sub-area;
- (c) Prospect Creek groundwater sub-area.

129 Elements of water allocations

A water allocation to take unsupplemented groundwater is to state the following—

- (a) the location from which water may be taken under the allocation;
- (b) the purpose for which water may be taken under the allocation;

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- (c) the nominal volume for the allocation;
- (d) the annual volumetric limit for the allocation;
- (e) the water allocation group to which the allocation belongs;
- (f) the conditions under which water may be taken under an allocation;
- (g) the groundwater management area that includes the location from which groundwater may be taken under the allocation.

130 Location for taking water under a water allocation

The location for taking water to be stated on a water allocation to take unsupplemented groundwater is to include the place at which water could have been taken under the previous authorisation.

131 Purpose to be stated on a water allocation

The purpose to be stated on a water allocation to take unsupplemented groundwater is to be—

- (a) if the purpose stated on the previous authorisation is irrigation, stock intensive, agriculture or a similar purpose—‘agriculture’; or
- (b) otherwise—‘any’.

132 Nominal volume for a water allocation

In deciding the nominal volume for a water allocation to take unsupplemented groundwater, the chief executive must have regard to the following—

- (a) the local availability of groundwater;
- (b) the conditions under which groundwater may be taken under the previous authorisation;

- (c) the annual volumetric limit under section 133;
- (d) the simulated mean annual diversion for the proposed water allocation.

133 Annual volumetric limit for a water allocation

The annual volumetric limit for a water allocation to take unsupplemented groundwater is the annual volumetric limit decided by the chief executive under section 139.

134 Water allocation groups

A water allocation to take unsupplemented groundwater belongs to the following water allocation groups—

- (a) for a water allocation to take unsupplemented groundwater from Upper Callide groundwater sub-area—
 - (i) for water allocations converted from water authorisations 33535X and 47301D—the GW1A water allocation group; or
 - (ii) for all other water allocations—the GW1B water allocation group;
- (b) for a water allocation to take unsupplemented groundwater from Lower Callide groundwater sub-area—
 - (i) for a water allocation converted from water authorisation 43919D—the GW2A water allocation group; or
 - (ii) for all other water allocations—the GW2B water allocation group;
- (c) for a water allocation to take unsupplemented groundwater from Prospect Creek groundwater sub-area—

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- (i) for a water allocation converted from water authorisation 68275D—the GW3A water allocation group; or
- (ii) for all other water allocations—the GW3B water allocation group.

135 Conditions for water allocations

In deciding the conditions under which groundwater may be taken under a water allocation, the chief executive must have regard to the conditions stated on the previous authorisation, or a development permit relating to the previous authorisation.

Division 4 Nominal volume and annual volumetric limit for new groundwater allocations

136 Application of div 4

This division applies to the following—

- (a) an interim water allocation mentioned in section 51 converted under the resource operations plan to a water allocation to take supplemented water and belonging to the medium priority group as stated on the interim resource operations licence;
- (b) an authorisation mentioned in section 128 converted under section 121 of the Act to a water allocation to take unsupplemented groundwater.

137 Purpose of div 4

The purpose of this division is to provide for—

- (a) water allocations to be converted from interim water allocations mentioned in section 136(a)—the nominal volume for the water allocations; and

- (b) water allocations to be converted from authorisations mentioned in section 136(b)—the annual volumetric limit for the water allocations.

138 Definitions for div 4

In this division—

2007 authorisation means a prescribed authorisation in existence on 1 July 2007.

2007 authorisation volume, for a 2007 authorisation, see section 140.

accounted use means the volume of water, taken by a water user in a water year, decided by the chief executive having regard to all available information, including information from water accounts.

annual adjusted use volume, for a 2007 authorisation, see section 141(1).

carry over means a volume of water, not taken in a water year, that was authorised to be taken in the following water year.

converting authorisation means—

- (a) an interim water allocation mentioned in section 51; and
- (b) an authorisation mentioned in section 128.

deemed use, for an authorisation, means the volume of water deemed to have been taken in a water year under the authorisation.

forward draw means a volume of water, for a water year, that was authorised to be taken in the previous water year.

HOU consideration period means the period from 1 July 1997 to 30 June 2007.

pre-2007 contributing authorisation means a prescribed authorisation that contributed the whole or part of its nominal entitlement to a 2007 authorisation as a result of subdivision

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or amalgamation, or a series of subdivisions or amalgamations.

Examples—

- Authorisation A is a 2007 authorisation, and is the result of the amalgamation of authorisation B and C. Authorisations B and C are pre-2007 contributing authorisations to authorisation A.
- Authorisations D and E are 2007 authorisations, and each is the result of the subdivision of authorisation F. Authorisation F is a pre-2007 contributing authorisation for authorisation D and authorisation E.

prescribed authorisation means a medium priority interim water allocation or a water licence to take groundwater that existed at any time between 1 July 1997 and the day the resource operations plan is amended to convert the interim water allocations or authorisations mentioned in section 136.

water accounts means the records of water taken from the Upper Callide, Lower Callide and Prospect Creek groundwater sub-areas and the Callide Valley Water Supply Scheme, as recorded in the department's, and interim resource operations licence holder's, water accounting systems.

water year means a 12-month period beginning on 1 July.

139 Nominal volume or annual volumetric limit for a water allocation

- (1) A water allocation mentioned in section 136(a) is to have a nominal volume for the allocation.
- (2) A water allocation mentioned in section 136(b) is to have an annual volumetric limit for the allocation.
- (3) The nominal volume or annual volumetric limit of the water allocation is equal to—
 - (a) for a converting authorisation that is a 2007 authorisation that has not been subdivided, or amalgamated with another authorisation, after 1 July 2007—the lesser of—

-
- (i) the nominal entitlement of the converting authorisation; and
 - (ii) the 2007 authorisation volume plus 5ML; or
 - (b) otherwise—the lesser of—
 - (i) the nominal entitlement of the converting authorisation; and
 - (ii) the volume calculated by the chief executive using the beneficial volumes of the post-2007 contributing authorisations that contributed to the nominal entitlement of the converting authorisation.
 - (4) When calculating the volume under subsection (3)(b)(ii), the chief executive must—
 - (a) for a post-2007 contributing authorisation in existence on [*date of the release of the draft water resource plan*]*—include an additional 5ML in the beneficial volume; and*
 - (b) if a post-2007 contributing authorisation is subdivided—apportion the beneficial volume of the subdivided authorisation between the authorisations resulting from the subdivision in the same ratio as the nominal entitlement was apportioned between the resulting authorisations; and
 - (c) if a post-2007 contributing authorisation is amalgamated—add the beneficial volumes of the authorisations that have been amalgamated.
 - (5) In this section—

beneficial volume, of a post-2007 contributing authorisation, means the volume, derived from a 2007 authorisation volume, of the post-2007 contributing authorisation as a result of the subdivision or amalgamation of—

 - (a) a 2007 authorisation; or
 - (b) another post-2007 contributing authorisation.

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Note—

The volume is not the nominal entitlement for an authorisation.

post-2007 contributing authorisation means a prescribed authorisation in existence on or after 1 July 2007, including a 2007 authorisation, that contributes, as a result of subdivision or amalgamation, or a series of subdivisions or amalgamations, to the nominal entitlement of a converting authorisation.

Examples—

- Authorisation A is the result of the amalgamation of authorisations B and C. Authorisations B and C are post-2007 contributing authorisations to authorisation A.
- Authorisations D and E are each the result of the subdivision of authorisation F. Authorisation F is a post-2007 contributing authorisation for authorisation D and authorisation E.

140 2007 authorisation volume

The volume (the ***2007 authorisation volume***) for a 2007 authorisation is the mean, rounded up to the nearest megalitre, of the five largest annual adjusted use volumes for the 2007 authorisation.

141 Annual adjusted use volume

- (1) The ***annual adjusted use volume*** for a 2007 authorisation for each water year in the HOU consideration period is equal to—
 - (a) for a 2007 authorisation not affected by a subdivision or amalgamation of an authorisation during the HOU consideration period—the deemed use for the 2007 authorisation for the water year as adjusted under subsection (2); or
 - (b) otherwise—the sum of the deemed use for each pre-2007 contributing authorisation in existence on the last day of the water year as adjusted under subsections (2) and (3).

-
- (2) The deemed use for an authorisation for each water year is adjusted in the following way—
 - (a) any deemed use for the authorisation up to the amount of the announced allocation volume for the authorisation is to be attributed to the particular water year;
 - (b) after adjusting the deemed use under paragraph (a), any remaining deemed use for the authorisation up to the volume taken under a carry over is to be attributed to the water year from which the carry over was derived;
 - (c) after adjusting the deemed use under paragraph (b), any remaining deemed use for the authorisation up to the volume taken under a forward draw is to be attributed to the water year from which the forward draw was derived.
 - (3) In addition to the adjustment under subsection (2), the deemed use for an authorisation is adjusted to account for any amalgamation or subdivision of authorisations as follows—
 - (a) when adjusting for the amalgamation of authorisations—add the deemed use from all authorisations contributing to the amalgamation;
 - (b) when adjusting for the subdivision of an authorisation—apportion the deemed use between the resulting authorisations in the same ratio as the nominal entitlement of the subdivided authorisation was apportioned to the resulting authorisations.
 - (4) In this section—

announced allocation volume, for an authorisation, means the volume of water authorised to be taken in a water year under the authorisation, not including any carry over or forward draw.

142 Deemed use for an authorisation

- (1) The deemed use for each 2007 authorisation and pre-2007 contributing authorisation is to be calculated by the chief

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executive for each water year in the HOU consideration period.

- (2) In calculating the deemed use for an authorisation, the chief executive must—
 - (a) consider the accounted use for all water users in the Upper Callide, Lower Callide and Prospect Creek groundwater sub-areas and Callide Valley Water Supply Scheme; and
 - (b) consider the volumes of water taken under a seasonal water assignment or temporary transfer arrangement; and
 - (c) disregard the volumes of water considered to be taken under a stock or domestic accounting arrangement; and
 - (d) disregard any volume of water taken that the chief executive is satisfied was not authorised to be taken under the authorisation.

- (3) In this section—

stock or domestic accounting arrangement means an arrangement that allows for a particular volume of water taken to be considered as water taken for stock or domestic purposes.

temporary transfer arrangement means an arrangement that had the same effect as seasonal water assignment and was implemented prior to the commencement of the *Water Act 2000*.

Chapter 6 Monitoring and reporting requirements

143 Monitoring

- (1) The monitoring requirements for this plan are—
 - (a) water monitoring for—
 - (i) stream flows; and
 - (ii) taking and diverting water; and
 - (iii) releases from water storages; and
 - (iv) water quantity for water storages, including inflow, storage volume or level and outflow; and
 - (v) groundwater levels.
 - (b) natural ecosystems monitoring for—
 - (i) volume, frequency, duration and timing of stream flows; and
 - (ii) information on hydraulic habitat requirements of ecological assets in the plan area; and
 - (c) groundwater developments, including records of water bores drilled; and
 - (d) existing overland flow works of which the chief executive is notified under section 110(3); and
 - (e) other water and natural ecosystem monitoring required by the chief executive.
- (2) The monitoring requirements are to be achieved by—
 - (a) monitoring programs undertaken by operators of infrastructure for interfering with water under the resource operations plan; and
 - (b) monitoring programs administered by the chief executive and relevant State agencies; and

- (c) other monitoring programs considered by the chief executive to be relevant to the matters mentioned in subsection (1).

144 Monitoring programs undertaken by operators of infrastructure

- (1) Each operator of infrastructure for interfering with water in the plan area must develop and undertake the monitoring programs stated, for the operator, in the resource operations plan.
- (2) The monitoring programs must assist in enabling the chief executive to assess the effectiveness of the strategies under chapter 5.

145 Operators of infrastructure to give reports

- (1) Each operator of infrastructure for interfering with water in the plan area must, to the extent required under the resource operations plan, give the chief executive a written report containing the following information—
 - (a) details of information obtained by the monitoring programs mentioned in section 144;
 - (b) details of decisions made by the operator in managing water and water infrastructure, or distributing water, including, for example, decisions about the following—
 - (i) making water available to water users under the operator’s usual procedures for managing or distributing water;
 - (ii) managing the flow of water;
 - (iii) restricting the taking or supply of water;
 - (iv) infrastructure modifications or installations;
 - (c) information about any noncompliance by the operator with the resource operations plan;
 - (d) details about remedial action taken by the operator—

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- (i) in relation to a requirement under the resource operations plan; or
 - (ii) in response to an event or thing affecting water quality;
- (e) details of any emergency action taken by the operator that may affect the achievement of the outcomes under chapter 3.
- (2) A report about a matter mentioned in subsection (1) must be given—
 - (a) for each financial year in which the operator manages or distributes water under this plan; and
 - (b) within 3 months after the end of the financial year to which the report relates.
- (3) A report about a matter mentioned in subsection (1)(e) must also be given the next business day after the action is taken.
- (4) Despite subsection (2), the resource operations plan may require reports about matters mentioned in subsection (1) to be given more frequently than for each financial year.

146 Minister's report on plan—Act, s 53

- (1) The Minister's report on this plan must be prepared—
 - (a) for each financial year this plan is in force; and
 - (b) within 6 months after the end of the financial year to which the report relates.
- (2) If the Minister is satisfied about any of the matters mentioned in section 149, the report, in its assessment of the effectiveness of the implementation of the plan in achieving the plan's outcomes, must include a consideration of the matters.

Chapter 7 Implementing and amending this plan

147 Implementation schedule

- (1) This section states the proposed arrangements for implementing this plan.
- (2) Within 2 years after the commencement of this plan, it is proposed to amend the resource operations plan to—
 - (a) grant, or convert authorisations to, water allocations to take water in all of the priority areas; and
 - (b) for water in the Callide Valley Water Supply Scheme—make environmental management rules, infrastructure operating rules, water sharing rules, water allocation change rules and seasonal water assignment rules; and
 - (c) establish a process to grant licences to take groundwater in the Callide groundwater notification area and the Isaac Connors groundwater notification area; and
 - (d) establish a process to deal with unallocated water available for future water requirements in the plan area; and
 - (e) establish a process for granting water licences for taking overland flow water; and
 - (f) implement the monitoring requirements mentioned in chapter 6.
- (3) In this section—

priority area means each of the following—

 - (a) the Callide Valley Water Supply Scheme;
 - (b) the Upper Callide, Lower Callide and Prospect Creek groundwater sub-areas in the Callide groundwater management area;
 - (c) the following parts of the Fitzroy Basin—

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- (i) the Nogoia River from the upstream limit of Fairbairn Dam at AMTD 737.5km to its junction with Theresa Creek;
- (ii) Theresa Creek from its junction with Retreat Creek at AMTD 15.0km to its junction with the Nogoia River;
- (iii) Retreat Creek, including anabranches, from its junction with Kettle Creek at AMTD 23.6km to its junction with Theresa Creek;
- (iv) the Comet River, including anabranches, from Lake Brown gauging station AMTD 199.2km to its junction with the Nogoia River;
- (v) the Dawson River from the upstream limit of Glebe Weir at AMTD 356.5km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible;
- (vi) the Dawson River from Utopia Downs gauging station at AMTD 453.5km to the upstream limit of Glebe Weir at AMTD 356.5km, including sections of tributaries where Dawson River flows are accessible.

148 Minor or stated amendment of plan—Act, s 57

The following types of amendment may be made to this plan under section 57(b) of the Act—

- (a) an amendment or addition of an environmental flow objective if the amendment or addition achieves an equivalent or improved ecological outcome without adversely affecting—
 - (i) the outcomes mentioned in chapter 3; or
 - (ii) the water allocation security objectives mentioned in chapter 4, part 2;

- (b) an amendment or addition of a water allocation security objective if the amendment or addition does not adversely affect—
 - (i) the outcomes mentioned in chapter 3; or
 - (ii) the environmental flow objectives mentioned in chapter 4, part 1;
- (c) an amendment or addition of a node;
- (d) an amendment to subdivide a subcatchment area;
- (e) an amendment to adjust the boundaries of a groundwater management area and groundwater sub-area if more accurate information about the boundaries of the plan area or hydrological characteristics of the plan area becomes available;
- (f) an amendment or addition of a priority group;
- (g) an amendment or addition of a water allocation group;
- (h) an amendment of the capacity of works to take overland flow water mentioned in section 109(2)(b);
- (i) an amendment or addition of a monitoring or reporting requirement under chapter 6.

149 Amending or replacing plan

The Minister must consider amending this plan or preparing a new plan to replace this plan if the Minister is satisfied—

- (a) in relation to this plan’s general outcomes under section 12—
 - (i) water entitlements in the plan area are not sufficient to meet water needs sourced from the plan area having regard to—
 - (A) the extent to which water is being taken under the water entitlements; and
 - (B) the efficiency of present, and expected future, water use; and

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- (C) emerging requirements for additional water; and
- (D) water savings that may be made from improvements in the efficiency of water use or the use of water from other sources including, for example, recycled water; and
- (E) the likely timeframe in which additional water will be required; and
- (ii) there are economically viable and ecologically sustainable uses for additional water; or
- (b) any of the following are not being achieved—
 - (i) the specific surface water and groundwater outcomes under section 13;
 - (ii) the general ecological outcomes under section 14;
 - (iii) the specific ecological outcomes under section 15.

Chapter 8 Repeal of the Water Resources (Fitzroy Basin) Plan 1999

150 Repeal

The Water Resources (Fitzroy Basin) Plan 1999 is repealed.

Schedule 1 Plan area

section 4

Consultation draft



CAS1752.1

Schedule 2 Subcatchment areas

sections 5 and 33(1)(b)

Consultation draft



CAS1752.4

Schedule 3 Groundwater management areas

section 6, schedule 13, definitions *Callide groundwater notification area* and *Isaac Connors groundwater notification area*

Consultation draft



Note—

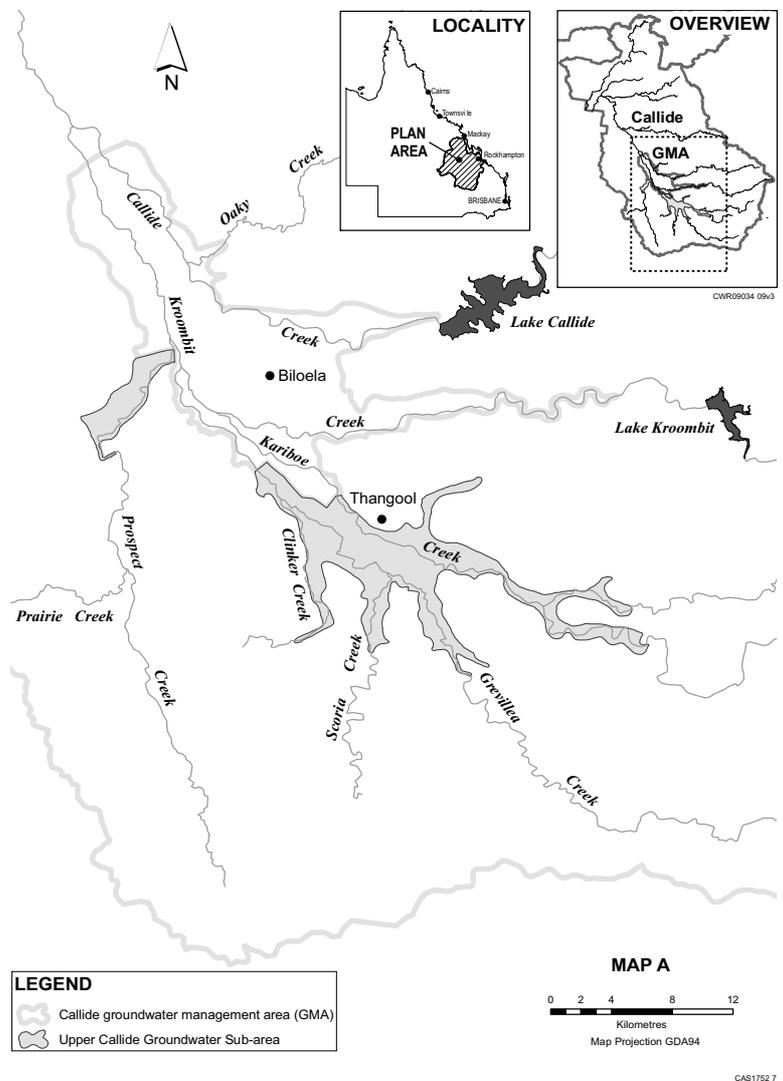
The Callide Valley Water Supply Scheme is not part of the Callide groundwater management area.

Schedule 4 Groundwater sub-areas

section 7(2), (4) and (6)

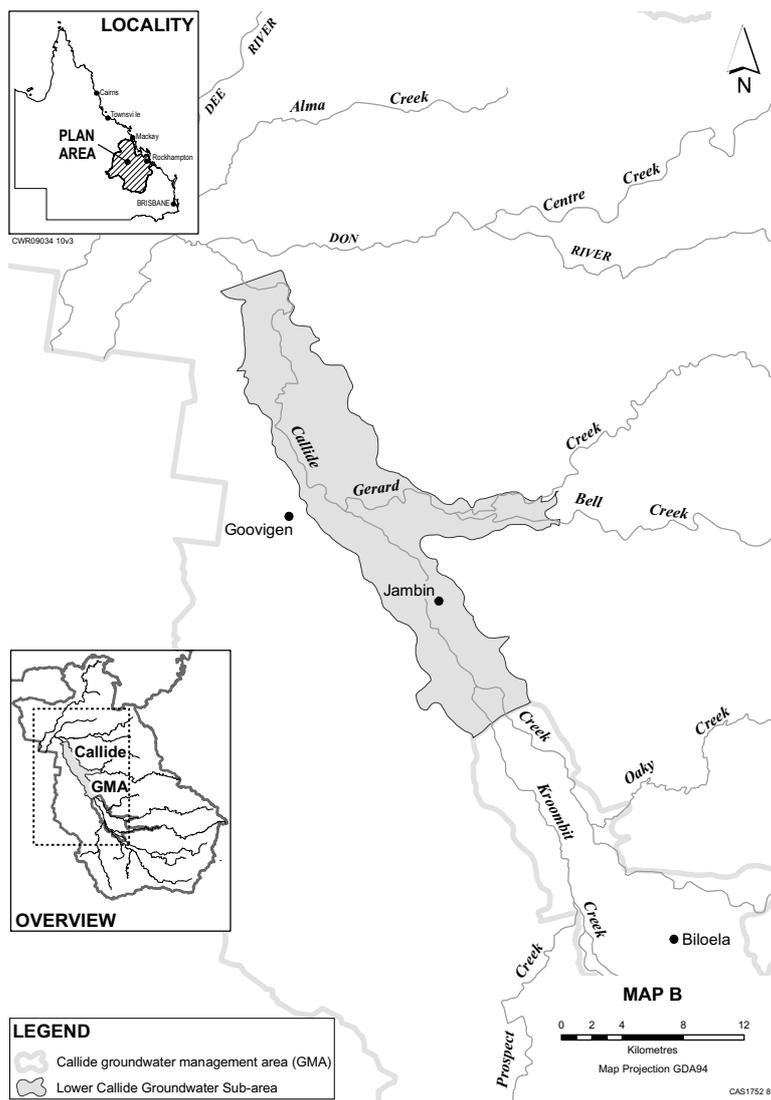
Map A—Upper Callide groundwater sub-area

Consultation draft

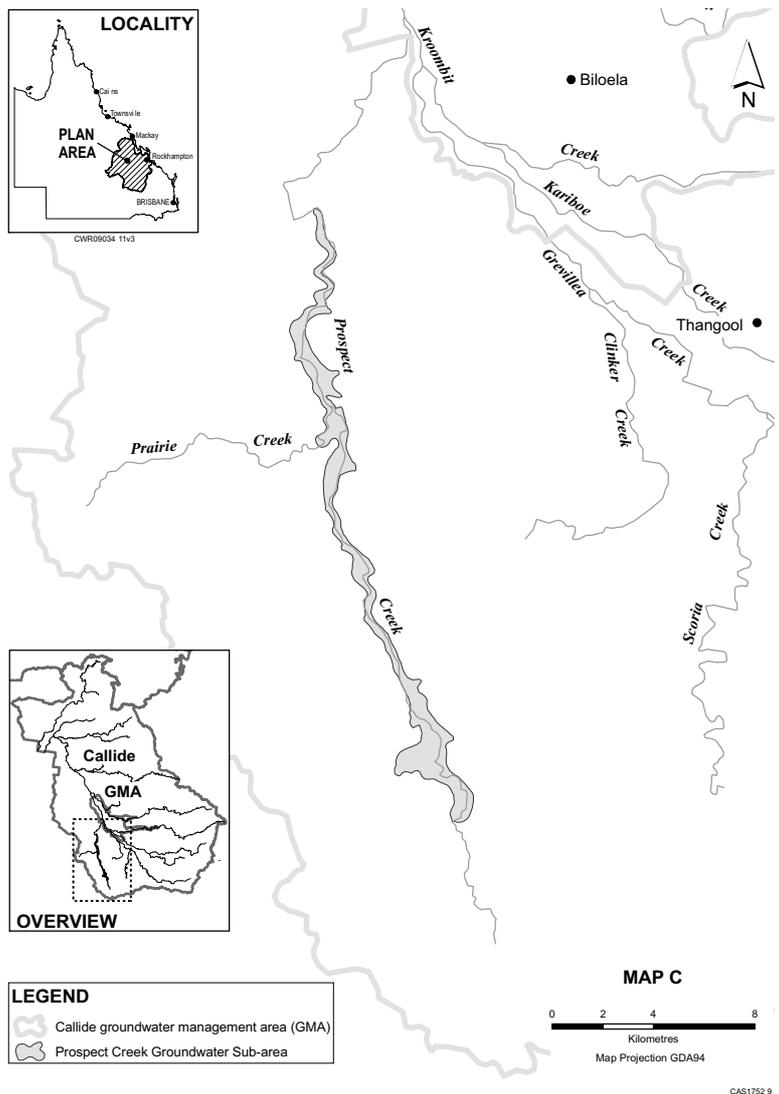


Map B—Lower Callide groundwater sub-area

Consultation draft

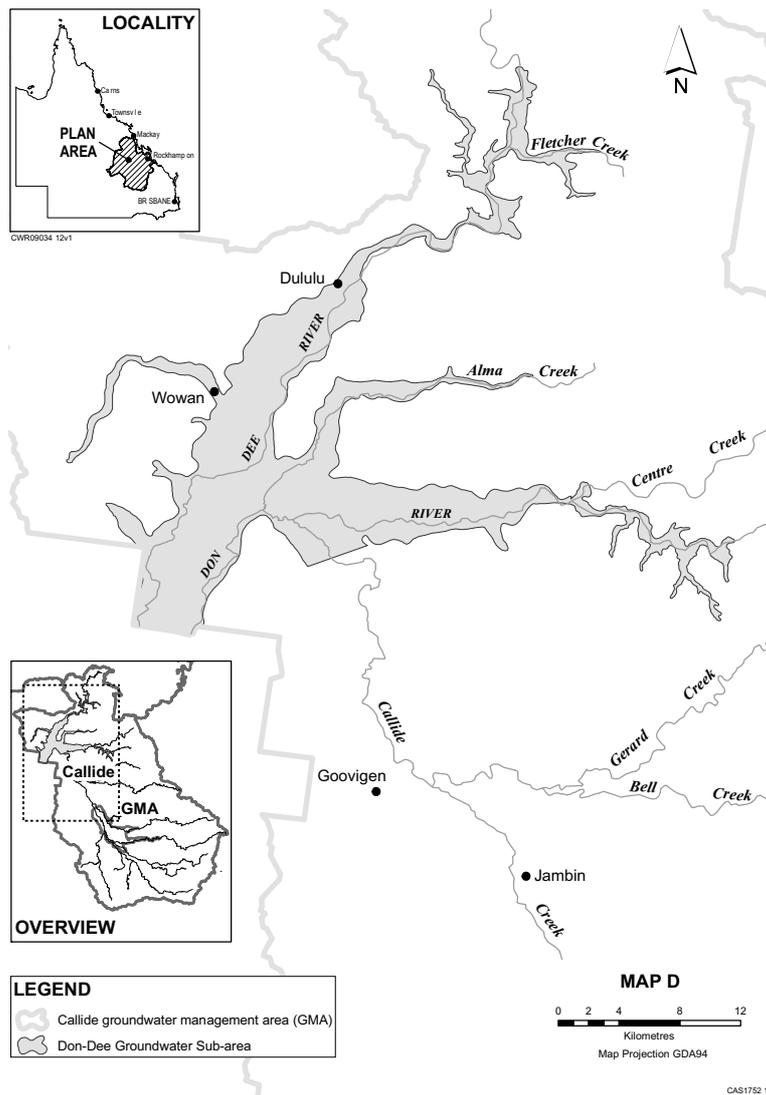


Map C—Prospect Creek groundwater sub-area



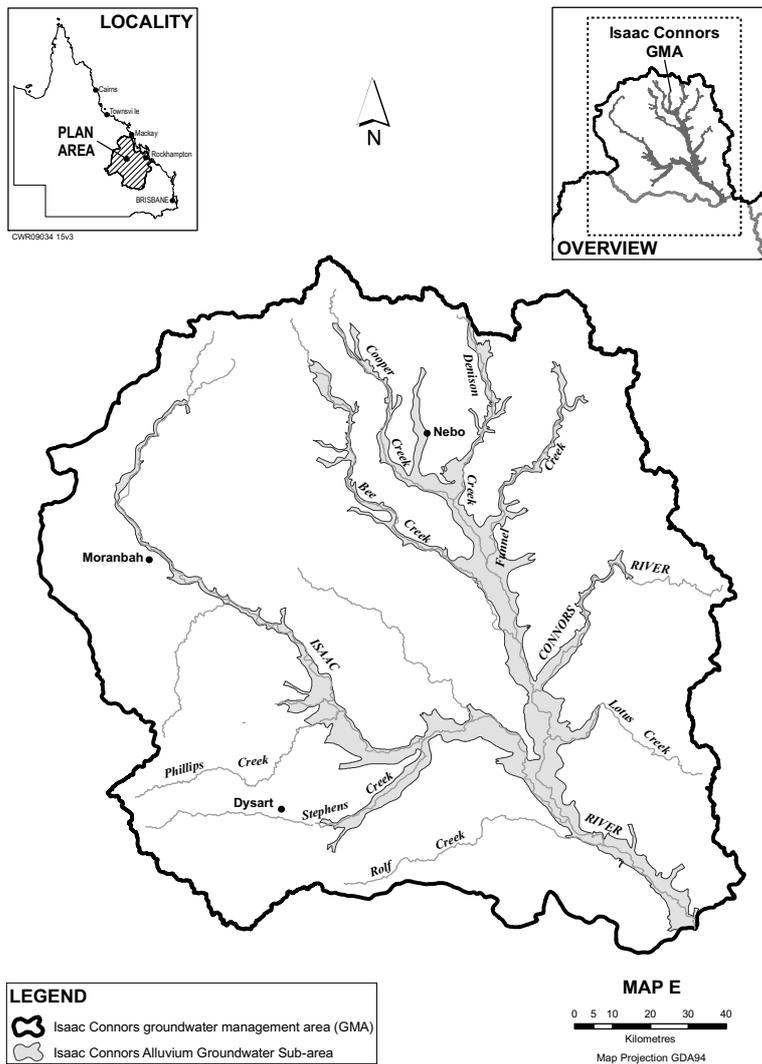
Map D—Don and Dee groundwater sub-area

Consultation draft



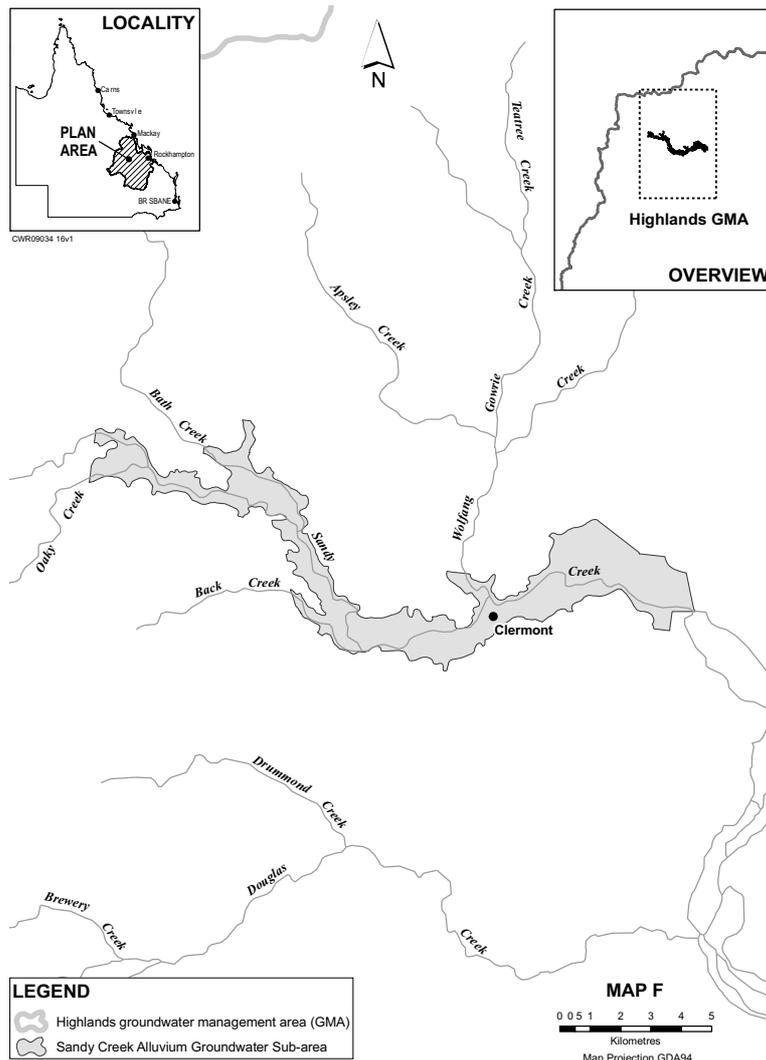
Map E—Isaac Connors Alluvium groundwater sub-area

Consultation draft



Map F—Sandy Creek Alluvium groundwater sub-area

Consultation draft

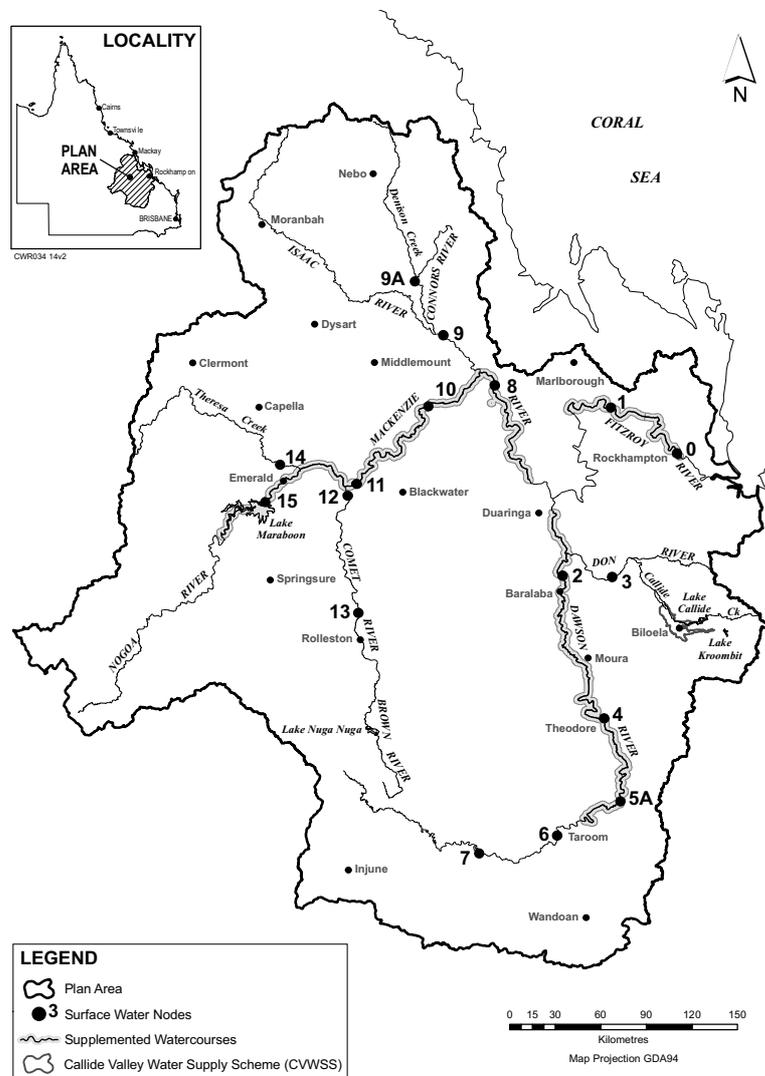


Schedule 5 Nodes

section 9(2)

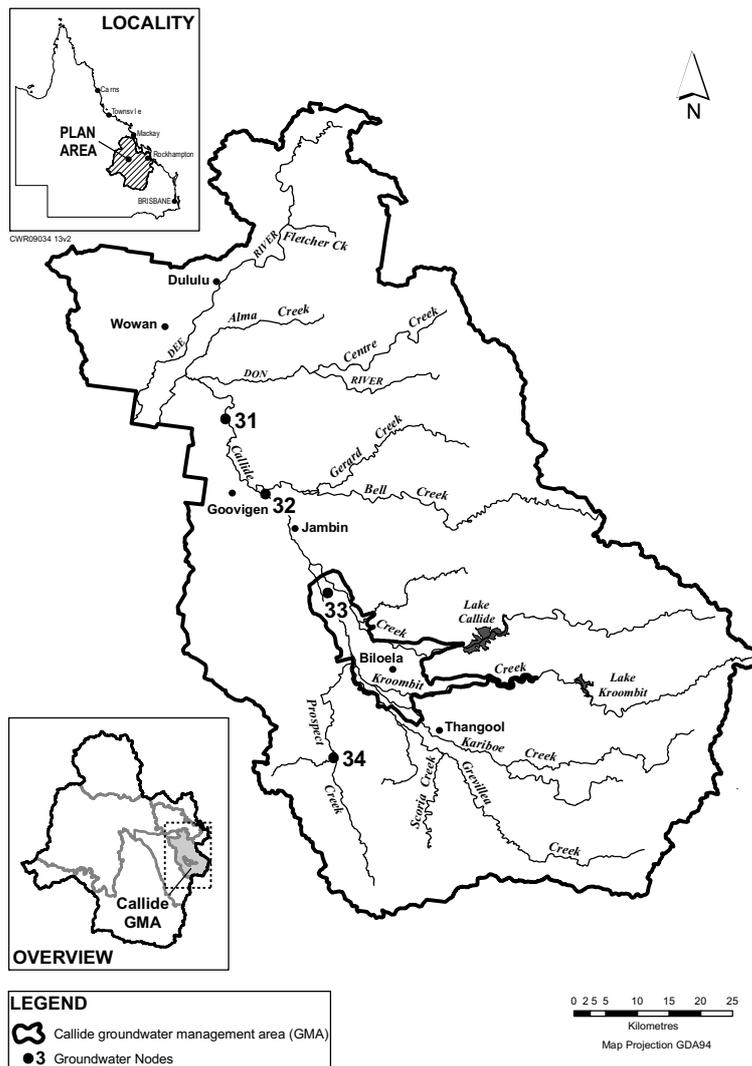
Part 1 Surface water node location

Consultation draft



Part 2 Groundwater node location

Consultation draft



Part 3 Surface water node description

Column 1	Column 2
Node	Location
Node 0	Fitzroy River at Fitzroy Barrage (AMTD 59.6km)
Node 1	Fitzroy River immediately downstream of Eden Bann Weir (AMTD 141.2km)
Node 2	Dawson River at Beckers (AMTD 71.0km)
Node 3	Don River at Rannes (AMTD 44.4km)
Node 4	Dawson River immediately downstream of Theodore Weir (AMTD 228.5km)
Node 5A	Dawson River at Nathan Gorge (AMTD 307.2km)
Node 6	Dawson River at Taroom (AMTD 384.6km)
Node 7	Dawson River at Utopia Downs (AMTD 453.5km)
Node 8	Mackenzie River at Coolmaringa (AMTD 376.0km)
Node 9	Isaac River at Yatton (AMTD 43.0km)
Node 9A	Connors River at Pink Lagoon (AMTD 46.8km)
Node 10	Mackenzie River immediately downstream of Bingegang Weir (AMTD 489.2km)
Node 11	Mackenzie River at Rileys Crossing (AMTD 601.4km)
Node 12	Comet River immediately downstream of Comet Weir (AMTD 10.8km)
Node 13	Comet River at The Lake (AMTD 124.2km)
Node 14	Theresa Creek at Main Road (AMTD 14.5km)
Node 15	Nogoa River immediately downstream of Fairbairn Dam (AMTD 685.6km)

Consultation draft

Part 4 Groundwater node description

Column 1	Column 2
Node	Location
31	Downstream part of Callide Valley
32	Confluence of Bell Creek and Callide Creek
33	Downstream section of supplemented area
34	Prospect Creek

Consultation draft

Schedule 6 Environmental flow objectives

sections 16, 17, 19 and 23 and schedule 13, definition *base flow*

Part 1 Seasonal base flow objectives

At each node mentioned in table 1, column 1—

- (a) for watercourses within water supply schemes—the percentage of the total number of days in a water flow season in the simulation period that the base flow, for the node, in table 1, column 2, is equalled or exceeded should be between 0.8 and 1.2 times the percentage stated for the water flow season for the node, in table 1, column 3; and
- (b) for watercourses elsewhere—the percentage of the total number of days in a water flow season in the simulation period that the base flow, for the node, in table 1, column 2, is equalled or exceeded is to be at least 0.9 times the percentage stated for the water flow season for the node, in table 1, column 3.

Table 1

Column 1	Column 2	Column 3		
Node	Base flow (ML/d)	Water flow season		
		January–April water flow season	May–August water flow season	September–December water flow season
0	288	88%	57%	47%
2	86	64%	27%	35%
3	26	43%	19%	19%
6	38	51%	26%	30%
8	190	82%	41%	37%
9	104	84%	49%	33%

Column 1	Column 2	Column 3		
Node	Base flow (ML/d)	Water flow season		
		January–April water flow season	May–August water flow season	September–December water flow season
9A	90	87%	58%	36%
10	163	54%	19%	29%
12	148	33%	10%	11%
14	104	23%	5%	7%

Part 2 Medium to high flow objectives

- 1 At each node mentioned in table 2, column 1—
 - (a) the mean annual flow in the simulation period, expressed as a percentage of the mean annual flow for the pre-development flow pattern, is to be at least the percentage stated for the node in table 2, column 2; and
 - (b) the median annual flow ratio in the simulation period, expressed as a percentage, is to be at least the percentage stated for the node in table 2, column 3; and
 - (c) the annual proportional flow deviation is to be not more than the annual proportional flow deviation stated for the node in table 2, column 4; and
 - (d) the mean wet season flow in the simulation period, expressed as a percentage of the mean wet season flow for the pre-development flow pattern, is to be at least the percentage stated for the node in table 2, column 5.

Table 2

Column 1	Column 2	Column 3	Column 4	Column 5
Node	Mean annual flow	Median annual flow ratio	Annual proportional flow deviation	Mean wet season flow
0	77%	59%	2.3	80%
2	65%	48%	3.1	Not applicable
3	85%	85%	1.1	
6	90%	85%	0.5	
8	80%	65%	1.8	
9	90%	80%	1.1	
9A	90%	85%	1	
10	70%	50%	2.7	
12	80%	54%	1.8	
14	90%	75%	0.8	

- 2 At each node mentioned in table 3, column 1—
 - (a) the 10% daily exceedance duration flow in the simulation period, expressed as a percentage of the 10% daily exceedance duration flow for the pre-development flow pattern, is to be at least the percentage stated for the node in table 3, column 2; and
 - (b) the 4% daily exceedance duration flow in the simulation period, expressed as a percentage of the 4% daily exceedance duration flow for the pre-development flow pattern, is to be at least the percentage stated for the node in table 3, column 3; and
 - (c) the 2 year daily flow volume in the simulation period, expressed as a percentage of the 2 year daily flow volume for the pre-development flow pattern, is to be at least the percentage stated for the node in table 3, column 4; and
 - (d) the 5 year daily flow volume in the simulation period, expressed as a percentage of the 5 year daily flow volume for the pre-development flow pattern, is to be at

least the percentage stated for the node in table 3, column 5; and

- (e) the 20 year daily flow volume in the simulation period, expressed as a percentage of the 20 year daily flow volume for the pre-development flow pattern, is to be at least the percentage stated for the node in table 3, column 6.

Table 3

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Node	10% daily exceedance duration flow	4% daily exceedance duration flow	2 year daily flow volume	5 year daily flow volume	20 year daily flow volume
0	74%	55%	75%	87%	88%
2	53%	45%	55%	69%	80%
3	81%	82%	86%	89%	92%
6	81%	81%	91%	97%	98%
8	74%	57%	86%	91%	98%
9	82%	80%	76%	94%	93%
9A	87%	83%	74%	95%	90%
10	59%	45%	62%	79%	88%
12	61%	45%	60%	80%	98%
14	71%	82%	81%	95%	98%

Part 3 First post-winter flow event objectives and performance indicators

1 Performance indicators

The performance indicators for the first post-winter flow event objective are the following—

- (a) the number of first post-winter flow events in the simulation period expressed as a percentage of the number of post-winter flow years in the period;
- (b) the number of 5-week lag events in the simulation period, expressed as a percentage of the number of post-winter flow years in the period;
- (c) the number of 2-week lag events in the simulation period, expressed as a percentage of the number of 5-week lag events in the period;
- (d) the average of the volume ratios for the post-winter flow years in the simulation period;
- (e) the average of the peak flow ratios for the post-winter flow years in the simulation period;
- (f) the number of 2-times base flow events in the simulation period, expressed as a percentage of the number of post-winter flow years in the period;
- (g) the number of 5-times base flow events in the simulation period, expressed as a percentage of the number of post-winter flow years in the period.

2 First post-winter flow event objectives

The first post-winter flow event objectives are—

- (a) first post-winter flow events that pass through dams, weirs, barrages, watercourses or lakes are to mimic the pre-development flow pattern of first post-winter flow events in duration, timing and magnitude; and
- (b) for each node mentioned in table 4, column 1—
 - (i) the performance indicator mentioned in item 1(a) is to be at least the percentage stated for the node in table 4, column 2; and
 - (ii) the performance indicator mentioned in item 1(b) is to be at least the percentage stated for the node in table 4, column 3; and

- (iii) the performance indicator mentioned in item 1(c) is to be at least the percentage stated for the node in table 4, column 4; and
- (iv) the performance indicator mentioned in item 1(d) is to be at least the percentage stated for the node in table 4, column 5; and
- (v) the performance indicator mentioned in item 1(e) is to be at least the percentage stated for the node in table 4, column 6; and
- (vi) the performance indicator mentioned in item 1(f) is to be at least the percentage stated for the node in table 4, column 7; and
- (vii) the performance indicator mentioned in item 1(g) is to be at least the percentage stated for the node in table 4, column 8.

Table 4

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Node	Number of first post-winter flows	Number of flows within 5 weeks of the pre-development event	Number of flows within 2 weeks of the pre-development event	Average flow volume	Average peak flow	Flow duration (2-times base flow)	Flow duration (5-times base flow)
0	80%	60%	70%	70%	Not applicable	70%	70%
2	80%	60%	70%	Not applicable	60%	60%	60%
3	90%	90%	90%	Not applicable	90%	90%	90%
6	90%	90%	90%	Not applicable	90%	90%	90%
8	90%	70%	70%	Not applicable	80%	80%	80%
9	90%	80%	80%	Not applicable	80%	80%	70%

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Node	Number of first post-winter flows	Number of flows within 5 weeks of the pre-development event	Number of flows within 2 weeks of the pre-development event	Average flow volume	Average peak flow	Flow duration (2-times base flow)	Flow duration (5-times base flow)
9A	90%	90%	90%	Not applicable	90%	90%	80%
10	70%	50%	70%	Not applicable	60%	60%	60%
12	90%	80%	80%	Not applicable	80%	80%	50%
14	90%	80%	80%	Not applicable	80%	80%	80%

3 Definitions for pt 3

In this part—

2-times base flow event means a post-winter flow year in which the days of flow twice base flow are not more than 4 days fewer than the days of flow twice base flow in the year for the pre-development flow pattern.

2-week lag event means a first post-winter flow event that starts within 2 weeks of the date the first post-winter flow event starts in the same year for the pre-development flow pattern.

5-times base flow event means a post-winter flow year in which the days of flow 5-times base flow are not more than 4 days fewer than the days of flow 5-times base flow in the year for the pre-development flow pattern.

5-week lag event means a first post-winter flow event that starts within 5 weeks of the date the first post-winter flow event starts in the same year for the pre-development flow pattern.

daily flow means the volume of water that flows past a node in a day.

days of flow 5-times base flow means the number of days in a first post-winter flow event on which the daily flow is at least 5 times the base flow.

days of flow twice base flow means the number of days in a first post-winter flow event on which the daily flow is at least twice the base flow.

event volume—

- 1 *Event volume* means the total daily flows for a first post-winter flow event.
- 2 However, if the event volume calculated under paragraph 1 is greater than the volume of the estuary of the Fitzroy River, the event volume is the estuary volume.

first peak flow—

- 1 *First peak flow* means the daily flow on the first day in a first post-winter flow event on which the flow reaches a peak.
- 2 However, if the first peak flow calculated under paragraph 1 is greater than the daily flow for a flow with a nominal depth of 3m (a ***3-metre event***), the first peak flow is the daily flow for a 3-metre event.

first post-winter flow event—

- 1 *First post-winter flow event*, at a node, means the first flow in a year that—
 - (a) starts between 15 September and 10 April in the year; and
 - (b) either—
 - (i) for node 9A—lasts for 18 days; or
 - (ii) for another node—lasts for 21 days; or
 - (c) the chief executive is satisfied meets the following criteria—
 - (i) for node 0—

- (A) the flow at its start is at least 5000ML a day; and
- (B) the event has an event volume greater than half the volume of the estuary of the Fitzroy River;
- (ii) for another node—
 - (A) the flow, within 6 days after its start, is greater than a flow with a nominal depth of 1.5m; and
 - (B) the first peak in the flow that is greater than a flow with a nominal depth of 1.5m happens within 6 days after the start of the event;
- (iii) if the flow starts in September, the water temperature is at least 24°C;
- (iv) for the duration of the event the flow, at the node, is greater than the base flow for the node mentioned in table 1, column 2.

2 However, a first post-winter flow event does not include a flow that happens in a year in the simulation period for which a flow satisfying the requirements of paragraph 1 did not happen for the pre-development flow pattern.

peak flow ratio means the first peak flow for a year expressed as a percentage of the first peak flow for the year for the pre-development flow pattern where the ratio is less than or equal to 1.

post-winter flow year means a year in the simulation period in which a first post-winter flow event happens for the pre-development flow pattern.

volume ratio means the event volume for a year, expressed as a percentage of the event volume for the year for the pre-development flow pattern where the ratio is less than or equal to 1.

year means a period of 12 months beginning on 1 July.

Part 4 Groundwater objectives

For each node mentioned in table 5, column 1, the drawdown duration for the corresponding specified height in column 2 is not less than the corresponding percentage in column 3.

Table 5

Column 1	Column 2	Column 3
Node	Specified height above June 2007 level (metres)	Percentage
31	2	85
32	2	85
33	3	85
34	0	75

Schedule 7 Water allocation security objectives

sections 21 and 23

Part 1 Supplemented water

1 Callide Valley Water Supply Scheme

- 1 For water allocations in the high A priority group—
 - (a) the annual supplemented water sharing index is to be at least 95%; and
 - (b) the monthly supplemented water sharing index is to be at least 98%.
- 2 For water allocations in the high B priority group—the annual supplemented water sharing index is to be at least 95%.
- 3 For water allocations in the risk priority group—the annual supplemented water sharing index is to be at least 60%.
- 4 For water allocations in the medium priority group—the annual supplemented water sharing index is to be at least 65%.

2 Dawson Valley Water Supply Scheme

- 1 For water allocations in the high priority group—
 - (a) the annual supplemented water sharing index is to be at least 95%; and
 - (b) the monthly supplemented water sharing index is to be at least 98%.
- 2 For water allocations in the medium priority group—the monthly supplemented water sharing index is to be at least 82%.

-
- 3 For water allocations in the medium A priority group—the monthly supplemented water sharing index is to be at least 82%.

3 Lower Fitzroy Water Supply Scheme and Fitzroy Barrage Water Supply Scheme

- 1 For water allocations in the high priority group—
 - (a) the annual supplemented water sharing index is to be at least 95%; and
 - (b) the monthly supplemented water sharing index is to be at least 98%.
- 2 For water allocations in the medium priority group—the monthly supplemented water sharing index is to be at least 82%.

4 Nogoia Mackenzie Water Supply Scheme

- 1 For water allocations in the high priority group—
 - (a) the annual supplemented water sharing index is to be at least 95%; and
 - (b) the monthly supplemented water sharing index is to be at least 98%.
- 2 For water allocations in the medium priority group—the monthly supplemented water sharing index is to be at least 81%.

Part 2 Unsupplemented surface water

For water allocations in a water allocation group mentioned in table 1, column 1, the annual volume probability is to be at least the percentage stated for the group in table 1, column 2.

Table 1

Column 1	Column 2
Water allocation group	Annual volume probability
Class 0A	17%
Class 1A	73%
Class 1B	71%
Class 2A	47%
Class 2B	47%
Class 3A	38%
Class 4C	95%
Class 5A	61%
Class 5B	73%
Class 6C	95%
Class 7D	93%
Class 8A	48%
Class 9A	55%
Class 9B	47%
Class 10A	68%
Class 10B	68%
Class 10C	66%
Class 11A	63%
Class 11B	60%
Class 12A	63%
Class 13A	60%
Class 13C	67%

Part 3 Unsupplemented groundwater

For water allocations in a water allocation group mentioned in table 2, column 1, the annual volume probability is to be at least the percentage stated for the group in table 2, column 2.

Table 2

Column 1	Column 2
Water allocation group	Annual volume probability
GWA1A	95%
GWA1B	75%
GWA2A	95%
GWA2B	75%
GWA3A	95%
GWA3B	85%

Consultation draft

Schedule 8 Unallocated water

section s40 and 47

Part 1 Strategic reserve for surface water that may be granted—water licence

Consultation draft

Column 1	Column 2	Column 3
Subcatchment	State purpose nominal entitlement (ML)	Indigenous purpose nominal entitlement (ML)
Isaac Connors	15000	5000
Fitzroy		
Lower Mackenzie		
Upper Mackenzie		
Nogoa		
Upper Dawson		
Lower Dawson		
Comet		
Downstream of Fitzroy Barrage	1000	0

Part 2 Strategic reserve for groundwater that may be granted—water licence

Column 1	Column 2
Groundwater management area, unit or subcatchment	Nominal entitlement (ML)
Isaac Connors Alluvium groundwater sub-area	450
Isaac Connors groundwater management area other than Issac Connors Alluvium groundwater sub-area	250
Callide Groundwater Unit 1	0
Callide Groundwater Unit 2	500
Sandy Creek Alluvium groundwater sub-area	0
Highlands groundwater management area other than Sandy Creek Alluvium groundwater sub-area	3000
Fitzroy groundwater management area	500
Carnarvon groundwater management area	250

Part 3 General reserve surface water that may be granted—water licence or water allocation

Column 1	Column 2
Subcatchment	Mean annual diversion (ML)
Isaac Connors	32000
Fitzroy	
Lower Mackenzie	
Upper Mackenzie	0
Nogoa	0

Schedule 8

Column 1	Column 2
Subcatchment	Mean annual diversion (ML)
Upper Dawson	11500
Lower Dawson	0
Comet	0
Downstream of the Fitzroy Barrage	0

Part 4 **General reserve surface water
that may be granted—water
allocation**

Column 1	Column 2
Subcatchment	Nominal volume (ML)
Isaac Connors	0
Fitzroy	7000
Lower Mackenzie	8000
Upper Mackenzie	0
Nogoa	0
Upper Dawson	0
Lower Dawson	0
Comet	0
Downstream of the Fitzroy Barrage	0

Consultation draft

**Part 5 General reserve groundwater
that may be granted—water
licence**

Column 1	Column 2
Groundwater management area, unit or sub-area	Nominal entitlement (ML)
Isaac Connors Alluvium groundwater sub-area	0
Isaac Connors groundwater management area other than Isaac Connors Alluvium groundwater sub-area	750
Callide Groundwater Unit 1	0
Callide Groundwater Unit 2	500
Highlands groundwater management area—Sandy Creek Alluvium groundwater sub-area	0
Highlands groundwater management area—groundwater management area other than Sandy Creek Alluvium groundwater sub-area	7000
Fitzroy Groundwater Unit 1	20000
Fitzroy Groundwater Unit 2	2000
Carnarvon groundwater management area	1000

Consultation draft

Schedule 9 Water licences

sections 82(2) and 83(2)

Consultation draft

Column 1	Column 2
Item	Water licence to take water
1	<p>licensee—The State of Queensland, represented by the Department of Education</p> <p>period—10 years</p> <p>watercourse—Gogango Creek</p> <p>location—Lot 1 on Plan No N25658</p> <p>nominal entitlement—3ML per water year</p> <p>maximum rate—1L/s</p> <p>daily volumetric limit—0.1ML</p> <p>purpose—any</p>
2	<p>licensee—Queensland Coal Pty Limited</p> <p>period—5 years</p> <p>watercourse—Washpool Creek</p> <p>location—ML 1804</p> <p>nominal entitlement—150ML per water year</p> <p>maximum rate—100L/s</p> <p>daily volumetric limit—8.6ML</p> <p>purpose—any</p> <p>conditions—Water taken under this authorisation must only be water that has been impounded under the authority of water licence 38931F (West Dam)</p>

Schedule 10 Rates and pump sizes

sections 94(1), 95(1), 103(1) and 104(1)

Column 1	Column 2	Column 3
Nominal pump size (mm)	Maximum rate (litres/second)	Daily volumetric limit (ML/day)
32	11	0.6
40	15	1
50	35	1.5
65	60	2.6
80	80	3.9
100	110	5.6
125	140	7.8
150	165	9.9
200	215	16
250	275	21.6
300	340	25.9
350	415	30.2
400	500	37.2
500	780	56.2
600 to 660	1400	95
750	2375	160
800	2900	201

Consultation draft

Schedule 11 Water allocation groups to take unsupplemented surface water

sections 90(2) and 96

Column 1	Column 2	Column 3	Column 4
Place	Flow condition	Water allocation group	Number of days
Nogoa River from the upstream limit of Fairbairn Dam at AMTD 737.5km to its junction with Theresa Creek	2592ML/day	Class 0A	Not applicable
Theresa Creek from its junction with Retreat Creek at AMTD 15.0 km to its junction with the Nogoa River	more than 0ML/day	Class 8A	24
Retreat Creek, including anabranches, from its junction with Kettle Creek at AMTD 23.6km to its junction with Theresa Creek			
Comet River, including anabranches, from Lake Brown gauging station AMTD 199.2km to its junction with the Nogoa River	less than 864ML/day	Class 9A	24
	equal to or more than 864ML/day	Class 9B	20

Column 1	Column 2	Column 3	Column 4
Place	Flow condition	Water allocation group	Number of days
Dawson River from its junction with Mimosa Creek at AMTD 133km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible	1296ML/day	Class 10A	20
	2592ML/day	Class 10B	19
Dawson River from the end of the supplemented section at AMTD 18.37km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible	0 to 25ML/day	Class 10C	Not applicable
Dawson River from Orange Creek Weir at AMTD 270.7km to its junction with Mimosa Creek at AMTD 133km, including sections of tributaries where Dawson River flows are accessible	1296ML/day	Class 11A	20
	2592ML/day	Class 11B	19

Consultation draft

Schedule 11

Column 1	Column 2	Column 3	Column 4
Place	Flow condition	Water allocation group	Number of days
Dawson River from the upstream limit of Glebe Weir at AMTD 356.5km to Orange Creek Weir at AMTD 270.7km, including sections of tributaries where Dawson River flows are accessible	1296ML/day	Class 12A	20
Dawson River from Utopia Downs Gauging Station at AMTD 453.5km to the upstream limit of Glebe Weir at AMTD 356.5km, including sections of tributaries where Dawson River flows are accessible	up to 1296ML/day	Class 13A	20
	up to 25ML/day	Class 13C	Not applicable

Consultation draft

Schedule 12 Formula for annual proportional flow deviation

schedule 13, definition *annual proportional flow deviation*

$$APFD = \sum_{j=1}^p \frac{\sqrt{\sum_{i=1}^{12} \left(\frac{c_{ij} - n_{ij}}{\bar{n}_i} \right)^2}}{p}$$

where—

APFD means annual proportional flow deviation.

i means a particular month.

j means a particular year.

p means the number of years.

c_{ij} means the modelled flow for month *i* in year *j*.

n_{ij} means the modelled natural flow for month *i* in year *j*.

\bar{n}_i means the modelled natural flow for month *i* across *p* years.

Schedule 13 Dictionary

section 3

Consultation draft

2 year daily flow volume, for a node, means the daily flow, at the node, that has a 50% probability of being reached at least once a year.

5 year daily flow volume, for a node, means the daily flow, at the node, that has a 20% probability of being reached at least once a year.

20 year daily flow volume, for a node, means the daily flow, at the node, that has a 5% probability of being reached at least once a year.

4% daily exceedance duration flow, for a node, means the daily flow that is equalled or exceeded on 4% of days in the simulation period.

10% daily exceedance duration flow, for a node, means the daily flow that is equalled or exceeded on 10% of days in the simulation period.

30% unsupplemented water sharing index, for a group of water allocations, means the total volume of water simulated to have been taken annually under the allocations in at least 30% of years in the simulation period, if the allocations were in existence for the whole of the simulation period, expressed as a percentage of the total of the nominal volumes for the allocations in the group for the allocations.

50% unsupplemented water sharing index, for a group of water allocations, means the total volume of water simulated to have been taken annually under the allocations in at least 50% of years in the simulation period, if the allocations were in existence for the whole of the simulation period, expressed as a percentage of the total of the nominal volumes for the allocations in the group for the allocations.

70% unsupplemented water sharing index, for a group of water allocations, means the total volume of water simulated

to have been taken annually under the allocations in at least 70% of years in the simulation period, if the allocations were in existence for the whole of the simulation period, expressed as a percentage of the total of the nominal volumes for the allocations in the group for the allocations.

2007 authorisation, for chapter 5, part 3, division 4, see section 138.

2007 authorisation volume, for chapter 5, part 3, division 4, see section 138.

2010 moratorium publication day means the day the December 2010 moratorium was published under section 26(1) of the Act.

Editor's note—

A copy of the moratorium is available on the department's website at <www.derm.qld.gov.au>.

Note—'2010 moratorium publication day' is a placeholder definition for the purposes of consultation. The Dept proposes to publish a moratorium in December 2010. In the final plan, that date will be known and will replace the instances of this term throughout the plan.

accounted use, for chapter 5, part 3, division 4, see section 138.

adopted middle thread distance means the distance in kilometres, measured along the middle of a watercourse, that a specific point in the watercourse is, at the commencement of this plan, from—

- (a) the watercourse's mouth; or
- (b) if the watercourse is not a main watercourse—the watercourse's confluence with its main watercourse.

amended water licence—

- (a) for chapter 5, part 2, division 8, subdivision 2, see section 101; or
- (b) for chapter 5, part 3, division 2, subdivision 2, see section 118.

AMTD means the adopted middle thread distance.

annual adjusted use volume, for chapter 5, part 3, division 4, see section 138.

annual entitlement see the *Water Regulation 2002*, section 67.

annual flow volume, for a node, means the total volume of flow, at the node, in a period of 12 months starting on 1 July.

annual proportional flow deviation, for a node, means the statistical measure of changes at the node to flow season and volume in the simulation period calculated using the formula in schedule 12.

annual supplemented water sharing index, for water allocations to take supplemented water in a particular priority group, means the percentage of years in the simulation period in which the allocations are fully supplied.

annual volume probability, for a water allocation group, means the percentage of years in the simulation period in which the volume of water that may be taken by the group is at least the total of the nominal volumes for the allocations in the group.

annual volumetric limit, for an interim water allocation or water allocation, means the maximum volume of water that may be taken under the allocation in a water year.

authorisation means a licence, permit, interim water allocation or other authority to take water given under the Act or the repealed Act, other than a permit for stock or domestic purposes.

base flow, for a node, means the flow stated for the node in schedule 6, part 1, table 1, column 2.

baseflow means the part of streamflow derived from the natural discharge of groundwater into a watercourse, lake or spring.

Braeside borefield means a bore field of production bores near Nebo that takes groundwater from the Denison Creek alluvium in the Isaac Connors Alluvium groundwater sub-area.

Callide groundwater notification area means the area identified as the Callide groundwater notification area shown in schedule 3.

Callide Valley groundwater computer program means the department's computer program and associated data files, and statistical and data processing programs, that simulate groundwater levels, groundwater demand, recharge and groundwater flows in parts of the Callide Groundwater Unit 1.

Callide Valley Water Supply Scheme means the scheme for the supply of water under the interim resource operations licence for the Callide Valley Water Supply Scheme.

carry over, for chapter 5, part 3, division 4, see section 138.

converting authorisation, for chapter 5, part 3, division 4, see section 138.

daily flow, for a node, means the volume of water, expressed in megalitres, that flows past the node in a day.

daily volumetric limit, for a water allocation, means the maximum volume of water that may be taken under the water allocation in a day.

Dawson Valley Water Supply Scheme is the scheme for the supply of water under the resource operations licence for the Dawson Valley Water Supply Scheme.

deemed use, for chapter 5, part 3, division 4, see section 138.

discharge, for a flow at a point in a watercourse, means the rate at which water passes the point, measured in cubic metres a second or megalitres a day.

drawdown duration means the percentage of days in the simulation period that the water level is above a specified height above the June 2007 level.

ecological assets include a species, a group of species, a biological function, an ecosystem and a place of natural value.

existing groundwater works means—

- (a) works that are prescribed existing groundwater works; and

- (b) works, other than prescribed existing groundwater works, that were in existence immediately before the commencement of this plan.

existing overland flow works—

- (a) means works that allow the taking of overland flow water and—
 - (i) for an owner of land—were in existence on 13 September 2001; or
 - (ii) for a lessee under a mining lease—were in existence before the commencement of this plan; and
- (b) includes works that—
 - (i) are a reconfiguration of existing overland flow works (the ***original works***); and
 - (ii) do not increase the average annual volume of water taken above the average annual volume taken using the original works.

Fitzroy Barrage Water Supply Scheme is the scheme for the supply of water under the resource operations licence for the Fitzroy Barrage Water Supply Scheme.

flow regime means the entire range of flows at a point in a watercourse including variations in the watercourse height, discharge, seasonality and annual variability.

forward draw, for chapter 5, part 3, division 4, see section 138.

groundwater means underground water that is subartesian water not connected to artesian water.

groundwater management area means the groundwater management area under section 6.

groundwater sub-area means a groundwater sub-area under section 7.

groundwater unit means a groundwater unit under section 7.

HOU consideration period, for chapter 5, part 3, division 4, see section 138.

hydraulic habitat requirements, of an ecological asset, are the hydraulic or physical attributes of the flow regime or groundwater that are—

- (a) required for a particular biological process or response to happen in relation to the asset; or
- (b) necessary to maintain the long-term biological integrity of the asset.

hyporheic zone means the zone where an exchange between surface water and groundwater happens.

Indigenous purpose means a use for the purpose of helping an Indigenous community achieve its economic and social aspirations.

IQQM computer program means the department’s Integrated Quantity and Quality Modelling computer program, and associated statistical analysis and reporting programs, that simulate daily stream flows, flow management, storages, releases, instream infrastructure, water diversions, water demands and other hydrologic events in the plan area.

Isaac Connors groundwater notification area means the area identified as the Isaac Connors groundwater notification area shown in schedule 3.

June 2007 level means the actual water level on 30 June 2007.

Lower Fitzroy Water Supply Scheme is the scheme for the supply of water under the resource operations licence for the Lower Fitzroy Water Supply Scheme.

mean annual flow, for a node, means the total volume of flow, at the node, in the simulation period divided by the number of years in the simulation period.

mean wet season flow, for a node, means the total volume of flow during the months of January, February, March and April in the simulation period divided by the number of years in the simulation period.

median annual flow ratio, for a node, means the ratio of the annual flow volume in the simulation period to the corresponding annual flow volume for the pre-development

flow pattern that is equalled or exceeded in 50% of years in the simulation period.

mine dewatering means the removal of groundwater that is necessary to ensure a safe and efficient mine working environment for an authorised activity for a mining tenement under the *Mineral Resources Act 1989*.

Examples—

- the removal of groundwater that has accumulated in mine workings
- the extraction of groundwater from bores surrounding the mine workings to lower the water table or hydraulic pressure

mining lease see the *Mineral Resources Act 1989*, schedule.

modern coastal deposits means quaternary colluvial and alluvial sediments in close proximity to the coast in the Fitzroy groundwater management area.

monthly supplemented water sharing index, for water allocations to take supplemented surface water in a particular priority group, means the percentage of months in the simulation period in which the allocations are fully supplied.

node see section 9.

Nogoa Mackenzie Water Supply Scheme is the scheme for the supply of water under the resource operations licence for the Nogoa Mackenzie Water Supply Scheme.

nominal entitlement see the *Water Regulation 2002*, section 65.

plan area see section 4.

pre-2007 contributing authorisation, for chapter 5, part 3, division 4, see section 138.

pre-development flow pattern means the pattern of water flows, during the simulation period, decided by the chief executive using the IQQM computer program as if—

- (a) there were no dams or other water infrastructure in the plan area; and
- (b) no water was taken under authorisations in the plan area.

prescribed authorisation, for chapter 5, part 3, division 4, see section 138.

prescribed existing groundwater works, for chapter 5, part 3, division 2, subdivision 3, see section 122.

previous authorisation, for chapter 5, part 3, division 3, see section 127.

project of State significance means a project declared under the *State Development and Public Works Organisation Act 1971*, section 26 to be a significant project.

quaternary alluvium, means the quaternary age alluvial deposits of sand, gravel, silt and clay.

refugia means the habitat required by a species during a time of stress, for example, drought.

relevant groundwater-dependent ecosystem means a groundwater-dependent ecosystem that is a riparian vegetation ecosystem or terrestrial vegetation ecosystem.

riparian vegetation ecosystem means a vegetation ecosystem that includes groundwater-dependent vegetation growing on, or immediately adjacent to, the banks of a lagoon or stream in the plan area.

seasonality, in relation to the flow in a watercourse, means the time of year when the flow happens.

simulated mean annual diversion, for an authorisation or group of authorisations, means the total volume of water simulated to have been taken under the authorisations, if the authorisations were in existence for the whole of the simulation period, divided by the number of years in the simulation period.

simulation period means the period from 1 January 1900 to 31 December 2007.

State purpose means—

- (a) a project of State significance; or
- (b) a project of regional significance; or
- (c) town water supply purposes; or

- (d) use by Indigenous peoples for non-commercial purposes, including cultural and traditional purposes.

subcatchment area see section 5.

supplemented water means water supplied under an interim resource operations licence, resource operations licence or other authority to operate water infrastructure.

surface water see section 10(1).

terrestrial vegetation ecosystem means a vegetation ecosystem, other than a riparian vegetation ecosystem.

this plan means this water resource plan.

traditional owners, of an area, means the Aboriginal people who identify as descendants of the original inhabitants of the area.

unallocated water means water available for allocation in the plan area.

unsupplemented water means water that is not supplemented water.

volume density, for a locality in a part of the groundwater management area, means the total annual volumetric limits for all the water allocations in the locality divided by the area of the locality.

water accounts, for chapter 5, part 3, division 4, see section 138.

water bore means a subartesian bore.

water flow season means any of the following periods in a year—

- (a) the period from 1 January to 30 April (**January–April water flow season**);
- (b) the period from 1 May to 31 August (**May–August water flow season**);
- (c) the period from 1 September to 31 December (**September–December water flow season**).

waterhole means a part of a watercourse that contains water after the watercourse ceases to flow, other than a part of a watercourse that is within the storage area of a dam on the watercourse.

water year, for chapter 5, part 3, division 4, see section 138.

works that allow the taking of overland flow water include—

- (a) storages, sumps, drains, embankments, channels and pumps for taking, or that can be used for taking, overland flow water; and
- (b) storages that are connected to the works mentioned in paragraph (a); and
- (c) works that make, or that can be used to make, the original connection between the storages mentioned in paragraph (b) and the works mentioned in paragraph (a).

ENDNOTES

- 1 Approved by the Governor in Council on . . .
- 2 Notified in the gazette on . . .
- 3 Laid before the Legislative Assembly on . . .
- 4 The administering agency is the Department of Environment and Resource Management.

Drinking Water Quality Management Plan Guideline

September 2010

Prepared by:

Urban Water Policy and Management

Department of Environment and Resource Management

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1. Introduction

The *Water Supply (Safety and Reliability) Act 2008* (the Act) commenced on 1 July 2008. The purpose of the Act is to provide for the safety and reliability of water supply throughout Queensland.

The Act also introduces new provisions relating to the management of drinking water quality, aimed at protecting public health. This outcome is achieved primarily through the regulatory framework for drinking water quality which requires drinking water service providers to:

- undertake monitoring and reporting on drinking water quality
- have an approved drinking water quality management plan (the plan) in place.

The Act can be accessed online at <www.legislation.qld.gov.au>.

1.1 Scope of the *Water Supply (Safety and Reliability) Act 2008*

1.1.1 Administration of the Act

The Act is administered by the chief executive (Director-General) of the Department of Environment and Resource Management (the department). The chief executive of the department is the regulator under the Act. The chief executive of the department, as the regulator, has delegated certain powers under the Act to officers of the Office of the Water Supply Regulator.

1.1.2 Definition of drinking water

The Act defines drinking water to mean water for human consumption, intended primarily as water for drinking, whether or not the water is used for other purposes. Drinking water does not include:

- (a) water that is food as defined under the *Food Act 2006*¹
- or
- (b) water taken or supplied for domestic purposes under the *Water Act*².

1.1.3 Definition of a drinking water service provider

The Act defines a drinking water service provider as a water service provider for a drinking water service. A water service provider means a person registered under Chapter 2, part 3 of the Act as a service provider for a water service.

A water service does not include a service supplied by infrastructure, if:

- (a) the infrastructure is used solely for mining purposes
- or
- (b) the service is used only by:
 - (i) the owner of the infrastructure or the owner's guests or employees including, for example, guests at a resort
 - or
 - (ii) if the owner of the infrastructure is a body corporate for a community titles scheme under the *Body Corporate and Community Management Act 1997*—the occupants of lots in the scheme.

¹This is water sold for human consumption (for example, bottled water) or is used by a food business that involves the handling of food intended for sale or the sale of food. It also includes water carried in bulk in a vehicle and intended for human consumption, regardless of the source of water.

²In the *Water Act 2000*, the term 'domestic purposes' includes irrigating a garden not exceeding .25 ha, being a garden cultivated for domestic use and not for the sale, barter or exchange of goods produced in the garden. Domestic purposes are sometimes referred to as 'stock and domestic' water.

1.1.4 Definition of a drinking water service

A drinking water service means a water service that is:

- (a) the treatment, transmission or reticulation of water for supply as drinking water; or
- (b) water collection in a water storage, if the water in the storage:
 - (i) includes recycled water
 - and
 - (ii) is used to augment a drinking water supply.

1.2 Aim of this guideline

This guideline has been developed to provide information to drinking water service providers (providers) about preparing the plan. Section 95(3) of the Act states that the plan must be prepared in accordance with this guideline.

Information contained in this guideline includes details on:

- requirements of the Act and related criteria
- matters considered by the regulator in assessing the plan and making a decision about the plan
- operating under the plan
- amending the plan
- adopting best practice recommendations.

It is the responsibility of the provider to meet the requirements of the Act and to provide the necessary information to fulfil these requirements. This will ensure that all relevant information needed by the regulator to make a decision about the plan is available.

This guideline also contains a series of best practice recommendations in recognition of current practices that promote the safe supply of drinking water within the industry. These recommendations are primarily based on the Australian Drinking Water Guidelines (ADWG). Providers are encouraged to consider, and where possible or practical adopt, these recommendations in the plan to demonstrate their continued commitment to achieving industry best practice.

It is anticipated that this guideline will be reviewed on a regular basis.

This guideline can be accessed online at <www.derm.qld.gov.au>.

1.3 Relationships to other guidelines

1.3.1 Other regulatory guidelines

This guideline is part of a suite of guidelines prepared to assist water service providers in understanding the regulatory requirements that the Act places on them. In addition to this guideline, other water related regulatory guidelines in this suite include the:

- Drinking Water Quality Management Plan Auditing and Review Guideline³
- Drinking Water Quality Management Plan Annual Reporting Guideline⁴
- Water Quality and Reporting Guideline for a Drinking Water Service
- Water Quality Guidelines for Recycled Water Schemes
- Recycled Water Management Plan and Validation Guidelines

³ The Drinking Water Quality Management Plan Auditing and Review Guideline is being developed and will be made available when approved.

⁴ The Drinking Water Quality Management Plan Annual Reporting Guideline is being developed and will be made available when approved.

- Recycled Water Management Plan Exemption Guidelines
- Guidelines for the Preparation of a System Leakage Management Plan
- Guidelines for Granting Exemptions for a System Leakage Management Plan
- Guidelines for Preparing Strategic Asset Management Plans
- Guidelines for Preparing Customer Service Standards
- Guidelines for Granting Exemptions for: Strategic Asset Management Plans, Customer Service Standards and Annual Reports
- Guidelines for the Review and Regular Audit of Strategic Asset Management Plans
- Annual Reporting of Strategic Asset Management Plan and Customer Service Standards Guidelines for Service Providers
- Guidelines for the Preparation of a Drought Management Plan.

1.4 Relationship to other legislation and regulations

1.4.1 Public health

At the same time the Act was established, amendments were made to the *Public Health Act 2005* and the Public Health Regulation 2005 to include provisions relating to drinking water quality.

As the administrator of the Public Health Act and the Public Health Regulation, Queensland Health has:

- set specific standards for drinking water quality in the Regulation
- the power to respond when drinking water supplied by a provider may present a risk to public health or be considered unsafe⁵.

Under section 57E of the Public Health Act, it is an offence for a provider to supply drinking water that the provider knows, or reasonably ought to know, is unsafe. The maximum penalty for the offence is 3000 penalty units or two years imprisonment.

Section 57C of the Public Health Act states that ‘drinking water is unsafe at a particular time if it would be likely to cause physical harm to a person who might later consume it, assuming nothing happened to it after that particular time and before being consumed by the person that would prevent its being used for its intended use’.

1.4.2 Other legislation and regulations

The operations of a water service or a drinking water service (the service) will also be covered under other state and Commonwealth legislation, such as the *Workplace Health and Safety Act 1995*, *Plumbing and Drainage Act 2002*, *Sustainable Planning Act 2009*, *Water Fluoridation Act 2008*, *Environmental Protection Act 1994*, *South-East Queensland Water (Distribution and Retail Restructuring) Act 2009*, *Water Act 2000* and the *Trade Practices Act 1974*.

The requirements of the *Water Supply (Safety and Reliability) Act 2008* do not negate the requirements of other legislation unless where expressly stated. It is the responsibility of the provider to determine and ensure compliance with relevant legislative obligations. The provider is also responsible for obtaining any necessary approvals under the other Acts to ensure the continued operation of the service. The plan only relates to matters under the *Water Supply (Safety and Reliability) Act 2008*.

⁵ For example, Queensland Health can require action to be taken to protect public health by the issue of a public health order or an improvement notice to a provider.

1.5 Other resource material

It is recognised that a variety of existing resources are used by industry to ensure the safe supply of drinking water. While these resources hold valuable information on supplying safe drinking water, providers may also find them useful when preparing the plan. Refer to the Preparing a Drinking Water Quality Management Plan: Supporting Information (supporting information) document which accompanies this guideline for further information relating to these resources.

2. Drinking water quality management plan

2.1 The drinking water quality management plan

The drinking water quality management plan (the plan) is about the storage, treatment, transmission or reticulation of water for drinking by a provider. Under section 95 of the Act, the plan must be prepared by a provider and must:

- (i) state the registered services to which the plan applies
- (ii) include details of the infrastructure for providing the services
- (iii) identify the hazards and hazardous events the drinking water service provider considers may affect the quality of water to which the services relate
- (iv) include an assessment of the risks posed by the hazards and hazardous events
- (v) demonstrate how the drinking water service provider intends to manage the risks posed by the hazards and hazardous events
- (vi) include details of the operational and verification monitoring programs under the plan, including the parameters to be used for indicating compliance with the plan and the water quality criteria for drinking water.

No exemptions will be granted by the regulator from preparing the plan.

Refer to Chapter 3 of this guideline for detailed information on the matters to be considered and/or included in the plan.

2.2 Purpose of the plan

In accordance with section 94 of the Act, the purpose of the plan is to protect public health through the identification and minimisation of any public health related risks associated with drinking water.

The drinking water quality management provisions in Queensland follow a risk management approach and it is intended that the plan be a documented, risk-based system for managing the supply of drinking water. It is also intended that the plan be a living document that reflects the requirements of the provider and be actioned through the provider's day to day activities now and in the future. To ensure that this is achieved, senior management should be actively involved in the development and implementation of the plan and encourage an organisational philosophy and culture that supports drinking water quality. The plan should be viewed by the provider as a means of achieving drinking water quality outcomes (in the short and long-term) and demonstrating that drinking water quality management measures are in place.

2.3 Requirement to prepare the plan

Section 95(1) of the Act states that each provider must prepare the plan for the service and apply to the regulator for approval of the plan (this includes providers that supply bulk water, manufactured water and distributor-retailer services). While a service may comprise of one or more discrete drinking water schemes⁶ (scheme(s)), all the schemes must be covered by the plan. Non-potable water supply schemes are not to be included in the plan.

The costs of preparing and maintaining the plan must be borne by the provider.

2.4 Timeframes for preparing the plan

An approved plan is not required while transitional periods are in place. Table 1 outlines the statutory deadlines for requiring an approved plan. Providers must submit the plan in advance of the dates to allow sufficient⁷ time for the regulator to consider and make a decision about the plan.

⁶ For a definition of a drinking water scheme, see the glossary of this guideline, or the Water Quality and Reporting Guideline for a Drinking Water Service.

⁷ Refer to section 4.2.3 of this guideline for timeframes for decisions.

Table 1: Statutory deadlines for requiring an approved plan

Service provider ⁸	Timeframes
Large	Must have an approved plan in place by 1 July 2011
Medium	Must have an approved plan in place by 1 July 2012
Small	Must have an approved plan in place by 1 July 2013
Providers that store or treat source water containing recycled water ⁹ intended to augment a drinking water supply	Must have an approved plan before recycled water used to augment a drinking water supply can be added to the source water
New drinking water service provider	Must have an approved plan one year after the day of becoming a provider

Under section 629 of the Act, the regulator may require the plan to be prepared at an earlier time, if the regulator is satisfied or reasonably believes that the continued operation of the service may have an adverse effect on public health.

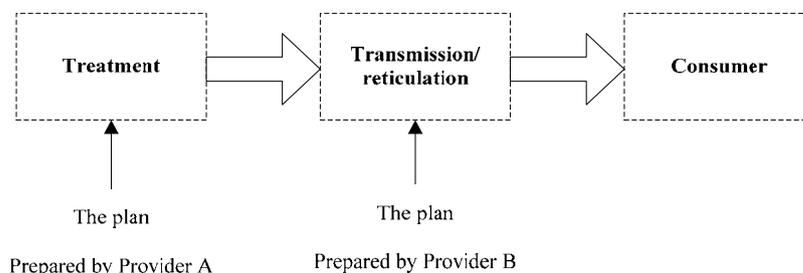
2.5 Multiple providers involved in preparing the plans

In the majority of cases, the service serving one or more communities would be owned and operated by a single provider. However, there are situations where the supply of drinking water to a community may involve multiple providers. For example, where:

- a provider supplies bulk treated water to another provider or providers, who are responsible for treatment, transmission and reticulation to the community served (refer to figure 1)
- a provider supplies bulk treated water to a second provider who is then responsible for the transmission of the water to a third provider (or group of providers). This third provider (or group of providers) is responsible for the reticulation to the community served (refer to figure 2)
- a recycled water provider supplies recycled water for the purposes of augmenting drinking water to another provider, who is then responsible for treatment, transmission and reticulation of water to the community served (refer to figure 3).

The Act requires each provider to prepare the plan relating to the service. Where there are multiple providers involved in the supply of drinking water to a community or communities, each provider must prepare the plan that relates to their respective service. As shown in the diagram below, while each plan is linked to the other as a result of the drinking water supply chain, a provider is only responsible for the preparation of the plan that relates to their service.

Figure 1: Provider supplying bulk treated water to another provider for the treatment, transmission and reticulation



⁸ For the definition of large, medium and small service provider, see the glossary of this guideline, or schedule 3 of the Act.

⁹ In the context of this guideline, recycled water refers to recycled water that is used to augment a drinking water supply. This is commonly known as purified recycled water (PRW).

Figure 2: Provider supplying bulk treated water to other providers for treatment, transmission or reticulation

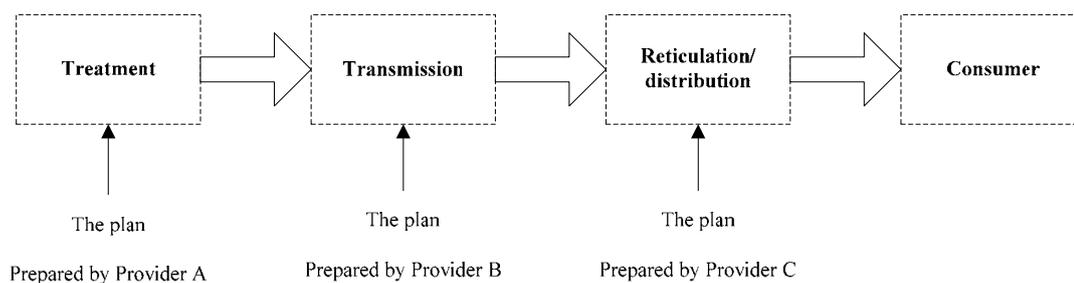
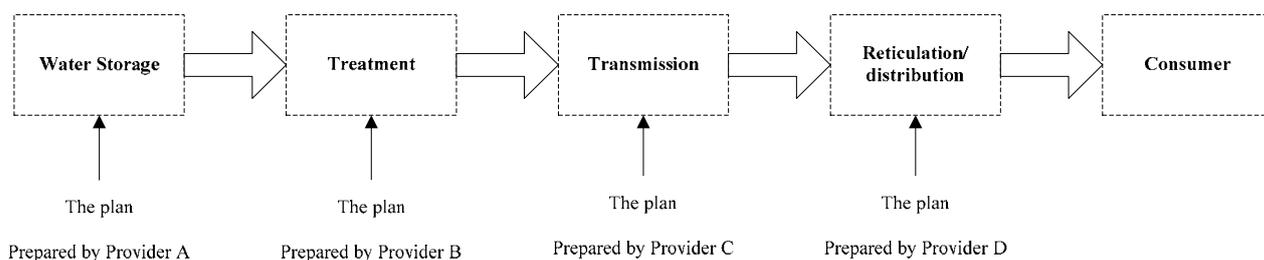


Figure 3: Bulk water provider receives recycled water into their water storage for the purposes of augmenting a drinking water supply



The linkages between these plans are critical to the protection of public health as the supply of water from the catchment to the consumer is seen as a continuum. All multiple providers involved in the supply of drinking water play a key role in protecting public health. Therefore, it is vital that each multiple provider understands:

- their role and responsibilities in the supply of drinking water
- how the provider’s actions impact another provider’s infrastructure or quality of water received or supplied
- their role in managing the situation when the water quality is compromised.

The relationship between multiple providers is important particularly those immediately upstream or downstream to their service. Each provider should consider available and relevant information to ensure hazards and risks are effectively managed from catchment to consumer.

In preparing the plan, the provider should consider, where relevant:

- existing agreements and arrangements between providers for the supply of water
- communication protocols
- emergency response plans, protocols and procedures
- general reporting (including incident reporting), management protocols and procedures
- water quality monitoring programs
- other related documents, actions or matters.

Chapter 3 of this guideline outlines specific criteria that relate to multiple providers. It is recognised that due to commercial-in-confidence issues, some aspects of the information relating to the specific criteria (that is, catchment characterisation, hazard identification, risk assessment) may not be readily available between providers, however, providers should endeavour to use all their available knowledge and information to address the criteria in the plan.

The applicability of some of the criteria may vary across multiple providers based on the provider’s service. For example, catchment characterisation is not required by a provider that only undertakes transmission or distribution services, however, the provider should be aware of the quality of water entering or leaving their service, and any hazards that may impact on their service from an upstream provider. Similarly, a provider that undertakes distribution is not required to provide information relating to treatment and disinfection processes in the plan unless it forms part of their service.

2.5.1 Augmenting a drinking water supply with recycled water

When a drinking water service is augmented with recycled water, the Act requires both a drinking water quality management plan and a recycled water management plan to be approved before recycled water is introduced into the drinking water supply. The drinking water quality management plan for the receiving water storage must be approved by the regulator before the recycled water management plan can be approved.

The provider must adequately consider the hazards and risks associated with the augmentation of drinking water with recycled water, and any other existing plans relevant to the supply, when preparing the drinking water quality management plan for the receiving water storage. The drinking water quality management plan(s) and the recycled water management plan must collectively demonstrate the management of risks from the catchment to the consumer to protect public health.

3. Preparing the drinking water quality management plan

This chapter outlines information relevant to a provider when preparing the plan, including:

- an overview on how to prepare the plan
- incorporating existing plans and procedures
- the specific criteria that the provider must meet in accordance with the Act
- best practice recommendations.

3.1 Overview on how to prepare the plan

Section 95(3) of the Act states that the plan must be prepared in accordance with this guideline. It should be noted that:

- each provider must submit the plan for the service that addresses the legislative requirements. The plan may comprise of:
 - a number of sub-parts to address each scheme associated with the service
 - a collection of existing documents including
 - supporting documentation such as other existing plans (for example, Hazard Analysis and Critical Control Point (HACCP) and ADWG
 - referenced documents and procedures
 - any additional information.
- the detail and complexity of the plan or sub-parts of the plan may vary due to the differences in scheme complexity, size and risks. Overall the level of detail in the plan must be sufficient to support the requirements of the Act aimed to protect public health
- while the plan may be structured in various ways, the criteria outlined in this guideline must be addressed. The provider must demonstrate how they comply with each criteria, rather than simply stating that they do comply
- sufficient supporting information is required to demonstrate how the criteria have been met. However, routine operational and maintenance procedures may simply be referenced¹⁰ in the plan (for example, calibration of testing equipment manual or mains breaks repairs procedures). In considering the plan, the regulator may request this documentation if required (refer to guideline section 4.2.2)
- the criteria are presented in this guideline to align with the requirements of the Act. A provider may choose to address all related criteria collectively and present the information as a component in the plan. For example, all criteria relating to stakeholders or multiple providers may be addressed in a stakeholder or multiple provider section within the plan
- multiple providers involved in the supply of drinking water have an obligation to be aware of the impacts the service may have on an upstream or downstream service and vice versa. Where information on an upstream or downstream service is sought, the provider must, to the best of their ability and knowledge, provide this information to address the relevant criteria
- where further information is required to meet the legislative requirements which was not available at the time of submission of the plan, or additional risk management measures are required, this information should be identified and documented in a separate part of the plan (refer to guideline section 3.9.4).

¹⁰ This existing documentation should clearly indicate where the relevant information can be found, to which criteria it applies and to which scheme it relates.

3.2 Incorporating existing plans and procedures

A provider may have existing plans or documents that meet all or part of the requirements of the Act, such as:

- risk assessments
- operation and maintenance manuals
- corporate procedures and forms
- other regulatory management plans (for example, strategic asset management plans).

Where a provider submits existing documentation to meet the requirements of the Act, the provider should clearly indicate where the relevant information can be found, to which criteria it applies and to which scheme it relates. The provider must also ensure that existing plans or documents that are being used are current and relevant to the criteria.

3.3 Use of risk management methodologies

Risk management focuses on reducing the likelihood of hazards and hazardous events occurring and proactively managing incidents and emergency responses. Risk management is gaining importance within the water industry. There are a range of existing risk identification and management methodologies that could be used to form the basis of the plan such as ADWG, HACCP, ISO 22000 or AS/NZS ISO 31000:2009.

Any risk management methodology can be used for the plan as long as it meets the legislative requirements of the Act. The methodology must be identified in the plan and consistently applied within each scheme. Table 2 provides an overview of where existing risk management methodologies may be used to address the legislative requirements of the Act. In the plan, a provider can, where applicable, use information from any existing risk management methodologies, they may have in place such as ADWG, HACCP or AS/NZ ISO 31000:2009 to satisfy the legislative requirements of the Act. However, it is important to recognise that these risk management methodologies do not address all the requirements. Therefore it is the provider's responsibility to submit any additional information to meet these requirements. For example, if a provider has a HACCP framework in place for managing their drinking water supply, they can submit this information as part of the plan. The provider must submit the additional information in the plan that may not be part of HACCP (for example, registered service details and information gathering for water quality and catchment characteristics) to fully comply with the legislative requirements of the Act.

3.3.1 Applying risk management methodologies

It is important to recognise each risk management methodology uses different terminology. This guideline generally uses the terms from the ADWG. As such, the terminology used in this guideline is different to that used in HACCP or AS/NZ ISO 31000:2009, but may have the same meaning or intent as the Act requirements. Where this is the case, the HACCP or AS/NZ ISO 31000:2009 terminology can be used in the plan. For example, preventive measure in the ADWG has the same meaning as a control measure in HACCP and can be referenced as a control measure in the plan. It is preferable that terminology included as part of the plan, where different to that adopted or referenced in this guideline, is described.

Table 2: Act requirements compared to ADWG, HACCP and AS/NZS ISO 31000:2009 components

Requirements under the Act	Reference in this guideline	Related ADWG element	Related HACCP task	Related AS/NZS ISO 31000:2009 component
Registered service details				
Section 95(3)(b)(i): state the registered services to which the plan applies	3.5 Registered service details			Establish the context
Details of infrastructure for providing the service				
Section 95(3)(b)(ii):	3.6 Details of	2.1 Water supply	Task 4: Construct	Establish the context

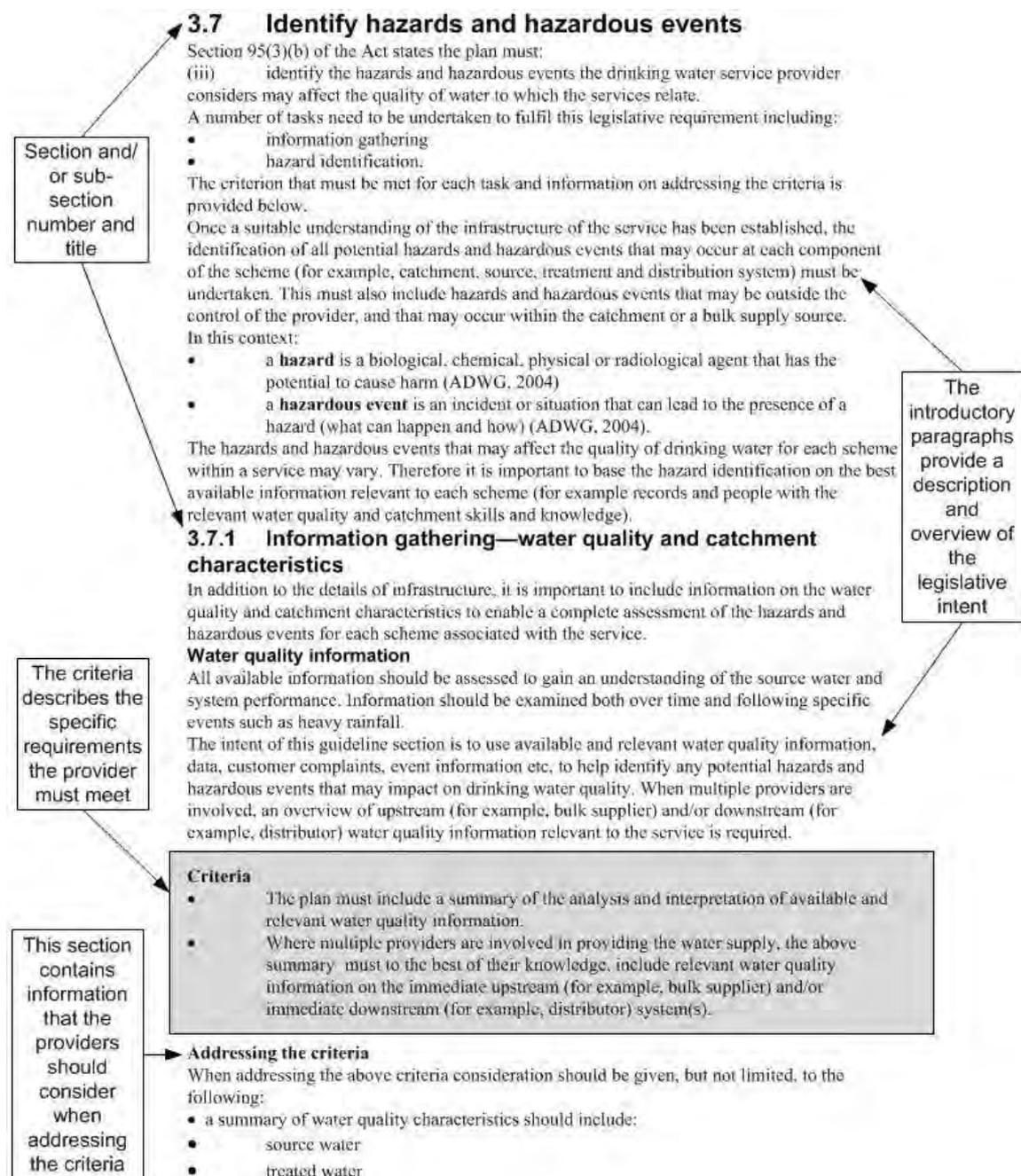
Requirements under the Act	Reference in this guideline	Related ADWG element	Related HACCP task	Related AS/NZS ISO 31000:2009 component
include details of the infrastructure for providing the services	infrastructure for providing the service	system analysis (construct a flow diagram, document key characteristics)	flow diagram	
Identify hazards and hazardous events				
Section 95(3)(b)(iii): identify the hazards and hazardous events the drinking water service provider considers may affect the quality of water to which the services relate	3.7.1 Information gathering—water quality and catchment characteristics	2.2 Assessment of water quality data (assess historical water quality data, exceedences and trend analysis)		Risk assessment (analysis and evaluation)
		2.1 Water supply (catchment to consumer)		
	3.7.2 Hazard identification	2.1 Water supply system analysis (assemble a team) 2.3 Hazard identification and risk assessment (define methodology, identify and document hazards)	Task 1: Assemble HACCP team Task 6: List all potential hazards, conduct hazard analysis	Develop risk criteria Risk assessment: (identification)
Assessment of risks				
Section 95(3)(b)(iv): include an assessment of the risks posed by the hazards and hazardous events	3.8 Assessment of risks	2.3 Hazard identification and risk assessment (evaluate hazards and estimate the risk levels)	Task 6: consider methods to control identified hazards	Risk treatment
Managing risks				
Section 95(3)(b)(v): demonstrate how the drinking water service provider intends to manage the risks posed by the hazards and hazardous events	3.9.1 Risk management measures	3.1 Preventive measures and multiple barriers (identify measures and where improvements are necessary) 7.1 Employee awareness and training (communications mechanisms, qualifications and training needs)	Task 6: Identify control measures Task 7: Determine critical control points Task 8: Establish critical limits for each Critical Control Point (CCP) Training requirement	Preparing and identifying risk treatment plans
	3.9.2 Operation and maintenance procedures	4.1 Operational procedures (identify and document) 4.4 Equipment calibration and maintenance	Task 12: Work procedures should be developed for each CCP	
	3.9.3 Management of incidents and	4.3 Corrective actions (document actions for control excursions and	Task 10: Establish corrective actions	Recording the risk management process

Requirements under the Act	Reference in this guideline	Related ADWG element	Related HACCP task	Related AS/NZS ISO 31000:2009 component
	emergencies	communications systems) 5.4 Corrective actions (document actions for non-conformance)		
	3.9.4 Risk management improvement program	6.1 Communication 6.2 Incident and emergency response 10.2 Reporting protocols 12.2 Drinking water quality management improvement plan	Task 10: Establish corrective actions	Recording the risk management process
	3.9.5 Service wide support—information management	5.3 Short-term evaluation of results 10.1 Management of documentation and records	Task 12: Establish documentation and record keeping	
Operational and verification monitoring programs				
Section 95(3)(b)(vi): include details of the operational and verification monitoring programs under the plan including the parameters to be used for indicating compliance with the plan and the water quality criteria for drinking water	3.10 Operational and verification monitoring programs	3.2 Critical control points 4.2 Operational monitoring (document protocols, set criteria) 5.1 Drinking water quality monitoring 11.1 Long-term evaluation of results	Task 9 Establish a monitoring system for each CCP Task 11 Establish verification and auditing—establish procedures for verification, confirm efficacy of all elements of HACCP system	Monitoring (and review)

3.4 Using guideline sections 3.5 to 3.11

Guideline sections 3.5 to 3.10 are based on the legislative requirements under section 95(3) of the Act and follow a standard format, including:

- a section or sub-section number and title
- introductory paragraphs
- criteria—the criteria describe the specific requirements the provider must meet. These requirements are mandatory as they are legislative requirements under the Act and use the word ‘must’. Information required as a ‘must’ is considered the minimum amount of information needed to address the criteria
- addressing the criteria—contains information that the provider should consider when addressing the criteria. It is not intended to be a definitive list and it is the responsibility of the provider to ensure that sufficient, relevant information is provided to demonstrate that they have met the criteria to allow the regulator to make a decision about the plan.



Section 3.11 of this guideline also outlines a number of best practice recommendations. Based on the ADWG, these recommendations reflect current practices within the industry to promote the safe supply of drinking water. There is no requirement under the Act for these recommendations to be incorporated and they will not be assessed by the regulator in making a decision about the plan. Consequently, they do not have any criteria listed. However, the consideration and inclusion of these recommendations in the plan is encouraged, to demonstrate the provider's continued commitment to achieving industry best practice.

3.4.1 Key considerations

Guideline sections 3.5 to 3.10 are based on the legislative requirements under section 95(3) of the Act. The relationship between these guideline sections is illustrated in the supporting information which accompanies this guideline. In preparing the plan, it is important to note:

- the provider must submit all relevant and available information for the service, and each scheme associated with it, to meet the legislative requirements of the Act. Where there is insufficient information about the plan to make a decision, the regulator may request additional information (refer to guideline section 4.2.2)
- the plan must contain the necessary information to fulfil each criteria, outlined in the shaded boxes under guideline sections 3.5 to 3.10, for the service and each scheme associated with it, to enable the regulator to make a decision about the plan
- the criteria are further explained in the addressing the criteria section. This section provides an indication of the type of information the regulator believes will assist in fulfilling the requirements of the criteria
 - the provider may submit information on all or some of the items listed in the addressing the criteria section. The level of information provided in the plan is dependant on the service, its size and complexity and the availability of information for all or some of the schemes associated with it
- the structure of the plan will vary from provider to provider. It is up to the provider to determine the best way to present the information. It may be worth considering the plan as a narrative on how the provider manages its service from catchment to the consumer to protect public health
- in some cases, further information may be required to address particular criteria for a scheme associated with the service, where the relevant information was not available at the time the plan was submitted:
 - the Risk Management Improvement Program¹¹ is an acceptable approach for addressing additional information requirements for one or more criteria for a scheme, where the information was unavailable at the time of the plan submission, and additional risk management measures that are required in the short, medium or long-term to address unacceptable risks to protect public health
 - the Risk Management Improvement Program must detail the outcomes to be achieved (for example, the type of information required or risk management measure to be put in place), the actions to be undertaken to achieve the outcomes (for example, the process for obtaining information or steps to be followed to put additional measures in place) and the timeframes in which the actions are to be completed
 - the Risk Management Improvement Program is part of the plan and forms part of the regulator's decision with respect to the appropriateness of the plan to protect public health.

3.4.2 Stakeholders

An integrated management approach with the collaboration from all relevant stakeholders is essential for effective drinking water quality management. Throughout guideline sections 3.5 to 3.10, reference is made to stakeholders in the relevant criteria. Key stakeholders who are actively involved and therefore could affect the quality of the drinking water, or be affected by the decisions or activities of the service or each scheme associated with the service are required to be identified in the plan. Appropriate mechanisms and levels of stakeholder engagement (for example, meetings, workshops, newsletters etc) should also be developed. Whilst community is an important stakeholder in the quality of drinking water supply, a general community consultation process is not considered necessary in the preparation of the plan, in most circumstances.

The following are examples of the types of stakeholders that should be included:

- upstream suppliers

¹¹ Refer to guideline section 3.9.4.

- catchment users and/or managers
- downstream customers
- vulnerable customers
- material suppliers
- the community served
- internal organisational units
- regulatory agencies or statutory authorities (for example, regulator, catchment boards).

3.5 Registered service details

Section 95(3)(b) of the Act states the plan must:

- (i) state the registered services to which the plan applies.

This guideline section requires the registered service details to be provided with the intent being to clearly identify the service, the scheme(s) and the communities to which the plan applies.

3.5.1 Service description

Criteria

- The plan must contain information on the registered service, including the:
 - service provider identification number (SPID)
 - service provider name and contact details. If the service provider is not the operator, then the operator's name and contact details must also be provided
 - name of each scheme to which the plan applies
 - name of the communities that are supplied including the current and future (next 10 years) populations, connections and demands.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- details of the service (for example, SPID, name and contact details, name of scheme(s)) could be provided using the Drinking Water Quality Management Plan Approval Application form
- current and future projections should include
 - name of the community served by the scheme
 - current population of the community served (i.e. number of persons), number of connections and the water demand (i.e. volume)
 - projected future population of that community (i.e. number of persons), likely increase in the number of connections and the likely increase in water demand for the next 10 years (i.e. volume).

3.6 Details of infrastructure for providing the service

Section 95(3)(b) of the Act states the plan must:

- (ii) include details of the infrastructure for providing the services.

Understanding the infrastructure of the service is a critical first step for identifying the hazards and hazardous events that can compromise drinking water quality, and ensuring that risks are addressed.

For the purposes of this guideline, infrastructure details include all the key components that form part of the service, from catchment to consumer, including:

- source
- treatment process

- disinfection process
- distribution and reticulation system including reservoirs and pump stations
- stakeholders (who are relevant to drinking water quality management).

This guideline section outlines the infrastructure details of the service that are required to be provided. The plan must contain sufficient information on infrastructure details for, and the communities served by, each scheme associated with the service. The plan must contain sufficient information to demonstrate that the provider has an understanding of each scheme and its operation.

Criteria

- The plan must describe the details of the infrastructure including the following:
- A schematic layout for each scheme must be included in the plan and must:
 - be representative of the scheme as at the date of the submission of the plan
 - include all components of the scheme from catchment to consumer (even when a bulk supplier exists upstream of the distributor)
 - show the linkages between the major infrastructure elements including sources, treatment plants, reservoirs, pump stations and re-chlorination facilities
 - include the locations of changes in infrastructure ownership and operational responsibility.
- Source details for each scheme must be provided in the plan. These details must contain information on the:
 - water source(s) including
 - name
 - characteristics
 - performance
 - source infrastructure.
- Treatment process details for each drinking water source must be provided in the plan. These details must contain information on:
 - the process steps
 - the relationship between each step design capacity
 - operation
 - current loading
 - availability of stand-by equipment
 - proportion of flow from each source
 - proportion of scheme supply distribution area
 - a list of chemicals (if added).
- A description of any variations to process operation (for example, bypassing a process step) must be included in the plan.
- A schematic(s) representing the treatment process(es) must be included in the plan.
- Any sources that do not undergo a treatment process must be identified and an explanation as to why no treatment process exists must be included in the plan.
- Disinfection process(es) for each drinking water source must be provided in the plan. These details must include:
 - location
 - type
 - operation.

Any sources that do not undergo a disinfection process must be identified and an explanation as to why no disinfection process exists must be included in the plan.

- Details of the distribution and reticulation system must be included in the plan. These must include the:
 - extent
 - characteristics
 - operation.
- Key stakeholders, who have been actively involved in the management of drinking water quality, and their relevance, must be identified for each scheme and detailed in the plan

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- Schematics should generally be at the level illustrated in the supporting information which accompanies this guideline.
 - The details of each water source should include:
 - name
 - proportion of scheme supply
 - historical performance (for example, does it run dry or to very low levels)
 - water quality issues (for example, blue-green algae, pesticides, fluoride, radiological agent, nitrates etc.).
 - The details of the source infrastructure should include (where appropriate):
 - for surface water:
 - intake location
 - type of intake structure (for example, flexible, fixed)
 - multiple off take level capability
 - protection from debris and flood damage
 - for groundwater: pre-treatment (for example, aeration for groundwater):
 - bore location, depth
 - aquifer description:
 - depth and thickness
 - confined/unconfined
 - fast or slow response to events on surface
 - bore construction details, for example:
 - casing (for example, depth, diameter, material, age)
 - borehead details to prevent contamination.
 - Details of the treatment process(es) used should include:
 - flocculants used
 - type of sedimentation
 - chemical correction
 - filtration and type of filter media
 - fluoridation.
 - The schematic of the treatment process(es) should show the linkages between each treatment step.
 - Details of the disinfection process(es) should include:
-

- location (including re-disinfection facilities)
- type of disinfection and make and age of infrastructure
- chemical dosing (where applicable)
- dose rate and dosing arrangements (for example, fixed, flow-paced, residual analyser)
- target residual levels (where applicable)
- duty/stand-by available and description:
 - alarms (for example, failure, low/high residual)
 - auto shut-off arrangements.
- Details of the distribution and reticulation system should include:
 - pipe material and age range
 - approximate proportion of total length of each material
 - areas where potential long detention periods could be expected
 - areas where low pressure could be expected
 - details of reservoirs (for example, name, type, capacity, roofed Y/N)
 - details of pump stations (for example, number and location).
- Details of key stakeholders¹² who have been actively involved in the management of drinking water infrastructure and their relevance for each scheme.

3.7 Identify hazards and hazardous events

Section 95(3)(b) of the Act states the plan must:

- (iii) identify the hazards and hazardous events the drinking water service provider considers may affect the quality of water to which the services relate.

A number of tasks need to be undertaken to fulfil this legislative requirement including:

- information gathering
- hazard identification.

The criterion that must be met for each task and information on addressing the criteria is provided below.

Once a suitable understanding of the infrastructure of the service has been established, the identification of all potential hazards and hazardous events that may occur at each component of the scheme (for example, catchment, source, treatment and distribution system) must be undertaken. This must also include hazards and hazardous events that may be outside the control of the provider, and that may occur within the catchment or a bulk supply source.

In this context:

- a **hazard** is a biological, chemical, physical or radiological agent that has the potential to cause harm (ADWG, 2004)
- a **hazardous event** is an incident or situation that can lead to the presence of a hazard (what can happen and how) (ADWG, 2004).

The hazards and hazardous events that may affect the quality of drinking water for each scheme within a service may vary. Therefore it is important to base the hazard identification on the best available information relevant to each scheme (for example, records and people with the relevant water quality and catchment skills and knowledge).

¹² Refer to guideline section 3.4.2 for further details on stakeholders. Stakeholders would generally include the community, however a general community consultation process is not considered necessary in all circumstances.

3.7.1 Information gathering—water quality and catchment characteristics

In addition to the details of infrastructure, it is important to include information on the water quality and catchment characteristics to enable a complete assessment of the hazards and hazardous events for each scheme associated with the service.

Water quality information

All available information should be assessed to gain an understanding of the source water¹³ and system performance. Information should be examined both over time and following specific events such as heavy rainfall.

The intent of this guideline section is to use available and relevant water quality information, data, customer complaints, event information etc, to help identify any potential hazards and hazardous events that may impact on drinking water quality. When multiple providers are involved, an overview of upstream (for example, bulk supplier) and/or downstream (for example, distributor) water quality information relevant to the service is required.

Criteria

- The plan must include a summary of the analysis and interpretation of available and relevant water quality information.
- Where multiple providers are involved in providing the water supply, the above summary must to the best of their knowledge, include relevant water quality information on the immediate upstream (for example, bulk supplier) and/or immediate downstream (for example, distributor) system(s).

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- a summary of water quality characteristics should include:
 - source water
 - treated water
 - supplied water:
 - number of samples, maximum/minimum/median/standard deviation, annual values for the above (where appropriate)
- a commentary on figures or information given, should include reasons for:
 - trends
 - exceedences
 - major variations
 - abnormal results
 - low number of results or no results for some relevant characteristics
 - potential problems
- a commentary on the validity of the data should include:
 - position of person that takes the samples, transport arrangements for off-site analysis, the testing laboratory
 - whether there have been any significant changes such as catchment characteristics, treatment process(es) during or since the period the tests were undertaken
- summary information and commentary on any water quality complaints that may have impacted on public health, should include:
 - the nature of the complaints by category (for example, dirty water, suspected illness)

¹³ For a drinking water service that has multiple providers, source water may include the raw water entering the treatment process or treated water entering a transmission or distribution and reticulation system.

- proportion of customers affected
- frequency of occurrence
- likely cause of complaints
- It would also be desirable to provide the history of water quality complaints (relevant to the safety of the supply). For example: Suburb A experiences 30 dirty water complaints each week over the wet season. The provider believes that the dirty water could impair disinfection residual and therefore result in excessive *E. coli*.

Catchment characteristics

The aim of this guideline section is to provide a broad qualitative description of the catchment characteristics. It is not anticipated that providers that are responsible for transmission or distribution will need to undertake a catchment characterisation exercise. However, the information necessary to underpin this hazard identification process should be available through the upstream entity (for example, a bulk supplier).

Criteria

- The catchment characteristics for each scheme's water source must be documented in the plan. This includes a description of:
 - catchment area or groundwater recharge area
 - topography
 - main geological features
 - climatic features
 - land use.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- details on the catchment characteristics should include:
 - soil type
 - annual and monthly rainfall (for example, average, maximum, minimum)
 - incidence of flooding and bushfire
 - predominant vegetation types
 - urban settlements, population and location
 - agricultural, industrial, mining and recreational activities
 - planned future activities which may impact on water quality.

3.7.2 Hazard identification

The plan must contain sufficient detail to indicate that the provider has identified all the hazards and hazardous events that might affect each scheme component (for example, catchment, sources, treatment and distribution system). This includes:

- all appropriate point and diffuse sources of pollution, continuous, intermittent and seasonal pollution patterns, including infrequent and extreme events
- treatment plant failure, operational error or incorrect chemical dosing
- hazards that are not under the direct control of the provider but which may impact on drinking water quality.

Where multiple providers are involved, the identification of hazards and hazardous events for each provider's plan should include those identified by the other entities (to the extent they are relevant). To ensure consistency between plans and minimise duplication of effort this information should be obtained from the other provider (where possible).

Each provider must take into account the hazards which are likely to occur, based on the infrastructure details, catchment characteristics and relevant water quality information for each scheme within the service.

The identification of potential hazards, hazardous events and the subsequent risk assessment should be undertaken by those that have the relevant skills and experience to fully assess the hazards that may affect drinking water quality. The hazard identification process should involve other members of the organisation that have the knowledge of each scheme within the service. Members may include management, operations and maintenance staff, laboratory staff, external consultants, multiple providers, stakeholders and consumer groups (where applicable). Staff responsible for undertaking the hazard identification process and risk assessment should also be involved with developing, verifying and implementing the plan.

Refer to the supporting information which accompanies this guideline for a list of examples of potential sources of hazards and hazardous events.

Criteria

- The hazards and hazardous events and the sources of the hazards and hazardous events that could adversely affect water quality must be documented in the plan, including those affecting the:
 - catchment
 - sourcing infrastructure
 - treatment plants
 - disinfection process(es)
 - distribution system.
- When multiple providers are involved, the plan must to the best of their knowledge, include the hazards and hazardous events and the sources of the hazards and hazardous events associated with the operations and water quality management processes of the other entities' systems which the provider considers could impact on the service.
- Whole of service hazards and hazardous events and the sources of the hazards and hazardous events must be documented in the plan.
- The plan must detail the personnel (i.e. position) responsible for the hazard identification and risk assessment process, their roles and responsibilities and how knowledge of the actual day to day operations of the scheme(s) has been included in this process.
- Key stakeholders who have been actively involved in the hazard identification process, their role and rationale for inclusion must be documented in the plan.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- details of the hazards and hazardous events¹⁴ should include those arising from:
 - catchment activities, for example:
 - alternative water sources
 - polluted discharges
 - contaminated runoff
 - mining
 - agriculture (for example, grazing animals, pesticide spraying, fertiliser application etc)
 - intense feedlots/dairy
 - environmental events (for example, bush fire, storm events, drought etc)

¹⁴ Refer to the supporting information which accompanies this guideline for a list of potential sources of hazards and hazardous events.

- high levels of naturally occurring fluoride or radionuclides
 - human access to catchments and recreational use of storages
 - any potential sewage or recycled water discharges within the catchment
 - land uses (for example, landfill, forestry, industry, roads, urban development)
 - PRW used for augmenting a drinking water supply
 - algal blooms within raw or source water storages
 - spillage and/or accidents in catchment
 - residence time, short circuiting and stratification of dams
 - sourcing infrastructure, for example:
 - for surface water:
 - intake details (for example, operation, ability to change levels etc)
 - raw water or source water pipeline (for example, breakages)
 - for groundwater:
 - bore details (for example, age, construction, susceptibility to ingress of poor quality water etc)
 - treatment plant, for example:
 - equipment failure and/or availability of stand-by
 - treatment plant component capacity exceedences
 - operational excursions
 - inadequate treatment processes
 - use of chemicals (for example, storage, dosage etc)
 - natural disasters
 - disinfection or lack of disinfection process(es), for example:
 - equipment failure and/or availability of stand-by
 - operational excursions
 - disinfection by-products
 - no, or inadequate, disinfection process(es)
 - distribution system, for example:
 - equipment failure and/or availability of stand-by
 - operational excursions
 - pressure fluctuations
 - no, or inadequate, disinfectant residual
 - maintenance practices
 - aging infrastructure
 - backflow
 - upstream and/or downstream infrastructure, for example:
 - re-chlorination facilities
 - balance storages
 - long delivery mains
 - potential low pressure areas
 - alternative and/or varying sources
-

- catchment characteristics
- treatment facilities
- whole of service context, for example:
 - organisation wide issues (for example, amalgamation or formation of distributor and/or retailer)
 - workforce structure, skills retention, etc
- personnel involved in the hazard identification and risk assessment process, for example:
 - role in the process
 - expertise
 - knowledge of the service.
- Details of key stakeholders who have been actively involved in the hazard identification process, their role and rationale for inclusion.

3.8 Assessment of risks

Section 95(3)(b) of the Act states the plan must:

(iv) include an assessment of the risks posed by the hazards and hazardous events.

Following the identification of the hazards and hazardous events relevant to each scheme, an assessment of the risk posed by each hazard is necessary in order to correctly apply risk management measures.

Risk is defined as the likelihood of identified hazards causing harm in exposed populations in a specified timeframe, including the severity of the consequences (i.e. risk = likelihood x consequence) (ADWG, 2004).

For drinking water supplies, risk assessments need to be undertaken in two stages:

- Maximum risk—assumes no preventive measures are in place¹⁵
- Residual risk—includes the mitigating effects of existing preventive measures.

Preventive measures are those actions, activities and processes that are used to prevent hazardous events from occurring or reduce the risks to acceptable levels. Refer to the supporting information which accompanies this guideline for a list of preventive measures. The supporting information also provides an example of a risk methodology table.

For multiple providers, the risk assessment of each provider should consider the maximum and residual risk assessment results from the other provider(s) to the extent they are relevant.

Uncertainty relates to the level of confidence that is placed in the risk assessment and arises from issues such as:

- lack of complete knowledge (ADWG, 2004)

or

- variability of information (ADWG, 2004).

The plan should recognise any uncertainties surrounding the risk assessment and factor these into the preventive measures adopted.

The plan must contain sufficient information to indicate that the provider's risk assessment outcomes have addressed the hazards and hazardous events identified.

¹⁵ At the very least, the maximum risk should be evaluated on the basis that no treatment is provided, i.e. raw water being supplied to the community. Assessing maximum risk level prioritises risks and assists with the development of emergency and incident plans in the event that major treatment components or barriers fail. It also helps to establish the critical preventive measures across the service to guide appropriate operational procedures and monitoring to ensure these critical measures are continuously effective.

Criteria

- The plan must detail the risk assessment methodology used for each scheme including:
 - reference to a published version such as ADWG, HACCP, AS/NZS ISO 31000-2009
 - if a published version has not been used, a description of the methodology which has been used must be provided
 - the definition of likelihood, consequence and risk level used
 - an explanation of the acceptable risk level and the rationale for this selection.
- Details of the risk assessment results for each scheme's identified hazards and hazardous events must be documented in the plan, including:
 - hazard
 - source of hazard and hazardous event
 - maximum risk level or equivalent process¹⁶ (i.e. without existing barriers in place for example, treatment and/or disinfection)
 - existing preventive measures including multiple barriers (i.e. treatment process steps)
 - residual risk level (i.e. with existing barriers in place for example, treatment and/or disinfection)
 - any uncertainties.
- Key stakeholders who have been actively involved in the risk assessment process, their role and rationale for inclusion must be documented in the plan.
- Where multiple providers are involved, the plan must, to the best of their knowledge, explain how the relevant maximum and residual risk assessment results from other provider's service(s) have been considered.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- Details of the risk assessment should include:
 - if different risk assessment methodologies are used for different schemes across the service, an explanation as to why
 - if significant future changes have been noted (for example, population growth), a scenario in the risk assessment
 - how the risk assessment process was conducted (for example, workshop, interviews, data analysis etc)
 - the treatment performance assumed for each multiple barrier and the rationale
 - key stakeholders.
- Where risks arise from other providers' systems or activities, the risk assessment should (where relevant):
 - consider the risk assessment results from the other provider¹⁷
 - be evaluated in the context of the risk and the measures in place by both providers
 - include maximum and residual risks from the other provider that impact on the service
 - include an assessment of the methodology adopted for the service.

¹⁶ A process that assesses unmitigated risks or the situation where there are no barriers or existing control measures in place.

¹⁷ Where the other provider's risk assessment results are not available, an estimate of the risks likely to be transferred from the other provider's system may need to be undertaken.

3.9 Managing risks

Section 95(3)(b) of the Act states the plan must:

- (v) demonstrate how the drinking water service provider intends to manage the risks posed by the hazards and hazardous events.

In completing the risk assessment, the effectiveness of any existing preventive measures would have been evaluated to determine the level of residual risk (for example, low, medium, high or 1, 2, 3) for each identified hazard and any uncertainties in the results. The level of each residual risk will then need to be assessed as acceptable or unacceptable. The unacceptable residual risks will require the identification of (further) measures or actions to reduce them to an acceptable level.

It is the responsibility of the provider to determine, within the circumstances of its service and each scheme associated with the service, the appropriate measures or actions for managing risks to drinking water. These measures or actions include internal organisational measures, such as infrastructure improvements, operational procedures, workforce skills and knowledge, information management, incident and emergency management protocols or procedures, and actions by external organisations or stakeholders.

The plan must demonstrate the provider has appropriate measures or actions in place to adequately manage the identified risks and protect public health. To achieve this, the plan will need to document how:

- the existing preventive measures will be managed to ensure their ongoing effectiveness
- unacceptable residual risks will be addressed in both the short and long-term
- uncertainties in the risk assessment will be reduced
- incidents and emergencies will be managed
- information will be handled to support the management of risks.

3.9.1 Risk management measures

The provider must demonstrate how they intend to manage the identified risks posed by the identified hazards and hazardous events.

Criteria

- The plan must contain an overall list of all the existing and proposed preventive actions or measures managed by the provider to achieve acceptable residual risks in the short and longer-term.
- Where the provider relies on an external organisation to manage a risk to their service, the plan must document what the preventive actions or measures are, and what arrangements are in place with the external organisation to ensure the measures remain effective.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- a description of short-term measures should include:
 - replacement of equipment
 - operational procedures
 - improving workforce awareness or use of external expertise
 - information sharing processes
 - management of existing measures
- a description of longer-term measures should include:
 - alternate sourcing arrangements
 - infrastructure upgrades
 - workforce composition
 - skills gaps and training needs

- training and skills development
- water quality management skills in the organisation through recruitment, succession planning, mentoring etc
- ensuring that staff are made fully aware of their responsibilities to drinking water quality (for example, through position descriptions)
- ensuring that contractors and/or new staff have appropriate skills and knowledge
- when multiple providers are involved in the supply of recycled water to augment a drinking water supply, a summary of arrangements should include:
 - contracts, and agreements
 - service level agreements relating to volume and water quality
 - other relevant strategies and/or plans, for example:
 - communication or stakeholder strategies between providers
 - recycled water management plans and/or other provider’s drinking water quality management plans
- when external organisations are relied on to manage a risk to the service, details may include:
 - preventive actions or measures including:
 - controlling stock access to source water
 - catchment land use controls and/or practices
 - arrangements with the external organisation to ensure the measures remain effective:
 - contracts, agreements
 - agreed plans and/or protocols.

3.9.2 Operation and maintenance procedures

Operation and maintenance procedures formalise the day-to-day activities and help to ensure that all preventive measures are effective in managing the identified risks. While operation and maintenance procedures are usually developed to manage infrastructure related aspects of the service, these procedures may also address program areas such as stakeholder or catchment management.

The plan must demonstrate the preventive measures identified in the risk assessment process, and used to achieve a documented residual risk, are supported and managed by appropriate operation and maintenance procedures. These procedures must be identified, documented and implemented.

In preparing the plan, providers should review the current practices to identify any procedures that need to be improved or upgraded and detail how this will be achieved in the Risk Management Improvement Program (refer guideline section 3.9.4 for further information).

Refer to the supporting information which accompanies this guideline for a list of potential documented operation and maintenance procedures.

Criteria

- The plan must contain, for each existing preventive measure identified in the risk assessment as a measure for achieving the documented residual risk, a list of the documented operation and maintenance (or other) procedures that are required to ensure the integrity of the measures, including:
 - title
 - date last revised
 - the process used for maintaining the documented procedures
 - the process for implementing the procedures.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- details of the operation procedures should include:
 - a summary of routine operational practices, including changes to routine activities during abnormal conditions (for example, flooding)
- a summary of maintenance practices:
 - asset group
 - maintenance activity
 - frequency
 - reference to a documented procedure (if applicable)
- details of the operation and maintenance procedures:
 - date that each procedure was reviewed and when any proposed new procedures will be completed
 - processes to ensure that documented procedures are accepted and implemented by staff
 - processes for documentation review, update and distribution to relevant staff
- details of procedures or practices for ensuring any other measures relied on to achieve acceptable levels of risks (for example, external organisation actions, land use planning and management) are maintained.

3.9.3 Management of incidents and emergencies

In addition to having preventive measures for managing risk, effective incident and emergency communication and response protocols are also essential to protect public health and important to maintain community confidence. Protocols for both internal and external communications should be established in advance.

The plan must define potential incidents and emergencies and responses to these events, including communication protocols for internal and external notification.

Staff training and follow-up investigations are also important aspects of incident and emergency management and, therefore, the process for training employees for emergency situations and the protocols for investigating incidents and emergencies should also be established and included in the plan.

Criteria

- The process for managing drinking water incidents and emergencies must be described in the plan, including:
 - incidents and emergencies
 - the level of emergency (for example, green, amber, red or level 1, 2)
 - summary of action(s) taken for each level including emergency contacts
 - internal and external communication processes and protocols , including those with other key stakeholders that are actively involved
 - responsible positions.
- When multiple providers are involved in providing drinking water, the plan must explain how incidents and emergencies are managed between the entities.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- details on managing drinking water incidents and emergencies should include:
 - defining the emergency and its incident level (for example, green, amber, red or level 1, 2)
 - links to local or regional emergency or disaster management plans

- documented procedures (for example, for providing safe drinking water to customers when a high *E. coli* test result is received, or loss of supply)
- a list of people to be contacted during emergencies, including:
 - incident or emergency type
 - organisation (including the department):
 - contact position(s)
 - contact details
 - communication protocols
 - level of engagement
- the processes for:
 - training employees for emergency situations
 - testing emergency response procedures and frequencies
 - incident investigation and how corrective and/or preventive measures are implemented
 - revising emergency protocols as necessary
- when multiple providers are involved in responding to incidents and emergencies, details on how each providers' incident management protocols integrate to demonstrate collaborative communication arrangements in managing risks, for example:
 - communication protocols
 - emergency response plan protocols and procedures
 - incident reporting and management protocols and procedures
 - relationship between monitoring programs
 - response measures to incidents.

3.9.4 Risk Management Improvement Program

The plan must:

- identify the hazards and hazardous events
- assess the risks (maximum risk and residual risk) posed to the quality of drinking water (risk assessment process)
- demonstrate how they intend to manage the risks identified through the risk assessment process.

The results of the risk assessment process should give the provider an indication of the types of risks that need to be managed across the service and each scheme associated with the service. Information on the measures that the provider has in place to manage these risks should be documented in response to the legislative requirement—managing risks (that is, guideline sections 3.9.1 (risk management measures) through to 3.9.3 (management of incidents and emergencies)).

It is recognised that for some risks identified in the plan for the service and each scheme associated with the service, management measures may not be in place at the time the plan is submitted for various reasons or external factors beyond the control of the provider. The provider is responsible for managing these risks, including unacceptable risks, to protect public health. In this situation, the provider is required to identify interim, short-term to long-term management measures as part of the plan. The risk assessment process should also assist the provider in prioritising these additional or improved measures or actions.

The Risk Management Improvement Program (the program) is a mechanism for the provider to demonstrate to the regulator how it will address these risks identified in the plan. The program must accompany the provider's plan and outline the interim, short-term to long-term management measures and actions and the implementation timeframes.

The program may include a wide range of measures or actions for improving the management of risks, such as:

- unknowns in the system description
- high uncertainties from the risk assessment
- risks that remain high at the current residual risk level
- operational monitoring and process controls
- water quality performance
- customer complaint performance
- required upgrades following any emergencies or incidents
- skills and staff levels
- areas that performed poorly during audit and review
- stakeholder engagement.

It is the provider's responsibility to ensure that funding or commitments to funding for any measures or actions identified in the program are secured through their organisation's budget processes. This will be an important issue for providers, as the program will be assessed by the regulator as part of the plan and the timing for implementing measures or actions will be a consideration. The regulator may choose to place conditions (for example, progress reports) relating to the measures, strategies or actions of the program. The consideration of the program by the regulator will not commit the state to funding in any measures or actions within the program.

Similarly, it is the responsibility of the provider to submit relevant and available information to meet the legislative requirements for the service and each scheme associated with the service. However, it is recognised in certain circumstances, the provider's ability to submit all relevant information relating to the service and each scheme associated with the service may be impeded due to external factors which are beyond the control of the provider. These factors may influence the availability of information on a scheme, or service, in terms of:

- common risk assessment methodology
- water quality information
- hazard identification
- risk assessment
- management of risks
- common protocols, procedures for managing risks, communication, training and awareness
- adequacy of the monitoring program.

A provider should attempt to provide all available information to meet the legislative requirements. Where further information is required for a service or scheme, the provider must articulate how the information will be provided to the regulator, including timeframes for completion and this can be done through the program.

Insufficient time to prepare the plan is not considered an external factor.

Criteria

- The plan, through the program, must describe the management measures proposed for each unacceptable residual risk. The process for providing the relevant information to the regulator must also be described. The description must include:
 - measures, actions, strategies or processes
 - priority for implementation
 - timeframe
 - other factors, for example, responsibilities between the provider and third parties and/or other stakeholders.

Addressing the criteria

When addressing the above criteria, the provider may combine the above requirements in the program. In developing the program, consideration should be given, but not limited, to:

- the prioritised measures, actions, strategies or process(es) including:
 - interim or short-term management measures proposed for each unacceptable residual risk
 - permanent or long-term management measures proposed for each unacceptable residual risk
 - strategies or process(es) for providing the relevant information to the regulator
- timeframe for delivery of measures, actions, strategies and process(es)
- a rationale for the implementation schedule
- funding available (yes/no), if no funding is available, then consider other alternatives to achieving the outcome
- position responsible for delivering the measures, actions, strategies or process(es).

3.9.5 Service wide support—information management

Information relating to drinking water quality must be appropriately managed so that it is readily accessible, accurate, reliable, timely and up to date. Providers should:

- maintain adequate records of operational activities and decisions that could impact on the management of drinking water quality
- have an information management system for document control, data management, record keeping and internal and external reporting. Document retention times should be based on any relevant regulatory requirements and to satisfy auditing needs.

Although records may not need to be included as part of the plan, they should be available to submit to the regulator on request.

Criteria

- The plan must describe the information management, record keeping and reporting processes relevant to drinking water quality management, including how they address:
 - accessibility
 - currency
 - record retention requirements.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- a description on the information management, record keeping and reporting processes should include:
 - information type (for example, manuals and procedures) and format (for example, hardcopy/electronic)
 - the document control process
 - responsible position(s)
 - processes for internal and external (including regulatory) reporting.

3.10 Operational and verification monitoring programs

Section 95(3)(b) of the Act states the plan must:

- (vi) include details of the operational and verification monitoring programs under the plan including the parameters to be used for indicating compliance with the plan and the water quality criteria for drinking water.

Operational and verification monitoring programs are required to support the management measures for the identified risks. The plan must contain sufficient information to demonstrate that the provider has appropriate operational and verification monitoring in place.

Monitoring should have a whole of scheme focus and include each of the components (for example, treatment, transmission and reticulation).

It is the provider's responsibility to determine the operational and verification monitoring program relevant for each scheme associated with the service.

Until the approved plan for the service is in place, the provider is responsible for undertaking water quality monitoring and reporting in accordance with the Drinking Water Service Provider Monitoring and Reporting Requirement Notice (the notice) issued by the regulator in December 2008 pursuant to section 630 of the Act. It is anticipated that the information collated as part of this process by the provider, together with the results of the hazard identification and risk assessment process should identify:

- whether the current operational and verification monitoring programs are appropriate and adequate to protect public health
- any deficiencies in the existing operational and verification monitoring programs of each scheme associated with the service
- improvements or upgrades to the existing operational and verification monitoring programs necessary to address these deficiencies.

The operational and verification monitoring programs contained in the plan should address all hazards and risks that may impact on each scheme associated with the service to protect public health.

The provider is responsible for complying with the operational and verification monitoring program under the plan and the water quality criteria generally.

The Water Quality and Reporting Guideline for a Drinking Water Service¹⁸ articulates the water quality criteria for drinking water. It identifies the parameters that must be included in the verification monitoring program of a service, in accordance with the Public Health Regulation. It also sets out the criteria made by the regulator that must be complied with for other parameters where they are included in the verification monitoring program. The water quality criteria are defined under schedule 3 of the Act as:

for drinking water, means all of the following:

- (i) the standards for the quality of drinking water prescribed in a regulation under the Public Health Act
- (ii) the criteria stated in a guideline, if any, made by the regulator about the quality of drinking water
- (iii) the criteria for the quality of drinking water stated in a condition applying to a drinking water quality management plan.

The ADWG also provides information on the types of parameters, monitoring methodology, sampling locations and sampling frequency that should be considered, along with desired water quality criteria or standards that should be achieved.

¹⁸ The Water Quality and Reporting Guideline for a Drinking Water Service can be accessed online at <www.derm.qld.gov.au>

3.10.1 Operational monitoring

Operational monitoring is a planned sequence of observations or measurements that ensure that the system, including critical control points, is operating within performance limits in 'real time'. It is an important component of an overall monitoring program and is used to:

- confirm the system is performing within the operational tolerance limits
- control process elements
- provide for corrective actions in the short-term.

An effective monitoring program should meet the following requirements:

- provide an immediate indication of performance
- include appropriate surrogates and indicators to enable continuous monitoring
- be used to trigger immediate short-term corrective actions to maintain drinking water quality
- monitor with sufficient frequency to reveal any failures in a timely manner (with sufficient time to act)
- monitor any significant hazards identified in the risk assessment (for surrogates or indicators of those hazards).

Criteria

- The plan must contain details of the operational monitoring program, including:
 - a link to the process step or operational function
 - the parameter being tested
 - location of monitoring
 - frequency
 - summary of how excursions are managed and/or corrective action is taken.
- The plan must describe why the operational monitoring program is appropriate to confirm and maintain the effective operation of the existing preventive measures.

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- details of the operational monitoring program should include:
 - operational monitoring details, for example:
 - the parameter being tested
 - sample method (for example, grab, online)
 - the process for sampling, routine analysis and transportation
 - analysis method
 - interpretation and communication of results (including quality control)
 - process for long-term evaluations of trends in monitoring results including use of results to influence and improve management of the drinking water service
 - referenced documented procedures, for example:
 - sampling procedures
 - data handling procedures
 - response to excursions
 - communication procedures

- contractual obligations
- list of plant operating procedures
- details of the operational monitoring program in relation to the identified preventive measures including:
 - the parameter
 - the test location
 - identified target and critical levels
 - the rationale for the monitoring program (including parameter selection).

3.10.2 Verification monitoring

Verification monitoring is used to confirm product quality at the point of supply, compliance with water quality criteria and to identify deficiencies in existing preventive or control measures. It is an assessment of the performance of the scheme and unlike operational monitoring, it does not occur in real time. It is used to confirm product quality, compliance with water quality criteria and to identify deficiencies in existing control measures.

The water quality criteria for the service must include the water quality criteria set by Queensland Health and any set by the regulator. Other parameters identified for monitoring the safety of the drinking water for individual schemes must also be included.

Criteria

- The plan must contain details of the verification monitoring program including:
 - the parameter being tested
 - location of monitoring
 - frequency
 - summary of how excursions are managed and/or corrective action is taken.
- The plan must also describe why the verification monitoring program is appropriate to confirm that the drinking water complies with the water quality criteria for drinking water (including the rationale for the choice of the parameters).

Addressing the criteria

When addressing the above criteria consideration should be given, but not limited, to:

- details of the verification monitoring program should include:
 - a tabulation of verification monitoring including:
 - ADWG value
 - analysing authority (for example, National Association of Testing Authority accredited laboratory, in-house)
 - other system monitoring measures (for example, customer complaints)
- description on the:
 - monitoring locations and the rationale for their selections
 - process for sampling, routine analysis and transportation of samples
 - interpretation and communication of results (including quality control)
 - process for long-term evaluation of trends in monitoring results
- referencing documented procedures, for example:
 - sampling procedures
 - data handling procedures

- response to excursions
- communication procedures, contractual obligations
- list of plant operating procedures.

3.11 Best practice recommendations

This guideline has been developed to provide information to providers about preparing the plan. The plan must reflect the requirements of the Act as stated in guideline sections 3.5 to 3.10. Providers, however, can choose to expand the plan criteria by incorporating some or all of the following best practice recommendations. These recommendations are based on the ADWG elements and sub-elements and reflect the current practices used within the industry to promote a safe supply of drinking water. However, as these recommendations are not requirements under the Act they will not be considered in the assessment of the plan. These recommendations include:

- commitment to drinking water quality management
- employee awareness and training
- research and development
- review and continual improvement.

3.11.1 Commitment to drinking water quality management

Drinking water quality policy

The purpose of a drinking water quality policy is for the organisation to demonstrate a commitment to protecting public health. Any policy statement for drinking water should provide a basis for the development of detailed guiding principles, procedures and implementation strategies.

To meet this recommendation, the plan should include a drinking water policy statement. This statement should address broad issues and requirements as outlined in ADWG, such as:

- commitment to the application of a risk management approach
- communication and engagement with employees and the public
- intention to adopt or work towards best practice and multiple barriers
- continuous improvement in managing drinking water.

Regulatory and formal requirements

There are a number of requirements placed on providers ranging from legislative and regulatory requirements to industry standards and codes of practice. Providers may also enter into formal agreements with their customers, stakeholders, other water service providers and recycled water providers.

The provider should demonstrate their understanding of the regulatory requirements, and any formal agreements associated with the service.

To meet this recommendation, the plan should include a list of regulatory requirements and/or formal agreements for the service.

3.11.2 Employee awareness and training

Employee awareness and involvement

It is vital to ensure that all staff and contractors fully understand the operations of the service and how their actions influence the protection of public health. The provider should have appropriate mechanisms and procedures in place to ensure staff across the organisation are aware of the key issues that influence the management of the service.

As mentioned in the ADWG, all staff should be aware of issues such as:

- drinking water quality policy of the organisation, regulatory and legislative requirements
- roles and responsibilities
- how their actions impact on water quality and public health.

Measures to enhance employee awareness may include:

- involving staff in the development of procedures and decision making
- induction training for employees and contractors, which may include a briefing on the ADWG, drinking water quality policy and the plan
- use of regular staff meetings (tool box meetings).

All staff awareness mechanisms should be recorded. This may include training material, date of training and attendance records.

To meet this recommendation, the plan should document what mechanisms are used to maintain employee awareness and involvement.

3.11.3 Research and development

Research and development is required to increase understanding of the service (identify potential hazards), validate that existing and proposed processes will successfully control hazards and to design new equipment.

Many providers undertake various research and development activities as part of their normal business, such as investigative studies and attending conferences to maintain awareness of emerging technologies and industry best practice.

The level of research and development undertaken will differ significantly between providers, and should be appropriate to the size and complexity of the service. Providers should maintain records of all research and development activities.

Investigative research and development activities may include:

- catchment surveys—used to identify activities that may affect drinking water quality such as pesticide use
- baseline source water monitoring—used to identify potential issues such as high naturally occurring fluoride and exploring seasonal or event driven variations in water quality
- attending conferences and reading journal articles—used to maintain awareness of emerging technologies and industry best practice
- planning studies—used to investigate ways to optimise or improve the system performance. Planning studies may also be used to validate the selection of potential new infrastructure by documenting expert judgement and referencing published technical literature.

To meet this recommendation, the plan should document what research and development activities are currently undertaken and ensure that the plan allows for any ongoing research and development activities that are required to support continual improvement.

3.11.4 Review and continual improvement

Review by senior executive

Providers should regularly review the activities relating to the service to improve operational processes and drinking water quality management. The review should ensure any changes to the internal (that is, activities of the organisation or outcomes of incidents) and external (that is, advances in science and technology or changes to legislation) environment are reflected in the operations of the service.

To meet this recommendation the plan should document the procedure for undertaking reviews of the effectiveness of the drinking water quality management system by a senior executive and evaluate the needs for change (that is, update policy, the plan, operational procedures).

4. Approval of the plan

4.1 Applying for approval of the plan

Each provider must apply to the regulator for approval of the plan. A copy of the plan must be submitted with an application for approval in accordance with section 95(2) of the Act¹⁹.

An application form for the plan is available on the department's website at <www.derm.qld.gov.au>.

4.2 Assessment process for the plan

4.2.1 Regulator's considerations when making a decision about the plan

In accordance with section 98 of the Act, when considering the plan the regulator must have regard to the following:

- (a) the plan and any additional information about the plan given to the regulator under section 96 of the Act
- (b) this guideline prepared by the regulator
- (c) any advice obtained by the regulator under section 97 of the Act
- (d) the water quality criteria for drinking water.

4.2.2 Request for additional information

The regulator must be satisfied that the plan is adequate to protect public health. In accordance with section 96 of the Act, the regulator may, by notice given to the provider, require the provider to give additional information about the plan, including, for example, information about arrangements relating to the supply of water to or from the provider's service. A requirement to give additional information under section 96 of the Act is an 'information requirement'.

If the provider fails, without reasonable excuse, to comply with the requirement within the reasonable period stated in the notice, the application is taken to be withdrawn.

In addition to requesting the provider to give additional information, the regulator may also obtain advice from an advisory council or any other entity the regulator considers appropriate, before making a decision on the application in accordance with section 97 of the Act.

4.2.3 Timeframes for decisions

In accordance with section 98 of the Act, the regulator must consider each application and decide to approve, with or without conditions, or refuse to approve, the plan:

- if an information requirement is not made in relation to the plan—within three months of receiving the plan
- if an information requirement is made in relation to the plan—within three months of the requirement being complied with.

¹⁹ Section 95(2)(b) of the Act states that the application must be accompanied by the fee prescribed under a regulation. However, currently there is no prescribed fee for an application for the plan.

4.2.4 Regulator’s decisions

After considering the plan, the regulator may approve the plan, with or without conditions, or refuse to approve the plan. The information the regulator must include in the notice of the decision or an information notice for the decision is given in accordance with section 99 of the Act and is shown below in Table 3.

Table 3: Regulator’s decisions

Decision	Factors included in the decision
Approve the plan without conditions	<p>The regulator must give the provider a notice of the decision.</p> <p>The notice of the decision must state:</p> <ul style="list-style-type: none"> • the intervals at which: <ul style="list-style-type: none"> ▪ regular reviews of the approved plan must be conducted (not less than one year) ▪ regular audits of the approved plan must be conducted (not less than two years).
Approve the plan with conditions	<p>The regulator must give the provider an information notice for the decision.</p> <p>The information notice for the decision must state:</p> <ul style="list-style-type: none"> • the conditions of the approval • the intervals at which: <ul style="list-style-type: none"> ▪ regular reviews of the approved plan must be conducted (not less than one year) ▪ regular audits of the approved plan must be conducted (not less than two years).
Refuse to approve the plan	<p>The regulator must give the provider an information notice for the decision.</p>

Section 99(1) of the Act states that, within 10 business days of deciding the application, the regulator must give the provider either the notice of the decision or the information notice for the decision.

4.3 Approval of the plan

Approval is based on submission of the plan, completeness of the plan in addressing the criteria and the adequacy of the plan in appropriately managing the risks that have been identified. It involves a detailed review of the content and practicality of the plan in protecting public health.

An approval of the plan does not imply approval of supporting documentation accompanying the plan. That is, for example, the provider may reference a document (for example, mains breaks repairs procedures) in the plan to demonstrate how the criteria has been met. Similarly, the regulator in considering the provider’s plan may request a copy of the mains breaks repairs procedures to cite the specific reference as it relates to the criteria. The referencing of the mains breaks repairs procedures in the plan or the review of the specific section in mains breaks repairs procedures does not imply that the mains breaks repairs procedures (and its contents in its entirety) has been approved by the regulator as part of the plan approval. The provider remains responsible for ensuring appropriate procedures are in place for the service to protect public health.

4.4 Conditions that can be placed on the plan

In accordance with section 99(2)(a) of the Act, the regulator can approve the plan with conditions. The types of conditions that can be placed on the plan include, for example:

- reporting drinking water quality incidents
- progress on a risk management improvement program (i.e. status report on their measures and actions)

- timing of particular actions, measures etc (i.e. bring forward a measure identified in the risk management improvement program)
- specific requirements (i.e. provide required information by a certain timeframe)
- conditions as deemed necessary by the regulator to protect public health.

4.5 Augmenting a drinking water supply with recycled water

The Act also deals with matters relating to recycled water aimed at protecting public health. For providers generally, an approved drinking water quality management plan must be in place by 1 July 2011, 2012 and 2013 for large, medium and small providers respectively. However, where a drinking water supply is augmented by recycled water, these arrangements do not apply.

Section 207 of the Act requires that before a recycled water management plan for a scheme that proposes to supply recycled water to augment a supply of drinking water is approved, there must be an approved drinking water quality management plan covering the water storage that will receive the recycled water. This means that the regulator will not approve a recycled water management plan for a recycled water scheme that proposes to supply recycled water to augment a supply of drinking water unless there is an approved drinking water quality management plan.

Where recycled water is proposed to be supplied under the recycled water scheme to augment a supply of drinking water, the complete water system (that is, from the source of recycled water to its addition to the drinking water supply), and ultimately the quality of water supplied to the customer (that is, from the drinking water supply to reticulation) should be covered by the combination of the drinking water quality management plan and the recycled water management plan.

The drinking water quality management plan that is developed for the receiving water storage and the water treatment plant(s) must meet all the requirements of the Act.

4.6 Appealing the decision

If the plan is refused by the regulator, or the provider disagrees with the conditions stated on the information notice for the decision, the applicant may appeal the decision.

Refer to Chapter 7, parts 1, 2 and 3 of the Act for further details about internal reviews and appeals of the regulator's decision.

4.7 Amending the approved plan

To retain the currency of the plan by ensuring continued compliance with the Act, the approved plan may require amendment. Amendments to the plan may be initiated:

- by a provider under section 100 of the Act

If the provider proposes to amend the plan they must apply²⁰ to the regulator for approval of the proposed amended plan.

- by the regulator under section 101 of the Act

The regulator may require a provider to amend the plan if the regulator is satisfied that the amendment is required to protect public health.

Before requiring the provider to amend the plan, the regulator must give the provider a show cause notice about the proposed amendment. After considering all properly made submissions about the proposed amendment, the regulator can decide whether the proposed amendment should or should not be made. If, after considering all properly made submissions, the regulator decides that the proposed amendment should be made, the regulator must give the provider a notice and an information notice for the decision in accordance with section 101(3) of the Act.

²⁰ Sections 95(2) and (3) and 96 to 99 of the Act apply to the application. That is, the same procedure that applies to the application for approval of the Plan applies to the application for amendment of the plan.

If the regulator is satisfied with the way the plan has been amended, the plan will then be taken to be the approved plan and the regulator must give the provider a notice stating that the plan as amended is taken to be the approved plan. The amended plan will take effect from the day the notice is given to the provider.

If, after considering all properly made submissions, the regulator decides that the proposed amendment should not be made, the regulator must give the provider a notice that the plan need not be amended.

4.8 Duration of the approved plan

The plan does not have an expiry date however it should be a living document and updated in line with any changes to the external and internal operating environment.

A provider will be required to undertake a regular review (under section 106 of the Act) and regular audit (under section 108 of the Act) of the plan²¹ at intervals stated by the regulator. The outcomes of the regular review of the plan may require an amendment to the plan (see guideline section 4.6). These outcomes will also need to be stated in the annual report²² prepared by the provider for the service.

4.9 Operating under the approved plan

4.9.1 Compliance with the conditions of the plan

The provider must have an approved plan in place for the service. The provider is responsible for ensuring compliance with the approved plan and any conditions set by the regulator. Failure to comply with the plan or the conditions of the plan is an offence under section 93 of the Act.

4.9.2 Noncompliance with water quality criteria

Under the approved plan, the provider must inform the regulator if the provider becomes aware that the quality of water supplied from the provider's service does not comply with the water quality criteria relating to the service.

In accordance with section 102 of the Act, unless the provider has a reasonable excuse, the provider must:

- immediately inform the regulator of the noncompliance with the water quality criteria and the circumstances that gave rise to the noncompliance
- give the regulator notice, in an approved form, of:
 - the noncompliance and the circumstances that gave rise to the noncompliance
 - any action taken or to be taken, by the provider to correct the noncompliance
 - the measures the provider will take to prevent the noncompliance in the future.

²¹ A service provider must arrange for regular audit and compliance with the plan.

²² The Drinking Water Quality Management Plan Annual Reporting Guideline is being developed and will be made available when approved.

5. Annual reporting, reviews and audits of the plan

Annual reporting, reviews and audits of the plan are requirements under the Act. The frequency of reviews and audits will be specified at the time of plan approval.

5.1 Annual reporting

In accordance with section 141 of the Act, a provider is required to prepare an annual report for each financial year after a financial year in which the plan is approved. The annual report may be prepared by the provider in combination with other reports required under section 141 of the Act. The provider must give a copy of the annual report to the regulator within 120 business days after the end of the financial year to which it relates.

Section 142 of the Act outlines the contents that must be included in the annual report for the plan.

Under section 142(2) of the Act, an annual report for the plan must, for example, contain a summary of the provider's compliance with the plan in relation to the water quality criteria for drinking water. This summary may contain the corrective and preventive actions taken by the provider in complying with the water quality criteria for the plan.

In accordance with section 575 of the Act, a provider must keep a copy of the annual report for inspection and purchase by the public.

5.2 Reviews and audits

Section 106(4) of the Act requires a provider to regularly review the provider's plan in accordance with the timeframes stated in a notice of the decision or an information notice for the decision given by the regulator under section 99 of the Act.

5.2.1 Reviews

In accordance with section 106(5) of the Act, the purpose of the review of the plan is to ensure that the plan remains relevant to the operation of the service provided by the provider. The annual report for the plan must contain the outcome of any review of the plan and how the provider has addressed matters raised in the review.

5.2.2 Audits

Audit reports

Section 108 of the Act states a provider is required to arrange for regular audit reports on the plan and compliance with the plan. The purpose of the regular audit report is:

- (a) to verify the accuracy of the monitoring and performance data provided to the regulator under the plan
- (b) to assess the provider's compliance with the plan
- (c) to assess the relevance of the plan in relation to the provider's service.

The annual report for the plan must contain a summary of the findings of, and any recommendations stated in, a regular audit report.

The regular audit report must be prepared by a person who is certified under the Drinking Water-Quality Management System Auditor Certification Scheme, or has a qualification the regulator is satisfied is at least equivalent to the Drinking Water-Quality Management System Auditor Certification Scheme. The report must be given to the regulator within 30 business days after its completion and made available for inspection and purchase. The regular audit report must be accompanied by a statutory declaration by the provider and the auditor.

Spot audits

Section 110 of the Act allows the regulator to arrange for a spot audit report to be prepared about the provider's plan in the following circumstances:

- (a) if the regulator is satisfied, or reasonably believes:
 - (i) a provider is not complying with the plan

or

- (ii) a provider's plan is no longer adequate for the provider's registered services
 - or
- (b) a provider does not:
 - (i) have an audit report prepared under section 108 of the Act
 - or
 - (ii) give the regulator a copy of an audit report under section 108 of the Act.

The regulator may only arrange for a spot audit if the regulator has given the provider a show cause notice in accordance with section 463 of the Act.

The spot audit for the plan must be prepared by a person who is certified under the Drinking Water-Quality Management System Auditor Certification Scheme, or has a qualification the regulator is satisfied is at least equivalent to the Drinking Water-Quality Management System Auditor Certification Scheme.

The spot audit report submitted to the regulator must be accompanied by a statutory declaration by the auditor. The regulator must give the provider a copy of the report within 30 business days after its completion.

If the report states the plan is inadequate in a material particular or the provider has not properly carried out the plan, the regulator must give the provider an information notice requiring the provider, within the reasonable period stated in the notice to either rectify the inadequacy or to properly carry out the plan.

The regulator may recover from the provider an amount equal to the cost of completing the report.

6. Glossary

Note: This guideline glossary contains terms taken from the Act and terms taken from various water industry sources. The provider should refer to the Act for the meaning of the terms. However, terms referred to in this guideline are provided below for your convenience.

Term	Meaning
ADWG	The Australian Drinking Water Guidelines incorporate the Framework for the Management of Drinking Water Quality based on the 12 elements and provides guidance on what constitutes good quality drinking water.
Conditions	Set by the regulator*.
Consequence	Consequence of a hazardous event occurring (for example, catastrophic, major, moderate, minor, or insignificant).
Control measure (preventive measure)	Any action or activity that can be used to prevent, eliminate or reduce a hazard to an acceptable level.
Corrective actions	Corrective actions are those taken immediately to prevent hazards from reaching end users for example, actions taken following noncompliance with water quality criteria.
Critical Control Point (CCP)	A point, step or procedure at which control can be applied and which is essential to prevent or eliminate a hazard or reduce it to an acceptable level.
Department	Department of Environment and Resource Management.
Distribution system	Means the infrastructure for: <ul style="list-style-type: none"> (a) the transmission of water or (b) the reticulation of water or (c) water treatment or recycling*.
Drinking water	Means water, for human consumption, intended primarily as water for drinking, whether or not the water is used for other purposes. Drinking water does not include: <ul style="list-style-type: none"> (a) water that is food as defined under the <i>Food Act 2006</i> or (b) water taken or supplied for domestic purposes under the Water Act*.
Drinking Water Quality Management Plan (the plan)	Means a plan about the storage, treatment, transmission or reticulation of water for drinking by a drinking water service provider*.
Drinking Water Quality Management Plan Auditing and Review Guidelines	Guidelines issued by the regulator under section 571(o) of the Act are yet to be developed.

* See Schedule 3 of the Act.

Term	Meaning
Drinking Water Quality Management Plan Annual Reporting Guidelines	Guidelines issued by the regulator under section 571(1) of the Act are yet to be developed.
Drinking water scheme	Infrastructure owned by a provider for single or multiple combinations of the individual components of treatment, transmission, or reticulation of drinking water supply, or the storage of recycled water to augment a drinking water supply. Refer to the Water Quality and Reporting Guideline for a Drinking Water Service for further information.
Drinking water service	Means a water service that is: <ul style="list-style-type: none"> (a) the treatment, transmission or reticulation of water for supply as drinking water or (b) water collection in a water storage, if the water in the storage: <ul style="list-style-type: none"> (i) includes recycled water and (ii) is used to augment a drinking water supply*.
Drinking water service provider	Means a water service provider for a drinking water service*.
Excursion including operational excursion	When a parameter goes outside identified limits. These limits may include alert levels, critical limits or water quality criteria.
HACCP	Hazard Analysis and Critical Control Point is an internationally recognised risk management system used extensively in the food industry.
Hazard	A biological, chemical, physical or radiological agent that has the potential to cause harm (contaminant).
Hazardous event	An incident or situation that can lead to the presence of a hazard (what can happen and how).
Large service provider	<ul style="list-style-type: none"> (a) a service provider primarily providing bulk water services or (b) for a retail water service or sewerage service—a service provider with more than 25 000 connections to a registered service or (c) for a drinking water service that is the reticulation of water and is not a retail water service—a service provider with more than 25 000 connections to a registered service or (d) for an irrigation service—a service provider with: <ul style="list-style-type: none"> (i) more than 500 users and (ii) a volume throughput, in any of the last five financial years, of more than 10 000ML*.

* See Schedule 3 of the Act.

Term	Meaning
Likelihood	Likelihood of hazard (for example, almost certain, likely, possible, unlikely, rare).
Maximum risk	Assumes that no preventive measures are in place.
Medium service provider	<p>(a) for a retail water service or sewerage service—a service provider with more than 1000 but not more than 25 000 connections to a registered service; or</p> <p>(b) for a drinking water service that is the reticulation of water and is not a retail water service—a service provider with more than 1000 but not more than 25 000 connections to a registered service</p> <p>or</p> <p>(c) for an irrigation service—a service provider with:</p> <p>(i) more than 100 but not more than 500 users</p> <p>and</p> <p>(ii) a volume throughput, in any of the last five financial years, of more than 10 000ML*.</p>
Operational monitoring	The act of conducting a planned sequence of observations or measurements that ensure that the system, including critical control points, is operating within performance limits in real time.
PAC	Powdered activated carbon.
Preventive measures/actions	Any action or activity that can be used to prevent, eliminate or reduce a hazard to an acceptable level.
Providers that store or treat source water containing recycled water intended to augment a drinking water supply	<p>If the drinking water service carried out by the provider is:</p> <p>(a) water collection in a water storage, if the water in the storage:</p> <p>(i) includes recycled water;</p> <p>and</p> <p>(ii) is used to augment a drinking water supply</p> <p>or</p> <p>(b) the treatment of water intended for drinking that is sourced from a water storage, or water released from a water storage, mentioned in paragraph (a).</p>
Recycled water	In the context of this guideline, recycled water refers to recycled water that is used to augment a drinking water supply.
Regulator	The chief executive of the department is the regulator under the Act. The chief executive of the department, as the regulator, has delegated certain powers under the Act to the officers of the Office of the Water Supply Regulator*.
Residual risk	Includes the mitigating effects of existing preventive measures.
Risk	Risk is defined as the likelihood of identified hazards causing harm in exposed populations in a specified timeframe, including the severity of the consequences (i.e. risk = likelihood x consequence).
Service provider	Means a water service provider or a sewerage service provider*
Small service provider	(a) for a retail water service or sewerage service—a service provider with 1000 or less connections to a registered service

* See Schedule 3 of the Act.

Term	Meaning
	<p>or</p> <p>(b) for a drinking water service that is the reticulation of water and is not a retail water service—a service provider with 1000 or less connections to a registered service</p> <p>or</p> <p>(c) for an irrigation service—a service provider with:</p> <p>(i) 100 or less users</p> <p>or</p> <p>(ii) a volume throughput, in any of the last five financial years, of 10 000ML or less</p> <p>or</p> <p>(d) for a water service other than a water service mentioned in paragraph (a), (b) or (c), a service provider:</p> <p>(i) with not more than 500 customers</p> <p>and</p> <p>(ii) that mainly provides drainage services or water for domestic purposes or for watering stock*.</p>
Spot audit	Means an audit conducted under section 110 of the Act*.
Uncertainty	<p>Relates to the level of confidence that is placed in the risk assessment and arises from issues such as:</p> <p>(a) lack of complete knowledge; or</p> <p>(b) variability of information.</p>
Verification monitoring	Used to confirm product quality at the point of supply, compliance with water quality criteria and to identify deficiencies in existing preventative/control measures. It is an assessment of the performance of the scheme, and unlike operational monitoring, it does not occur in real time.
Water quality criteria	<p>for drinking water, means all of the following:</p> <p>(a) the standards for the quality of drinking water prescribed in a regulation under the Public Health Act</p> <p>(b) the criteria stated in a guideline, if any, made by the regulator about the quality of drinking water</p> <p>(c) the criteria for the quality of drinking water stated in a condition applying to a drinking water quality management plan.</p>
Water service provider	Means a person registered under Chapter 2, part 3 as a service provider for a water service*.

* See Schedule 3 of the Act.

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Technical Report 3
Ecological Risk Assessment
For draft Fitzroy Basin Water Resource Plan

DRAFT

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1. Executive summary

Ecological risk assessment was undertaken to examine the implications of flow regime changes from water resource development on the long term viability of ecological assets. Ecological assets with critical links to flow were selected as indicators of the ecosystem, and assets with links to a range of flow classes were assessed (see Table 1).

The approach was based on methods developed for population viability analysis and was formalised through the construction of conceptual models, knowledge acquisition, and the construction of semi-quantitative and quantitative population models. A variety of data sources were used in the development of risk assessment models, including literature reviews, monitoring data and expert advice.

Because of the unique and specific requirements of ecological assets, the assessment was tailored to each asset based on the available information. In general terms the assessment considered the potential risk from flow management to the viability of the asset in question, based on the known flow requirements of the asset that are required for long term integrity. It is important to note that assessment of risk was only for flow related risk and did not include risk from other factors, such as the effects of weirs and barriers on connectivity.

The assessment firstly considered the opportunities provided by flow management for responses of individual organisms at particular places and times; and secondly the frequency and sequence of opportunities determines population responses, and thus the viability of values. In calculating potential risk to the asset from flow management, aspects of both likelihood and consequence were considered.

A total of 12 assets were assessed at up to 14 locations around the Fitzroy Basin (Table 1). The critical flow requirements of five assets were linked to no flow/low flow conditions, and included *Ambassis agassizii* (Glassfish), *Mogurnda adspersa* (Purple spotted gudgeon), *Melanotaenia splendida splendida* (Rainbowfish), waterholes as refugia and riffles as habitats. Two assets were linked to medium to high flows, including flow spawning fish (i.e. *Macquaria ambigua oriens* (Fitzroy golden perch)) and riparian vegetation communities (i.e. *Eucalyptus coolabah*). High to flood flow assets included wetlands and floodplain lagoons and the estuarine/marine species *Lates calcarifer* (Barramundi), *Penaeus merguensis* (Banana prawns), offshore reef fisheries and *Polydactylus macrochir* (King threadfin salmon).

Five assets were identified at low risk, of which four were low flow assets. The stable flow conditions necessary for low flow spawning fish (which included glassfish, purple spotted gudgeons and rainbowfish) were similar between flow scenarios, with some sites downstream of water infrastructure providing more spawning opportunity. Waterholes were modelled at low risk, with large waterhole size and flow supplementation (from upstream storages) contributing to the low risk. Barramundi growth was also modelled at low risk.

All remaining assets were identified at higher risk; however the degree of potential risk varied both within and between asset groups. The only low flow asset potentially at higher risk was riffles as habitat where an increase in dry periods was observed. Sites upstream of the water supply scheme remained generally unchanged (e.g. Taroom and Baroondah), whilst risk in the supplemented water supply schemes increased with downstream distance. Risk also increased at sites affected by the proposed Nathan Dam.

Both the medium to high flow assets, flow spawning fish and riparian vegetation communities, were modelled at higher risk. The findings of the Fitzroy golden perch Bayesian modelling suggested that, under the current development scenario, the population is mostly affected in the middle sections of the catchment. Future developments represent a greater risk, particularly in the middle to lower Dawson River where the impacts of the proposed Nathan Dam were realised.

Riparian vegetation communities, of which Coolabahs were the indicator species, experienced less flooding frequency, with sites directly downstream of major water infrastructure the most affected. Weirs were found to have very little influence on the flooding of riparian vegetation communities.

Wetland flooding downstream of major water infrastructure was also modelled to occur less frequently, with spells between flooding increasing under the development scenarios.

Notwithstanding these results, compensatory environmental flows may not be practical, if at all possible, for riparian vegetation communities and wetlands. Major flow events provide the only means of flooding as discharge capacities of the major infrastructure, including Fairbairn Dam, are not large enough to provide the necessary flooding flows.

Barramundi, king threadfin and offshore reef fisheries were all modelled to be at potentially higher risk under both development scenarios. Reductions in wet season flows during periods of naturally low flow were the primary cause for the increased risk profiles, with each asset having between 2 to 4 high risk periods over the 107 modelled sequences. In most instances, these high risk periods were not present in the pre-development scenario where the sequences were interrupted by years where flows provided the necessary recruitment conditions. During extended periods of low flow, low storage volumes and a high demand for water harvesting is expected, which would reduce the volume of water reaching the estuarine/marine systems. Given that these flows are very important for securing existing water entitlements, it is not expected that compensatory environmental flows during these low flow periods would be possible.

Table 1: Summary of ecological assets potential risk trajectory under the development cases. Upward arrow represents an increase in risk; downward arrow represents a decrease in risk; circles represent no change in risk profile.

Location		Low flow assets					Medium-High flow assets		High-flood flow assets						
		Glassfish	Purple spotted gudgeon	Rainbowfish	Waterholes	Riffles	Flow spawning fish	Riparian veg.	Wetlands	Barra (YCS)	Barra (growth)	Barr (recruits)	Banana prawns	Offshore reef fisheries	King salmon
Fitzroy	Barrage							o	↑	↑	o	↑	↑	↑	↑
	Wattlebank	↑	o	↑	o	↑	o	o	o						
Dawson	Beckers	↓	↓	↓	o	↑	o	o							
	Woodleigh	↓	↓	↓	o	↑	↑	↑	↑						
	Glebe Weir	↑	↑	↑		o	↑	↑	↑						
	Taroom	↑	↑	↑	o	o	↑		o						
	Utopia Downs	o	o	o		o	↑								
Mackenzie	Coolmaringa	↑	↑	↑	o	↑		o	↑						
	Bingegang Weir	↓	o	o		↑	o	↑							
	Carnangarra	↑	↑	↑	↓	↑	↑	↑	↑						
Comet	Comet Weir	o	o	o			↑	↑							
	Comet Lake	o	o	o			o	o							
Theresa	Gregory Highway	o	o	o			↑								
Nogoa	Fairbairn Dam	↓	↓	↓			↑	↑							
Overall		o	o	o	o	↑	↑	↑	↑	↑	o	↑	↑	↑	↑

These assessments also highlighted that further research is required to improve our understanding of the ecological risk through water resource planning. These included:

- Floodplain Riparian Vegetation Communities and wetlands where it was recommend that future studies be undertaken which assesses whether changes in flooding frequency impact on riparian communities and wetlands
- Barramundi, offshore reef fisheries and Threadfin salmon risk must be considered in a wider context, as their persistence is influenced by a variety of activities, including over fishing and habitat alterations. The increased risk to recruitment also needs to be assessed in terms of its potential impact on fisheries industry (this is also pertinent to Banana prawn production).
- Risk to the riffle community remains unknown and the consequence of these changes require further investigation.
- Risk to unsupplemented waterholes was not assessed in detail and requires further research
- The population status of flow spawning fish needs confirmation and management of connectivity of all parts of the basin's river network may require a high priority for long-term population management

In addition to further research on assets, the ecological modelling method requires improvement to include:

- The effects of barriers to longitudinal connectivity, as risk may be underestimated if recolonisation processes are impacted by barriers to dispersal.
- Details about how local populations rebound from adversity (or even local extinction), particularly as many high risk assets had long periods (up to 16 years) without receiving their critical water requirements.
- Asset thresholds of concern are currently binary (i.e. pass or fail) whereas current research suggests that these functions follow a more sigmoidal curve. Ongoing research is required to develop more rigorous population models to derive these functions.
- A more transparent process of linking the asset risk back to the values associated with the ecological outcome.

2. Introduction

2.1 Background

Overview

WRPs are subordinate legislation under the Water Act 2000, and are reviewed and replaced every 10 years in accordance with the Statutory Instruments Act 1992 and the Water Act 2000. The Fitzroy WRP 1999 will expire on the 1st September 2010 and must be replaced by a new WRP prior to this date. This report forms one part of the technical assessments undertaken to support the preparation of a water resource plan (WRP) to replace the Water Resource (Fitzroy Basin) Plan 1999 (Fitzroy WRP 1999).

The Fitzroy WRP 1999 was finalised in December 1999 as the first basin-wide plan in Queensland. It was written in response to the Council of Australian Governments' (COAG) 1994 Water Reform Framework Agreement to address a number of water allocation and management issues. The plan initially applied only to water in a watercourse, lake or spring (other than springs connected to artesian water, directly or via subartesian water). In 2005, it was amended by the Water Resource (Fitzroy Basin) Amendment Plan (No. 1) 2005 to include overland flows.

A Technical Advisory Panel (or TAP) was appointed by the department during the development of the Fitzroy WRP 1999 to provide advice on:

- the likely environmental flow requirements of river systems associated with the Fitzroy Basin;
- possible environmental flow management scenarios that might address some of these requirements; and
- the potential ecological implications associated with various combinations of possible future development scenarios and/or environmental flow management scenarios.

The TAP consisted of a range of environmental and other technical specialists, who were considered experts in their fields and had extensive local knowledge of the Fitzroy basin. Assessments made by the panel were expert opinion, based on their experience and comparison to sites under similar water resource development pressures within the catchment or in other catchments. This approach fulfilled the requirements under the 'National Principles for the Provision of Water for Ecosystems' for recommendations on environmental flows to be based on the best scientific information available (ARMCANZ and ANZECC 1996).

The approach of using expert panels for determining environmental flow requirements has been common throughout Australia in the 1990's and into the 21st century. Cottingham et al. (2001) reported that:

“One of the main attractions of Scientific Panels is that they can make decisions or develop recommendations in situations when information on flow–ecology relationships is limited. However, the lack of quantitative information — in particular, information on relationships

between flow and ecology or geomorphology — is also considered to be a common limitation to the Scientific Panel method and similar ‘holistic’ frameworks for determining environmental flows (Arthington 1998).”

The requirement for the ‘best scientific information available’ to determine the duration, frequency, size and timing of water flows is captured in the Water Act (2000), however the Act does not specify how this requirement is to met. While TAPs are still being used by the department to develop new water resource plans, a new approach has been trialled for the review and replacement of the Fitzroy WRP 1999.

This approach involved the department undertaking an assessment of the effectiveness of the current WRP and its implementation through the ROP, based on monitoring and assessment undertaken by the department and others since the development of the first plan. This assessment was then peer reviewed by three eminent scientists for its quality and comprehensiveness, referred to as a Scientific Review Process (or SRP).

Since the development of the first plan, biologists have been employed by the department to monitor the effectiveness of the current flow management strategies in each WRP, as indicated by the requirements of selected ecological assets with critical links to flow. The information gathered from this monitoring program, and other monitoring programs and research undertaken in the catchment now represents the best scientific information available. As such, this information has been drawn together and forms the scientific basis for this report. In addition, the approach used in this report has been peer reviewed by Mark Burgman, Australian Centre of Excellence for Risk Analysis, and the science and assumptions underpinning the assessment has been reviewed by numerous experts at various stages in the process (more information is provided on this later in the report).

The use of data collected as part of a targeted monitoring program to assess the effectiveness of the plan, and review of this assessment by external experts builds on the previous expert panel approach. The rigour of the assessment produced is improved by inclusion of highly relevant and informative data and assessments, and the capture of external scientific information from experts is maintained as part of the process.

Ecological Risk Assessment

An Ecological Risk Assessment (ERA) framework has been used to make an assessment of the effectiveness of the current plan in meeting its stated ecological outcome, using ecosystem values or ecological assets as indicators of the outcome. This approach involves assessing the implications of current and future water management scenarios for the long term viability of ecosystems in the WRP area. A risk assessment approach enables comparison of relative risk from multiple flow management scenarios, including the predevelopment scenario (representing the natural risk to the ecosystem).

Knowledge of the relative impact of flow management on ecosystem outcomes is vital to making informed decisions regarding flow management strategies. Because the risk assessment approach used in this report deliberately isolates the impact of flow management from all other factors impacting ecosystems, the assessment is more informative and targeted to the assessment of flow management strategies than ecosystem condition information alone. The risk assessment considers the impact of flow management on persistence and long term viability of the assets in the WRP area; therefore it captures risk to the long term condition of the ecosystem, in line with the longer timeframe in which the ecological outcomes of the plan are designed to be achieved.

Importantly, the risk assessment approach applied for the Fitzroy WRP environmental assessment considers both likelihood (probability of impact from flow management) and consequence (impact on asset) aspects where possible in making a risk assessment. Where insufficient information was available for the asset to complete an assessment of consequence, only likelihood has been reported and this can be considered a 'hazard' assessment rather than a risk assessment. Where sufficient information was available for both aspects, risk has been reported.

Risk is reported over the timeframe of the assessment period (approximately 100 years) and considers the effect of simultaneous failures in the population over space and time. Therefore there is more realism in the assessment than the qualitative risk assessment undertaken in the asset selection process, and as such this has been termed a 'medium intensity' risk assessment (see Figure 1). Still more complexity and realism is possible by developing a population model, and this has been completed for only one asset, the Fitzroy golden perch. This is a highly resource intensive exercise and as such is termed a 'high intensity' risk assessment (Figure 1).

The advantages of the risk assessment approach presented in this report include that it is much more quantitative than previous assessments, it can be repeated if new information becomes available, it makes use of the best available science which may be data or expert opinion, and the results obtained are comparable for each scenario. Documentation of assumptions and peer review of the assessment reduces the possibility of expert bias, provides transparency and allows validation of the approach and the science underpinning the assessment.

2.2 Objectives

This technical report is the third in a series of technical reports that contribute to the ERA framework, and includes:

- Technical Report 1: Asset Selection Report Fitzroy WRP 1999 (Cockayne 2008) focuses on the selection and prioritisation of the specific ecological values (or assets) that have been used in the ERA.
- Technical Report 2: Summary of monitoring and findings from the Environmental Flows Assessment Program (2004 - 2008) (Espinosa and Cockayne 2009) documents the findings from the monitoring and research undertaken for a specific ecological asset

(Fitzroy Golden Perch) as part of the Environmental Flows Assessment Program (EFAP).

- Technical Report 4: Golden Perch Population Model - Using spatial population dynamics for assessing water resource development (Menke et al., 2009) demonstrates the application of Bayesian Networks to assess the risk, through space and time, to Golden Perch population viability under various flow management options.
- Technical Report 5: Hydrologic Deviation Analysis (Tom & Coysh, 2009) provides the hydrologic context to the risk analysis for the selected ecological assets.
- Technical Report 6: Assessment of the ecological intent behind the Fitzroy Basin Water Resource Plan and Resource Operation Plan Environmental Flow Management Strategies assessed whether the ecological intent behind the Fitzroy Basin WRP and ROP environmental flow management strategies were achieved.
- Technical Report 7: Summary of findings from the environmental assessment of the Fitzroy Basin WRP summarises the results of the above reports.

The objectives of the assessment in this report are to:

- Determine how the ecological assets critical water requirements are provided under the various IQQM scenarios
- Quantify risk posed to the ecological assets
- Identify nodes and periods where scenarios have biggest impact on asset risk
- Identify flows requiring protection under the WRP/ROP
- Develop ecological risk assessment method which can assist the development and review of future WRP/ROP
- Provide direction to future monitoring activities

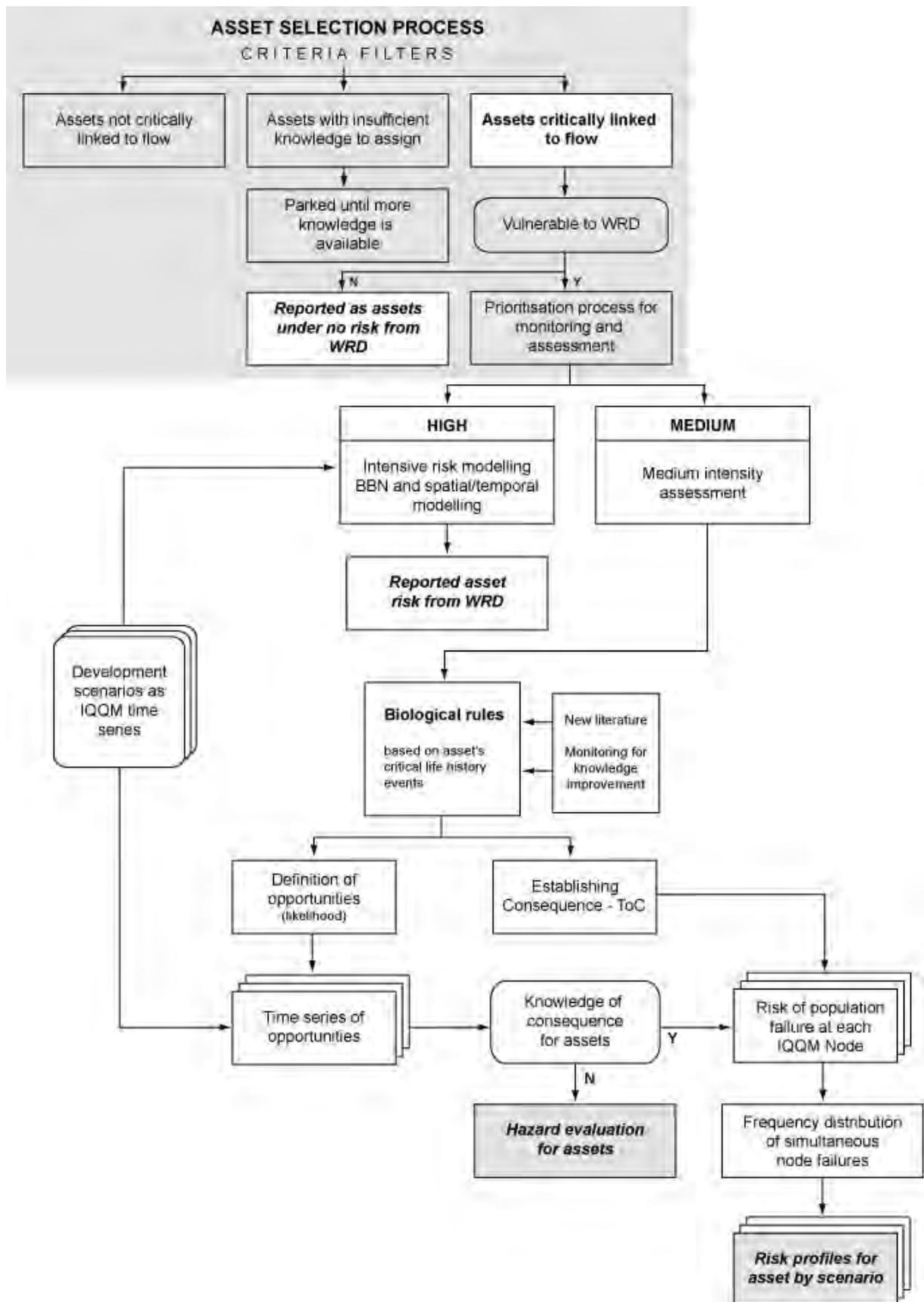


Figure 1: The Ecological Risk Assessment (ERA) framework

2.3 Rationale

The quantification of ecological responses to altered flow regimes is typically compromised by both confounding stressors and by the complex nature of the relationships between flow and ecology. The setting is critical to understanding these relationships and in most cases direct relationships between flow regime change and ecological condition (i.e. ecological health) are not measurable. This is supported by the outcomes of two large-scale studies conducted by DERM in the Condamine-Balonne and Fitzroy River catchments (Marshall & Negus, 2003; Marshall et al 2003; Negus et al 2003; Condamine refs needed).

These two studies investigated the responses of multiple ecological condition indicators to gradients of flow alteration and both demonstrated that community and process based ecological condition indicators did not respond to flow change in a predictable way (Negus et al. 2004). Thus such an approach can not inform flow management decisions. This result is corroborated by a global literature review (Poff and Zimmerman, 2007) which concluded that general, quantitative patterns between flow alteration and ecological responses are not strongly evident.

The absence of predictable ecological responses to flow modification is, in part, due to the influences of confounding stressors (e.g. land use gradients often correlate with gradients of flow alteration), but fundamentally it is because biota do not experience or respond directly to hydrology. Rather, flow interacts with other features to produce physical, chemical and biological conditions which biota perceives and which elicit ecological responses (Figure 2). Fish, for example, do not perceive mean annual discharge, but they do perceive depth, velocity and water temperature and react to these in measurable and predictable ways.

So, in order to inform the management of flow regimes to achieve ecological outcomes, we must abandon the notion of seeking direct flow-ecology relationships and focus our attention on understanding what conditions elicit ecological responses and how flow interacts with other aspects of the local setting to provide these conditions. The interactions between particular responses and the conditions that trigger them should be general and transferable. In contrast, the provision of the necessary conditions that is created by the flow regime interacting with other influences is a function of setting and thus is not transferable.

Because responses are also influenced by stressors other than flow alteration, it does not necessarily follow that good flow management will necessarily elicit the intended ecological outcome. Consequently it is not possible to evaluate the effectiveness of flow management by measuring the occurrence or the intensity of ecological responses. Even if flow management is ideal the response may not occur because of another stressor. For this reason the ecological implications of flow management should be determined and assessed by evaluating the provision of the flow-related conditions required for the response.

In this assessment, we apply this logic using ERA to assess the risk to specific ecological values that are linked to ecological responses that rely upon critical flow-related conditions. Relative risk to the ecological values between the predevelopment flow regime (as a reference) and the flow regimes generated by different management options are used as indices of ecological outcomes from management. This approach accounts for both the potential influence of confounding stressors and the complex relationships between flow, setting and ecology.

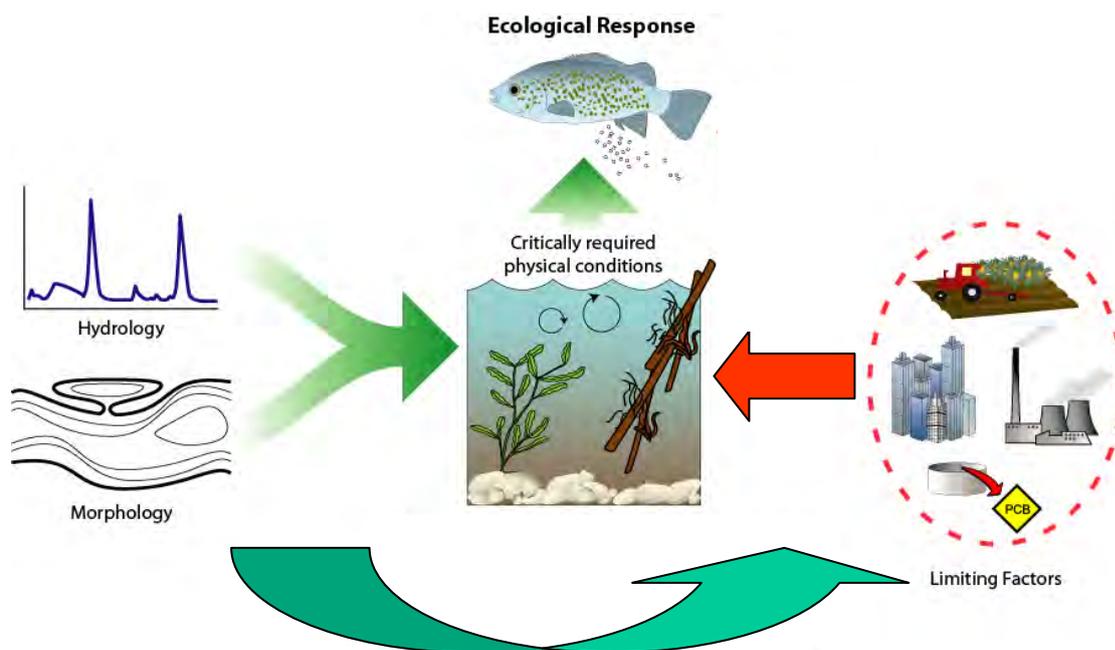


Figure 2: Ecological responses occur in reaction to the physical and chemical conditions experienced by biota, not directly to altered flow regimes. Altered flows influence ecology by interacting with various other properties of the setting to modify the conditions the biota experience. To understand ecological responses to flow modification one must first understand the relationships between physical/chemical conditions and the ecological response, and second, understand the relationship between flow and the provision of these conditions. Stressors other than altered flow may also influence the response, so the effectiveness of flow regime restoration or protection can not be judged directly by the occurrence or intensity of a response. Rather, it must be judged by evaluating the provision of the flow-related conditions necessary for the response to occur.

3. Methodology

3.1 A ‘medium intensity’ assessment of the risk flow management poses to asset viability

The assessment approach described herein is termed ‘medium intensity’ to differentiate it from the high intensity method exemplified by the Fitzroy Golden Perch Bayesian population viability model (Menke et al 2009) and the low intensity risk assessment used to prioritise assets and identify those at no risk from flow management (Cockayne, 2008) (Figure 1- Medium intensity assessment). This approach is based on methods and ideas developed for population viability analysis and is formalised through the construction of conceptual models, knowledge acquisition, and the construction of semi-quantitative and quantitative population models. It recognises that in most cases there will be a paucity of information on the assets of interest and provides a framework for the clarification of assumptions and integration of knowledge from all available sources. The quantitative risk assessment is the most rigorous, requiring the highest data quality, and model building effort (see Menke et al 2009). This section describes the generic method applied to all assets. Specific details of its application to each individual asset are provided in sections of the report relating to the assets.

The starting point for this process is the selection of ecological assets (with their critical links to flow and the values they support) that have been identified by the asset selection process (Cockayne, 2008) as being of potential risk from flow management in the Fitzroy WRP area. It is important to recognise the general mechanisms by which flow management may influence these assets and their associated values (see Introduction). These are not direct relationships, but rather are two step processes whereby firstly flow management provides opportunities for the responses of individual organisms at particular places and times and secondly the frequency and sequence of opportunities determines population responses and thus the viability of values.

3.2 Time series of opportunities

Opportunities for individuals to respond depend upon provision of suitable environmental conditions for the response. These conditions can be considered as triggers and be defined by a set of biological rules (see Figure 1- Biological rules). For assessing the risk posed by flow management, these biological rules are expressed in terms of facets of the flow regime (magnitude, duration, timing, rate of change and quality) and are specified based on best current understanding of the biology of the species being considered. Note that frequency is not included in this set of facets, as frequency typically influences population rather than individual organism responses. In such a case that frequency is known to influence individual responses it should also be included in rule sets to define triggers.

Once individual response triggers are defined, the rules that represent them are applied to a time-series of flow data. The output of this process is a time series of opportunities for the response of interest for each flow time-series (see Figure 1- Definition of opportunities (likelihood)). Because each record (e.g. day) in the time series will either pass or fail the rules as they are defined, the time-series of opportunities will be binary (i.e. 1- opportunity provided or 0- opportunity not provided). For WRP assessment, time-series will represent chosen places

(nodes) in a river network and particular flow management scenarios. They may be a series of gauged or modelled flow. For each node, modelled daily flow sequences representing the pre-development situation (the pre-development case approximating the natural flow regime), current management practices (herein referred to as the current development scenario) and future management practices (herein referred to as the full development scenario) are the minimum set required for this project and a record of approximately 100 years or more is desirable. Alternative management scenarios such as climate change scenarios may also be included.

3.3 Ecological Values

The ecological values associated with the asset that society wishes to maintain are clearly identified. Two examples of such values are Barramundi population persistence and Barramundi for fishing. Values may be broken-down into criteria and sub-criteria that reflect the independent elements that make up the value (Figure 3). It is important that the criteria and sub-criteria are representative of the value and do not repeat or over emphasise any aspects.

It is also important to be both spatially and temporally explicit when defining values. Where in the plan area and when should they be provided? For example, if society values persistence throughout the historical species range of an asset, then the status of the species and its component criteria (number of individuals, age class, patch occupancy) must be maintained at all times and at all nodes.

The relevance of the criteria may vary at different spatial scales – such as when considering values at a node as opposed to over the entire WRP area. For example, patch occupancy is important to consider across the whole plan area, but can be discounted at individual nodes because it is represented by the number of individuals at the node (i.e. one or more individuals present equates to occupancy).

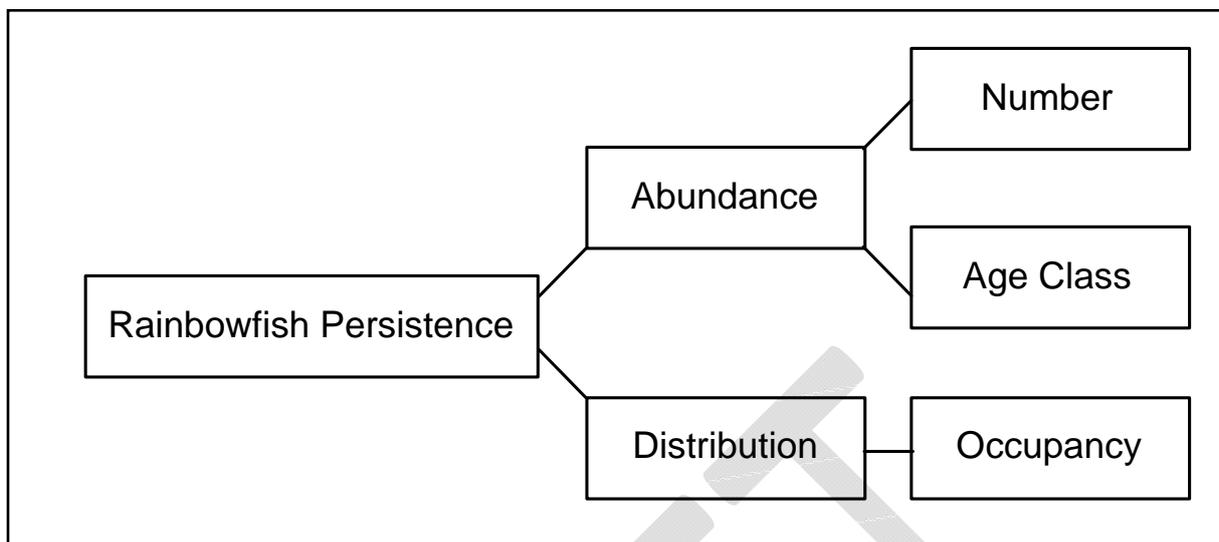


Figure 3: For an ecological value (e.g. Rainbowfish persistence) a breakdown of the criteria (abundance and distribution) and sub-criteria (number, age class, occupancy) that contribute to its value indicates aspects that need to be considered when assessing how flow management provides for that value.

3.4 Thresholds of Concern (ToC)

The next step is to identify aspects of the availability of opportunities that define the flow-related requirements to maintain the asset value (see Figure 1- Establishing consequence ToC). For instance, important aspects when considering the value ‘rainbowfish persistence’ may be (1) the frequency of opportunities within spawning seasons and (2) the duration of spells without opportunity in relation to reproductive longevity. These relate to aspects of the frequency and sequence of opportunities over the duration of the time-series. The reproductive longevity of the species is also a key consideration here, as spells without opportunities which exceed this period represent an obvious failure point for species-related values. Critical thresholds which represent acceptable upper and lower levels of change in these opportunities to prevent potential population failure are termed “Thresholds of Concern” (ToC) (after Rogers and Biggs 1999). They are asset-specific hypotheses of the limits of acceptable change following exposure to a known stressor. As such they represent scientifically described endpoints which have been derived using the full extent of the current knowledge base, and are integrated with research and monitoring processes to ensure that there is a continuous testing of their validity. By applying these thresholds to time series of opportunities, likelihood and consequence are in effect integrated to model relative risk.

In order to estimate risk at a node posed by flow management scenarios, the frequency of opportunities estimated from the pre-development (PWRD) scenario is subtracted from the frequency of opportunities from the current and full development scenarios. Frequency analyses of threshold exceedence can then calculate risk statistics for each development scenario at each node. These statistics represent the risk over time of loss of values at nodes from flow scenarios.

3.5 Spatial Integration of Risk

The risk to the maintenance of values across the entire plan area (rather than at each node as above) needs to be considered for values that are relevant (and thus defined) at scales broader than individual nodes. This is considered by integrating potential failure at the nodes (e.g. local population abundance falling below a critical threshold abundance) across all relevant nodes in order to identify potential simultaneous failure across space. This analysis utilises the temporal sequence of risk generated by a particular IQQM scenario across all nodes to identify the spatial and temporal patterns of potential failure (Figure 4). Aspects of value resilience (capacity to recover from local failure) need to be considered when evaluating the plan-scale implications of local failures. The impacts of artificial barriers to movement will be important for many values as they may restrict recolonisation. Note that such barriers are absent for the PWRD case.

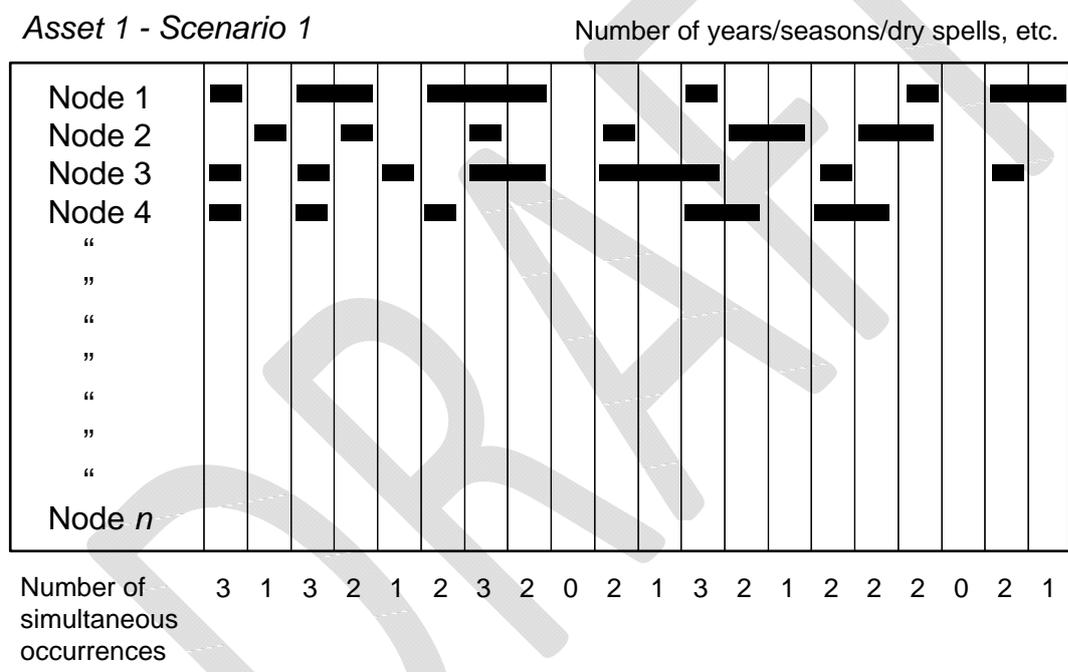


Figure 4: A hypothetical example of analysis of temporal sequences of potential loss of a value across multiple nodes to identify simultaneous potential loss within a WRP area. This example is for a single IQQM scenario. The black bars indicate periods of potential failure for each node, with the horizontal axis representing time. The actual time scale will vary to match the definition of asset failure but the analysis will be conducted over the entire IQQM simulation period.

3.6 Risk interpretation

Interpretive narratives for each asset contrast the various IQQM scenarios with the PWRD case in terms of the risk they pose to the maintenance of asset values. They highlight the risk factors in terms of the spatial distribution of risk across nodes and in terms of flow facets (magnitude, frequency, duration, timing, rate of change). Interpretation of the effects of

development scenarios on asset values should be robust so that a lack of better scientific knowledge does not result in inappropriate management decisions and lead to unintended loss of values.

Interpretive narratives also highlight how flow could be changed to decrease the risk to values where it is assessed to have been elevated from the PWRD case and encompass both node-specific and broader catchment issues. This will inform the development of alternative flow management scenarios.

3.7 Acceptable change in ecological values and setting plan targets

The risk assessments for asset values can be used by water planners to inform the process of setting environmental security targets for asset values. These could be expressed in terms of minimum levels of acceptable risk for value measures at each node and across the WRP area. The definition of acceptable risk is not a scientific decision but a social/political one and such targets should be developed in consultation with plan stakeholders. All ecological and economic/social values that are influenced by the WRP should be considered simultaneously and formally when setting targets so that acceptable balances can be found in a transparent and accountable way and so that trade-offs can be fully understood by stakeholders.

3.8 Assumptions

Core assumptions that underpin this approach include:

1. The flow regime as expressed at the WRP reporting nodes represents the flow regime in the WRP area;
2. IQQM development scenarios represent the flow regime that will actually be generated by management under the ROPs (including timing of extraction/supplementation)
3. Effects of barriers to longitudinal connectivity are not explicitly considered in the development cases. Risk to assets may be underestimated if recolonisation processes are impacted by barriers to dispersal.
4. The suite of assets being assessed across the various ecosystem components are representative indicators of the altered flow regime.

3.9 Assessment summary

Ecological Assets and links to flow

Table 2 provides a summary of the full list of ecological assets and their links to three flow categories. The table indicates the assets that were selected for the ecological risk assessment described in this report. These assets were deemed suitable as there is sufficient knowledge on their life history traits and critical links to flow. Translocated assets were excluded from the risk assessment. A total of 26 assets were used in the risk assessment.

Both riffles and waterholes have been linked to the cease to flow category (Table 2). These assets and a number of freshwater fish, the low flow spawners, have also been linked with the low flows. The medium to high flows are represented by the high flow freshwater fish spawners, wetlands, regional ecosystems and assets within the estuarine and marine fisheries group.

Flow Scenarios

Table 3 details the location and simulation periods of the modelled scenarios used in the risk assessment. It also lists the relevant assets that were analysed at each node or site. The major points to note are:

- The full simulation period (i.e. from 1900) was not used for Nodes 8 and 9 due to low confidence in the modelled flows that occurred before the commencement of gauged records.
- Data from Node 3 Don River at Rannes was unavailable

Table 2: List of the ecological assets and their links to three flow categories; cease to flow, low flow and medium to high flows. The table also indicates the assets that were included in the detailed ecological risk assessment.

Ecological Asset	Common Name	Detailed Assessment	Asset Link to Flow Regime Category		
			Cease to flow	Low flow	Med-High (incl. flood flows)
Freshwater Fish					
<i>Ambassis agassizii</i>	Olive perch	✓		✓	
<i>Amniataba percoides</i>	Barred grunter	✱✱		✓	
<i>Anguilla obscura</i>	Pacific shortfinned eel			✓	✓
<i>Anguilla reinhardtii</i>	Longfinned eel	✱✱		✓	✓
<i>Bidyanus bidyanus</i>	Silver perch	✱^		✓	✓
<i>Hephaestus fuliginosus</i>	Sooty grunter	✱^		✓	✓
<i>Macquaria ambigua orientalis</i>	Golden perch	✓		✓	✓
<i>Melanotaenia splendida splendida</i>	Eastern rainbowfish	✓		✓	
<i>Mogurnda adspersa</i>	Purple-spotted gudgeon	✓		✓	
<i>Neosilurus alter</i>	Black catfish	✓		✓	✓
<i>Neosilurus hyrtlii</i>	Hyrtl's catfish	✓		✓	✓
<i>Notesthes robusta</i>	Bullrout	✱✱		✓	
<i>Scortum hillii</i>	Leathery grunter	✓			✓
<i>Tandanus tandanus</i>	Freshwater catfish	✱✱		✓	
Riparian Vegetation (Regional Ecosystems)					
11.3.1, 11.3.3, 11.3.4, 11.3.15, 11.3.21, 11.3.25, 11.3.27, 11.3.37, 11.4.11		✓			✓
Habitat					
Riffles as habitat		✓	✓	✓	
Waterholes as refugia		✓	✓	✓	
Wetlands					
Yeppen Lagoon (Fitzroy)		✓			
Frogmore & Woolwash Lagoon (Fitzroy)		✓			✓
Horseshoe Lagoon (Fitzroy)		✓			✓
Dawson/Mackenzie floodplain confluence (Fitzroy)		✓			
10 Mile & associated floodplain (Mackenzie)		✓			✓
Lake Mary (Mackenzie)		✓			✓
Pink Lily (Mackenzie)		✓			
Lake McDonald (Mackenzie)		✓			
Duckponds Lagoons (LHB) (Nogoa)		✓			✓
Duckponds Lagoons (RHB) (Nogoa)		✓			
Bears Lagoon/Maloney Creek (Dawson)		✓			
Isla Delusion floodplain wetlands and lagoons (Dawson)		✓			✓
Boam Creek Anabranche (Dawson)		✓			✓
Eurombah Crossing anabranches, billabong & floodplain (Dawson)		✓			
Estuarine/Marine Fisheries					
<i>Lates calcarifer</i>	Barramundi				✓
<i>Mugil cephalus</i>	Striped mullet	✱✱		✓	✓
<i>Penaeus merguensis</i>	Banana prawn	✓			✓
<i>Polydactylus macrochir</i>	King threadfin salmon	✓			✓
Offshore catch Capricorn Bunker Group (GBR)		✓			✓
✱✱ - excluded as insufficient data					
✱^ - excluded as translocated species					

Table 3: Details on asset groups analysed and analysis period at each flow scenario locations.

Node	Location of modelled scenarios	Analysis period	Asset group analysed
0	Fitzroy River at Barrage	01/01/1900 - 31/12/2007	Estuarine and marine fisheries; wetlands
1	Fitzroy River at Eden Bann Weir	01/01/1900 - 31/12/2007	Low and high flow spawners; wetlands
n/a	Fitzroy River at Eden Bann Weir Inflow	01/01/1900 - 31/12/2007	Waterholes; riparian vegetation communities
n/a	Dawson River at Boolburra	01/01/1900 - 15/03/2008	Waterholes; riffles
2	Dawson River at Beckers	01/01/1900 - 15/03/2008	Low flow spawners; riparian vegetation communities
4	Dawson River at Woodleigh	01/01/1900 - 15/03/2008	Low flow spawners; riparian vegetation communities; riffles; waterholes; wetlands
5	Dawson River at Glebe Weir tailwater	01/01/1900 - 15/03/2008	Low flow spawners
n/a	Dawson River at Isla Delusion	01/01/1900 - 15/03/2008	Riparian vegetation communities; waterholes; riffles; wetlands
6	Dawson River at Taroom	01/01/1900 - 15/03/2008	Low and high flow spawners; waterholes; riffles
n/a	Dawson River at Baroondah	01/01/1900 - 15/03/2008	Riffles
7	Dawson River at Utopia Downs	01/01/1900 - 15/03/2008	Low flow spawners; wetlands
8	Mackenzie River at Coolmaringa	01/01/1972 – 31/12/2007	Waterholes; riffles; wetlands; Riparian vegetation communities
9	Isaac River at Yatton	01/01/1963 – 31/12/2007	
10	Mackenzie River at Bingegang Weir tailwater	01/01/1900 - 31/12/2007	Low flow spawners; riparian vegetation communities; riffles
11	Mackenzie River at Carnangarra	01/01/1900 - 31/12/2007	Low flow spawners; waterholes; riffles; wetlands; riparian vegetation communities
12	Comet River at Comet Weir tailwater	01/01/1900 - 31/12/2007	Low flow spawners; riparian vegetation communities
13	Comet River at 124.2 km AMTD	01/01/1900 - 31/12/2007	Low flow spawners; riparian vegetation communities
14	Theresa Creek at Main Road	01/01/1900 - 31/12/2007	Low flow spawners
n/a	Nogoa River at Bridge Flat Rd	01/01/1900 - 31/12/2007	Riparian vegetation communities
15	Nogoa River at Fairbairn Dam tailwater	01/01/1900 - 31/12/2007	Low flow spawners; wetlands; riparian vegetation communities
n/a	Nogoa River at Fairbairn Dam inflow	01/01/1900 - 31/12/2007	Waterholes

4. Ecological Asset Assessment

4.1 Low Flow Spawning Fish Species

Methods

Quantitative information about the spawning requirements of *Ambassis agassizii*, *Mogurnda adspersa* and *Melanotaenia splendida splendida* are available from studies conducted in the wild (Milton & Arthington, 1984; Humphrey *et al.*, 2003; Pusey *et al.*, 2004) and in aquaria (Leggett & Merrick, 1987). There are however, no documented studies conducted on these species in the Fitzroy Basin. The information available suggests that all three species have an extended spawning season from spring through to autumn, with a concentrated spawning effort between spring and early summer. It is generally accepted that spawning corresponds with increasing water temperatures and stable water levels, however this may vary between river basins (Pusey *et al.*, 2004).

Spawning occurs in aquatic macrophytes and submerged marginal vegetation and on the substrate (Pusey *et al.*, 2004). In the Fitzroy Basin, most spawning sites are restricted to the marginal habitat (otherwise known as edge habitat) which comprises of root masses from trees and trailing vegetation, leaf litter and woody debris. All three species are batch spawners and have the ability to spawn repeatedly over an extended period, with females depositing upwards of 120 eggs per day for several consecutive days (Pusey *et al.*, 2004). Eggs are attached to the marginal habitat structure where they remain until hatching. The larval period extends from 20-60 days (Pusey *et al.*, 2004). The approach undertaken to identify potential changes to flooding frequencies of low flow spawning fish is summarised below in Figure 5.

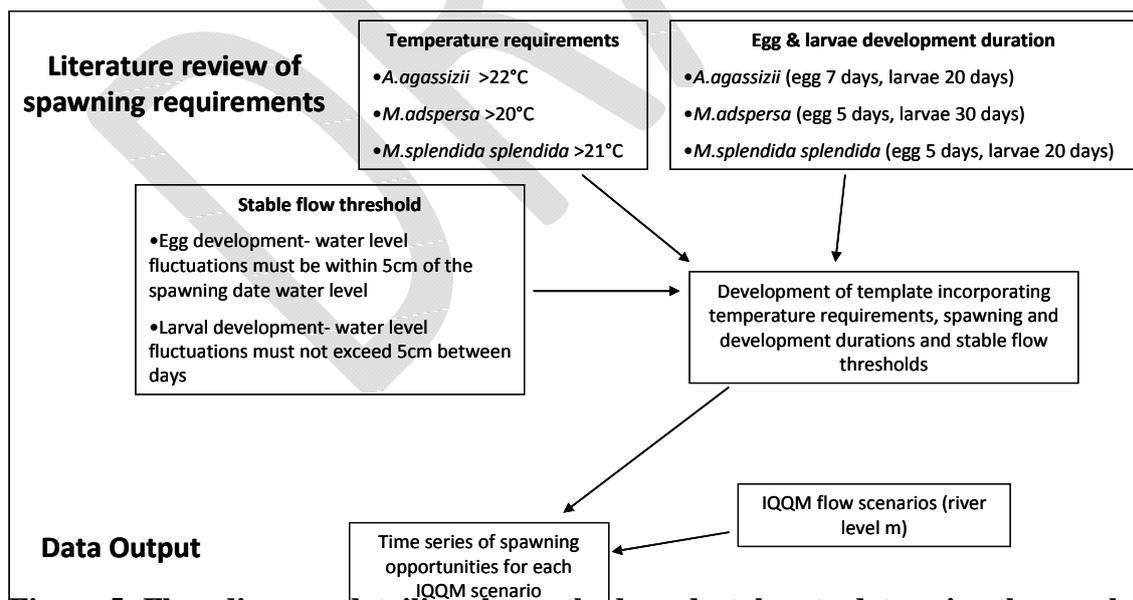


Figure 5: Flow diagram detailing the methods undertaken to determine the number of spawning opportunities per season for low flow spawning fish species

In calculating of the number of spawning opportunities the following spawning requirements were considered:

- Spawning stimulus of a rise in water temperature: 22°C for *A.agassizii*, 20°C for *M.adspersa* and 21°C for *M.splendida splendida*
- Duration of egg and larval development: Egg development of 7 days for *A.agassizii*, 5 days for *M.adspersa* and 5 days for *M.splendida splendida*. Larval development of 20 days for *A.agassizii*, 30 days for *M.adspersa* and 20 days for *M.splendida splendida*
- Stable flow conditions throughout the egg and larval development period

The spawning period for each of the species was derived from water temperature data collected from DERM gauging stations (Appendix A). At each site, an annual water temperature graph, with a daily time step, was plotted using the mean daily water temperatures for each corresponding day over the given period of record. This revealed that all species are likely to spawn during the same months, with spawning beginning in October for all sites and ending in April for sites in the upper catchments (upper Dawson, upper Mackenzie, Nogoia and Comet), May in the middle reaches of the basin (mid-lower Dawson and mid-lower Mackenzie) and June in the Lower parts of the basin (Fitzroy) (Appendix B).

Whilst stable flow conditions are often cited as a requirement of low flow spawning fish, an actual threshold of water level stability for such fish has not been documented. Consequently an average water level rate of change threshold of <0.05m/day (range of 0.01 to 0.1 m/day) was developed for this assessment. This threshold was calculated from the average rate of water level fluctuations observed during stable flow periods of the pre-development scenario, and the potential effects of water level fluctuations on the availability of species' egg laying and spawning habitat (i.e. marginal habitat) for all sites. This rate of change was deemed to have minimal effect on the egg laying and spawning habitat of the low flow spawning fish species. It was assumed that any rate of change greater than 0.05 m/day would cause a negative impact on the availability of spawning habitat.

The application of the water level fluctuation threshold was altered for the egg and larval development phases. The strategy of attaching eggs to a fixed structure results in eggs not being able to move with fluctuations in water level. Consequently, any change in water level from the date they were laid may affect egg viability. To address this, the water level fluctuation threshold was applied from day one of laying eggs and, to ensure egg viability, any change in water level would be required to be within ± 0.05 m of the day one water level over the egg duration period.

Whilst larvae are active and able to freely move with changes to water level, they still require the marginal habitat as a refuge against predators and adverse environmental variables. Fluctuations in water level can occur, but not in a manner which would limit available refuge or their ability to move to refuge. Therefore, the rate of change between two consecutive days must not exceed the threshold of 0.05 m/day during the larval development period. Thus a gradual rate of increase or decrease is acceptable, but only when the rate of change between days does not exceed 0.05 m/day.

Templates were created using Microsoft Excel© which integrated daily IQQM flow scenarios (back calculated to level in metres) and recruitment opportunity sub-routines, which included the spawning season, egg and larval development durations and acceptable rates of change thresholds. The recruitment opportunity sub-routine was developed such that all three requirements (i.e. spawning season, egg and larval development duration) must be met before recruitment was considered a success.

The recruitment opportunity template was applied to the three IQQM scenarios (pre-development, current development, full development) to generate three daily time series of recruitment opportunities for each node. This was summarised across the entire simulation period to highlight broad differences between the pre-development and each development scenario. The likelihood of water resource development affecting the persistence of populations at each node was calculated as the number of annual recruitment opportunities in the simulation period for each scenario.

A threshold of concern (ToC) was defined to assess the consequence of altering recruitment opportunities for the local (node) population persistence. A theoretical relationship between the annual provision of recruitment opportunity and population maintenance was calculated based on population attributes derived from the literature where possible. Where these parameters were not available it was estimated using a four-step interval elicitation procedure (Speirs-Bridge *et al.* 2008). The ToC was based on the number of annual recruitment opportunities required to maintain equilibrium in the local population size. If the number of annual recruitment opportunities is lower than this threshold, the population abundance is assumed to decline, thus representing a potential threat to the persistence of the local population (Appendix C). Based on the three year reproductive longevity of the species (Pusey *et al.* 2004), it was assumed that three consecutive years with fewer opportunities than the ToC represents a significant threat to the persistence of a local population (i.e. potential local population failure).

The occurrence of three or more consecutive years with fewer opportunities than the ToC was examined for each IQQM scenario. This identified the frequency of potential local population failures for the three cases (pre-development scenario and the two development scenarios).

Risk to the species' persistence across the plan area was assessed by identifying simultaneous occurrences of potential local population failure across multiple nodes. This risk was categorised based on the percentage of nodes experiencing simultaneous potential local population failures (high: $\geq 75\%$, moderate: 50 – 74%, low: $<50\%$). Risk was summarised for each IQQM scenario as the percentage of years in each category. Risk from water resource development was interpreted as a change in the risk profiles (i.e. relative proportion of each risk category) between the pre-development scenario and the two development scenarios.

Results

Ambassis agassizii

Individual nodes experienced increases and decreases in the total number of recruitment opportunities across the simulation period with percentage deviation from the pre-development case ranging between 205% and -51% (Table 4). Annual provision of spawning opportunities showed little variation between scenarios overall (Figure 6), or for many individual nodes (Appendix D). Exceptions included the Dawson River at Woodleigh and at Beckers and the Nogoia River downstream of Fairbairn Dam where the current and full development cases provide greater recruitment opportunities than the predevelopment case. Also, in the Dawson River at Glebe and at Taroom where the full development case provides reduced recruitment opportunities compared to the predevelopment case.

The frequencies of potential local population failures in the current and full development scenarios with respect to the pre-development case were generally either reduced (green shading) or remained unchanged (no shading) (Table 5 and Table 6). The exceptions to this where the comparative prediction was for increased potential local population failures under the development scenarios included Mackenzie River at Carnangarra, Fitzroy River at Wattlebank and Theresa Creek at Gregory Highway.

Across the entire Fitzroy WRP area the risk to *A.agassizii* persistence from water resource management was predicted to be low for both management scenarios as there were no changes to their risk profiles from the predevelopment case (Figure 7). There were never more than 50% of nodes predicted to have simultaneous potential local population failures for any of the three scenarios.

These results suggest that the value of a persistent population of *A.agassizii* in the Fitzroy WRP area is not threatened by either of the two development scenarios evaluated.

Table 4: Total percent deviation of *Ambassis agassizii* recruitment opportunities between IQQM scenarios (green shading: 0% to ± 5%; yellow shading: ±5% to ±15%; orange shading: ±15% to ±25%; red shading: >±25%)

River	Node	<i>Ambassis agassizii</i> total number of recruitment opportunities		
		Pre-development	Current development	Full Development
Fitzroy	Wattlebank (Node 1)	1403	1066	1096
	% change from pre-development		-24%	-22%
	% change from current development			3%
Mackenzie	Bingegang (Node 10)	4307	5039	5060
	% change from pre-development		17%	17%
	% change from current development			0%
	Carnangarra (Node 11)	2185	1523	1523
	% change from pre-development		-30%	-30%
Theresa	Gregory Highway (Node 14)	8994	9551	9551
	% change from pre-development		6%	6%
	% change from current development			0%
Nogoa	Downstream Fairbairn Dam (Node 15)	5538	9863	9862
	% change from pre-development		78%	78%
	% change from current development			0%
Comet	Comet Weir (Node 12)	9435	9777	9777
	% change from pre-development		4%	4%
	% change from current development			0%
	Comet Lake (Node 13)	8314	8374	8374
	% change from pre-development		1%	1%
Dawson	Beckers (Node 3)	3727	5362	4641
	% change from pre-development		44%	25%
	% change from current development			-13%
	Woodleigh (Node 4)	2123	2345	4149
	% change from pre-development		10%	95%
	% change from current development			77%
	Glebe (Node 5)	6437	5044	3147
	% change from pre-development		-22%	-51%
	% change from current development			-38%
	Taroom (Node 6)	5858	4574	4574
	% change from pre-development		-22%	-22%
% change from current development			0%	
Utopia Downs (Node 7)	2940	2782	2782	
% change from pre-development		-5%	-5%	
% change from current development			0%	

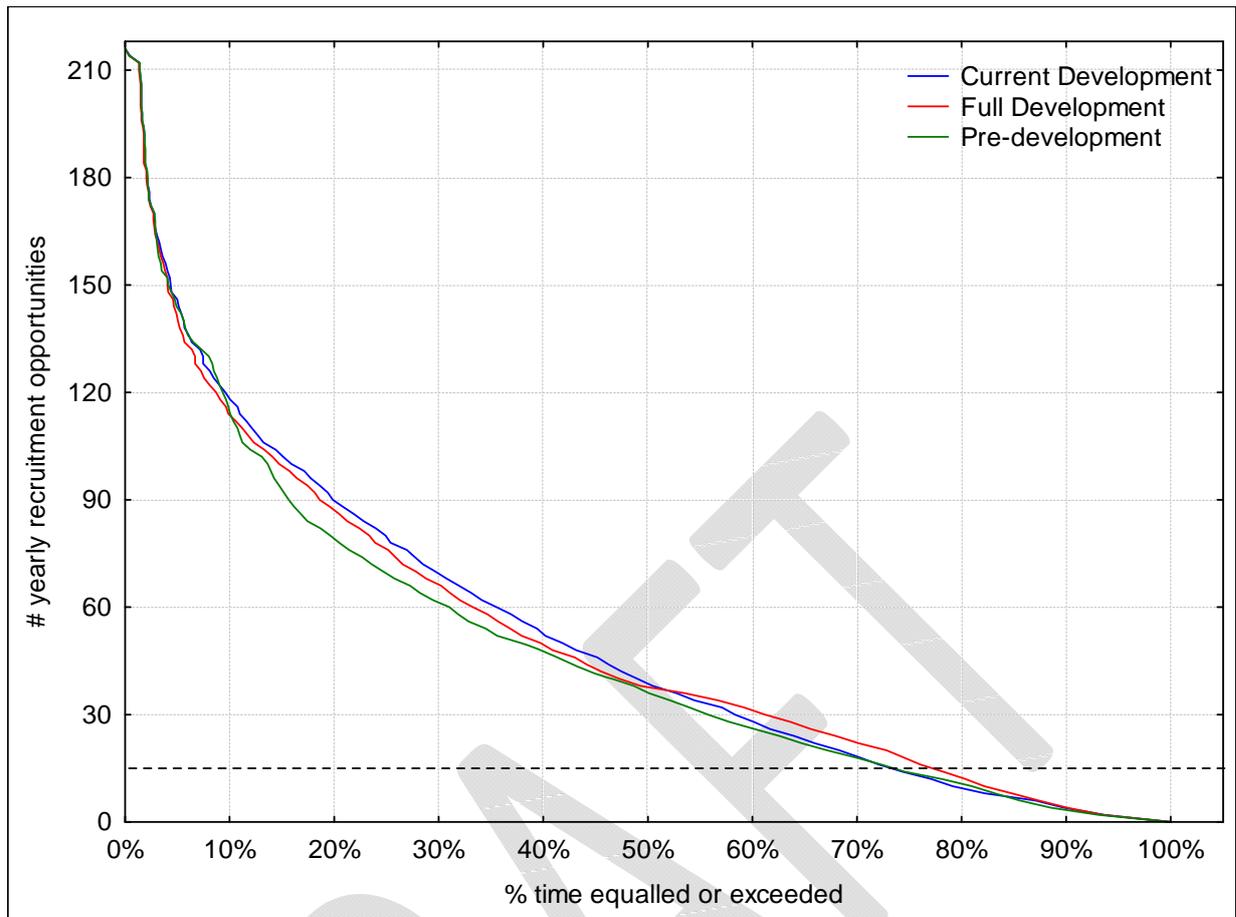


Figure 6: Cumulative frequency plot of *Ambassis agassizii* annual recruitment opportunities across all sites (nodes). Dashed line indicates the threshold of concern (15 or more opportunities per annum), necessary to maintain population equilibrium.

Table 5: Differences in *Ambassis agassizii* predicted potential local (node) population failures for the current development scenario in comparison with the predevelopment scenario (0 = no change; -1= current development with reduced prediction of population failure (green); 1 = current development with increased prediction of population failure (red)).

3 year sequence	Beckers	Bingegang	Carnagarra	Comet Lake	Comet Weir	dnst Fairbairn Dam	Glebe	Taroom	Theresa Ck	Utopia	Wattlebank	Woodleigh
1901_1903	0	0	0	0	0	0	0	0	0	0	1	0
1902_1904	0	0	0	0	0	0	0	0	0	0	-1	0
1903_1905	0	0	0	0	0	0	0	0	0	1	-1	0
1904_1906	0	0	0	0	0	0	0	0	0	0	-1	0
1905_1907	0	0	0	0	0	0	0	0	0	0	1	0
1906_1908	0	0	0	0	0	0	0	0	0	0	0	0
1907_1909	0	0	0	0	0	0	0	0	0	0	-1	0
1908_1910	0	0	0	0	0	0	0	0	0	0	-1	1
1909_1911	0	0	0	0	0	0	0	0	0	0	-1	1
1910_1912	0	0	0	0	0	0	0	0	0	0	-1	1
1911_1913	0	0	0	0	0	0	0	0	0	0	-1	0
1912_1914	0	0	0	0	0	0	0	0	0	0	-1	0
1913_1915	0	0	0	0	0	0	0	0	0	0	1	0
1914_1916	0	0	0	0	0	0	0	0	0	0	0	0
1915_1917	0	0	0	0	0	0	0	0	0	0	0	0
1916_1918	-1	0	0	0	0	0	0	0	0	0	-1	0
1917_1919	0	0	0	0	0	0	0	0	0	0	-1	1
1918_1920	0	0	0	0	0	0	0	0	0	0	0	0
1919_1921	0	0	0	0	0	0	0	0	0	0	0	0
1920_1922	0	0	0	0	0	0	0	0	0	0	0	0
1921_1923	0	0	0	0	0	0	0	0	0	0	0	0
1922_1924	0	0	0	0	0	0	0	0	0	0	-1	0
1923_1925	0	0	0	0	0	0	0	0	0	0	-1	0
1924_1926	0	0	0	0	0	0	0	0	0	0	-1	0
1925_1927	0	0	0	0	0	0	0	0	0	0	0	0
1926_1928	0	0	0	0	0	0	0	0	0	0	0	-1
1927_1929	0	0	1	0	0	0	0	0	0	0	0	0
1928_1930	0	0	0	0	0	0	0	0	0	0	0	0
1929_1931	0	0	0	0	0	0	0	0	0	0	1	0
1930_1932	0	0	0	0	0	0	0	0	0	0	1	0
1931_1933	0	0	0	0	0	0	0	0	0	0	1	0
1932_1934	0	0	1	0	0	0	0	0	0	0	0	0
1933_1935	0	0	1	0	0	0	0	0	0	0	0	0
1934_1936	0	0	1	0	0	0	0	0	0	0	0	0
1935_1937	0	0	0	0	0	0	0	0	0	0	0	0
1936_1938	0	0	0	0	0	0	0	0	0	0	0	1
1937_1939	0	0	0	0	0	0	0	0	0	0	0	0
1938_1940	0	0	0	0	0	0	0	0	0	0	1	0
1939_1941	0	0	0	0	0	0	0	0	0	0	-1	0
1940_1942	0	0	0	0	0	0	0	0	0	0	0	0
1941_1943	0	0	0	0	0	0	0	0	0	0	1	0
1942_1944	0	0	0	0	0	0	0	0	0	0	1	0
1943_1945	0	0	0	0	0	0	0	0	0	0	-1	0
1944_1946	0	0	0	0	0	0	0	0	0	0	-1	-1
1945_1947	0	0	0	0	0	0	0	0	0	0	-1	-1
1946_1948	0	0	1	0	0	0	0	0	0	0	0	0
1947_1949	0	0	0	0	0	0	0	0	0	0	0	0
1948_1950	0	0	0	0	0	0	0	0	0	0	0	0
1949_1951	0	0	0	0	0	0	0	0	0	0	1	1
1950_1952	0	0	0	0	0	0	0	0	0	0	0	0
1951_1953	0	0	0	0	0	0	0	0	0	0	0	0
1952_1954	0	0	1	0	0	0	0	0	0	0	1	0
1953_1955	0	0	1	0	0	0	0	0	0	0	-1	0
1954_1956	0	0	1	0	0	0	0	0	0	0	0	0
1955_1957	0	0	1	0	0	0	0	0	0	0	1	0
1956_1958	0	0	1	0	0	0	0	0	0	0	1	0
1957_1959	0	0	1	0	0	0	0	0	0	0	0	0
1958_1960	0	0	1	0	0	0	0	0	0	0	0	0
1959_1961	0	0	1	0	0	0	0	0	0	0	1	1
1960_1962	0	0	0	0	0	0	0	0	0	1	1	0
1961_1963	0	0	0	0	0	0	0	0	0	1	1	1
1962_1964	0	0	0	0	0	0	0	0	0	0	-1	-1
1963_1965	0	0	0	0	0	0	0	0	0	0	-1	0
1964_1966	0	0	0	0	0	0	0	0	0	0	0	0
1965_1967	0	0	0	0	0	0	0	0	0	0	0	0
1966_1968	0	0	0	0	0	0	0	0	0	0	0	0
1967_1969	0	0	0	0	0	0	0	0	0	0	0	0
1968_1970	0	0	0	0	0	0	0	0	0	0	0	0
1969_1971	0	0	0	0	0	0	0	0	0	0	0	0
1970_1972	0	0	0	0	0	0	0	0	0	0	-1	0
1971_1973	0	0	0	0	0	0	0	0	0	0	0	-1
1972_1974	0	0	0	0	0	0	0	0	0	0	0	0
1973_1975	0	0	0	0	0	0	0	0	0	0	0	0
1974_1976	0	0	1	0	0	1	0	1	0	0	0	0
1975_1977	0	0	1	0	0	1	0	0	0	0	0	-1
1976_1978	-1	0	0	0	0	0	0	0	0	0	1	0
1977_1979	-1	0	0	0	0	0	0	0	0	0	1	0
1978_1980	0	0	0	0	0	0	0	0	0	0	0	0
1979_1981	0	0	1	0	0	0	0	0	1	0	0	0
1980_1982	0	0	1	0	0	0	0	0	1	0	0	0
1981_1983	0	0	0	0	0	0	0	0	0	0	1	1
1982_1984	0	0	0	0	0	0	0	0	0	0	1	0
1983_1985	0	0	0	0	0	0	0	0	0	0	0	0
1984_1986	0	0	0	0	0	1	0	0	1	0	0	0
1985_1987	0	0	0	0	0	-1	0	0	0	0	0	0
1986_1988	0	0	0	0	0	-1	0	0	0	0	0	0
1987_1989	0	0	0	0	0	0	0	0	0	0	1	0
1988_1990	-1	0	0	0	0	0	0	0	1	0	1	-1
1989_1991	0	0	0	0	0	0	0	0	1	0	1	-1
1990_1992	0	0	0	0	0	0	0	0	1	0	1	-1
1991_1993	0	0	0	0	0	0	0	0	1	0	0	0
1992_1994	0	0	0	0	0	0	0	0	1	0	0	0
1993_1995	0	0	0	0	0	0	0	0	1	0	0	0
1994_1996	0	0	1	0	0	0	0	0	0	0	-1	0
1995_1997	-1	0	1	0	0	0	0	0	0	0	-1	0
1996_1998	-1	0	0	0	0	0	0	0	0	0	-1	0
1997_1999	-1	0	1	0	0	0	0	0	0	0	-1	1
1998_2000	-1	0	0	0	0	0	0	0	0	0	1	0
1999_2001	0	0	0	0	0	0	0	0	1	0	1	0
2000_2002	0	0	0	0	0	0	0	0	0	0	0	0
2001_2003	0	0	0	0	0	0	0	0	0	0	0	0
2002_2004	0	0	0	0	0	0	0	0	0	0	-1	0
2003_2005	0	0	0	0	0	0	0	0	0	0	-1	0
2004_2006	0	0	0	0	0	0	0	0	0	0	-1	0
2005_2007	0	0	1	0	0	0	0	0	0	0	-1	1

Table 6: Differences in *Ambassis agassizii* predicted potential local (node) population failures for the full development scenario in comparison with the predevelopment scenario (0 = no change; -1= current development with reduced prediction of population failure (green); 1 = current development with increased prediction of population failure (red)).

3 year sequence	Beckers	Bingegang	Carnagarra	Comet Lake	Comet Weir	dnst Fairbairn Dam	Glebe	Taroom	Theresa Ck	Utopia	Wattlebank	Woodleigh
1901_1903	0	0	0	0	0	0	0	0	0	0	-1	0
1902_1904	0	0	0	0	0	0	0	0	0	0	-1	0
1903_1905	0	0	0	0	0	0	0	0	0	1	-1	0
1904_1906	0	0	0	0	0	0	0	0	0	0	-1	0
1905_1907	0	0	0	0	0	0	0	0	0	0	-1	0
1906_1908	0	0	0	0	0	0	0	0	0	0	0	0
1907_1909	0	0	0	0	0	0	0	0	0	0	-1	0
1908_1910	0	0	0	0	0	0	0	0	0	0	-1	0
1909_1911	0	0	0	0	0	0	0	0	0	0	-1	0
1910_1912	0	0	0	0	0	0	0	0	0	0	-1	0
1911_1913	0	0	0	0	0	0	0	0	0	0	-1	0
1912_1914	0	0	0	0	0	0	0	0	0	0	-1	0
1913_1915	0	0	0	0	0	0	0	0	0	0	-1	0
1914_1916	0	0	0	0	0	0	0	0	0	0	0	0
1915_1917	0	0	0	0	0	0	0	0	0	0	0	0
1916_1918	-1	0	0	0	0	0	0	0	0	0	-1	0
1917_1919	0	0	0	0	0	0	0	0	0	0	-1	0
1918_1920	0	0	0	0	0	0	0	0	0	0	0	0
1919_1921	0	0	0	0	0	0	0	0	0	0	0	0
1920_1922	0	0	0	0	0	0	0	0	0	0	0	0
1921_1923	0	0	0	0	0	0	0	0	0	0	0	0
1922_1924	0	0	0	0	0	0	0	0	0	0	-1	0
1923_1925	0	0	0	0	0	0	0	0	0	0	-1	0
1924_1926	0	0	0	0	0	0	0	0	0	0	-1	0
1925_1927	0	0	0	0	0	0	0	0	0	0	0	0
1926_1928	0	0	0	0	0	0	0	0	0	0	0	0
1927_1929	0	0	0	0	0	0	0	0	0	0	0	-1
1928_1930	1	0	0	0	0	0	0	0	0	0	0	-1
1929_1931	0	0	0	0	0	0	0	0	0	0	-1	0
1930_1932	0	0	0	0	0	0	0	0	0	0	-1	0
1931_1933	0	0	0	0	0	0	0	0	0	0	-1	0
1932_1934	0	0	-1	0	0	0	0	0	0	0	0	0
1933_1935	0	0	-1	0	0	0	0	0	0	0	0	0
1934_1936	0	0	-1	0	0	0	0	0	0	0	0	0
1935_1937	0	0	0	0	0	0	0	0	0	0	0	0
1936_1938	0	0	0	0	0	0	0	0	0	0	0	0
1937_1939	0	0	0	0	0	0	0	0	0	0	-1	-1
1938_1940	0	0	0	0	0	0	0	0	0	0	-1	-1
1939_1941	0	0	0	0	0	0	0	0	0	0	-1	-1
1940_1942	0	0	0	0	0	0	0	0	0	0	-1	-1
1941_1943	0	0	0	0	0	0	0	0	0	0	-1	-1
1942_1944	0	0	0	0	0	0	0	0	0	0	-1	-1
1943_1945	0	0	0	0	0	0	0	0	0	0	0	0
1944_1946	0	0	0	0	0	0	0	0	0	0	0	-1
1945_1947	0	0	0	0	0	0	0	0	0	0	0	-1
1946_1948	0	0	0	0	0	0	0	0	0	0	0	0
1947_1949	0	0	0	0	0	0	0	0	0	0	-1	0
1948_1950	0	0	0	0	0	0	0	0	0	0	-1	0
1949_1951	0	0	0	0	0	0	0	0	0	0	0	0
1950_1952	0	0	0	0	0	0	0	0	0	0	0	0
1951_1953	0	0	0	0	0	0	0	0	0	0	0	0
1952_1954	0	0	0	0	0	0	0	0	0	0	-1	0
1953_1955	0	0	0	0	0	0	0	0	0	0	-1	0
1954_1956	0	0	0	0	0	0	0	0	0	0	0	0
1955_1957	0	0	0	0	0	0	0	0	0	0	-1	0
1956_1958	0	0	0	0	0	0	0	0	0	0	-1	0
1957_1959	0	0	0	0	0	0	0	0	0	0	-1	0
1958_1960	0	0	0	0	0	0	0	0	0	0	0	0
1959_1961	0	0	0	0	0	0	0	0	0	0	-1	0
1960_1962	0	0	0	0	0	0	0	0	0	0	-1	0
1961_1963	0	0	0	0	0	0	0	0	0	0	-1	0
1962_1964	0	0	0	0	0	0	0	0	0	0	0	0
1963_1965	0	0	0	0	0	0	0	0	0	0	0	0
1964_1966	0	0	0	0	0	0	0	0	0	0	0	0
1965_1967	0	0	0	0	0	0	0	0	0	0	0	0
1966_1968	0	0	0	0	0	0	0	0	0	0	0	0
1967_1969	0	0	0	0	0	0	0	0	0	0	0	0
1968_1970	0	0	0	0	0	0	0	0	0	0	0	0
1969_1971	0	0	0	0	0	0	0	0	0	0	0	0
1970_1972	0	0	0	0	0	0	0	0	0	0	-1	0
1971_1973	0	0	0	0	0	0	0	0	0	0	0	-1
1972_1974	0	0	0	0	0	0	0	0	0	0	0	0
1973_1975	0	0	0	0	0	0	0	0	0	0	0	0
1974_1976	0	0	0	0	0	0	0	0	0	0	0	0
1975_1977	0	0	0	0	0	0	0	0	0	0	0	0
1976_1978	-1	0	0	0	0	0	0	0	0	0	-1	-1
1977_1979	-1	0	0	0	0	0	0	0	0	0	-1	-1
1978_1980	0	0	0	0	0	0	0	0	0	0	0	0
1979_1981	0	0	0	0	0	0	0	0	0	0	0	0
1980_1982	0	0	0	0	0	0	0	0	0	0	0	0
1981_1983	0	0	0	0	0	0	0	0	0	0	-1	0
1982_1984	0	0	0	0	0	0	0	0	0	0	-1	0
1983_1985	0	0	0	0	0	0	0	0	0	0	0	0
1984_1986	0	0	0	0	0	0	0	0	0	0	0	0
1985_1987	0	0	0	0	0	0	0	0	0	0	0	0
1986_1988	0	0	0	0	0	0	0	0	0	0	0	0
1987_1989	0	0	0	0	0	0	0	0	0	0	-1	-1
1988_1990	0	0	0	0	0	0	0	0	0	0	-1	-1
1989_1991	0	0	0	0	0	0	0	0	0	0	-1	-1
1990_1992	0	0	0	0	0	0	0	0	0	0	-1	-1
1991_1993	0	0	0	0	0	0	0	0	0	0	0	0
1992_1994	0	0	0	0	0	0	0	0	0	0	0	0
1993_1995	0	0	0	0	0	0	0	0	0	0	0	0
1994_1996	0	0	0	0	0	0	0	0	0	0	-1	0
1995_1997	-1	0	0	0	0	0	0	0	0	0	-1	0
1996_1998	-1	0	0	0	0	0	0	0	0	0	-1	0
1997_1999	-1	0	0	0	0	0	0	0	0	0	-1	0
1998_2000	-1	0	0	0	0	0	0	0	0	0	-1	0
1999_2001	0	0	0	0	0	0	0	0	0	0	-1	0
2000_2002	0	0	0	0	0	0	0	0	0	0	0	0
2001_2003	0	0	0	0	0	0	0	0	0	0	0	0
2002_2004	0	0	0	0	0	0	0	0	0	0	-1	0
2003_2005	0	0	0	0	0	0	0	0	0	0	-1	0
2004_2006	0	0	0	0	0	0	0	0	0	0	-1	0
2005_2007	0	0	0	0	0	0	0	0	0	0	-1	0

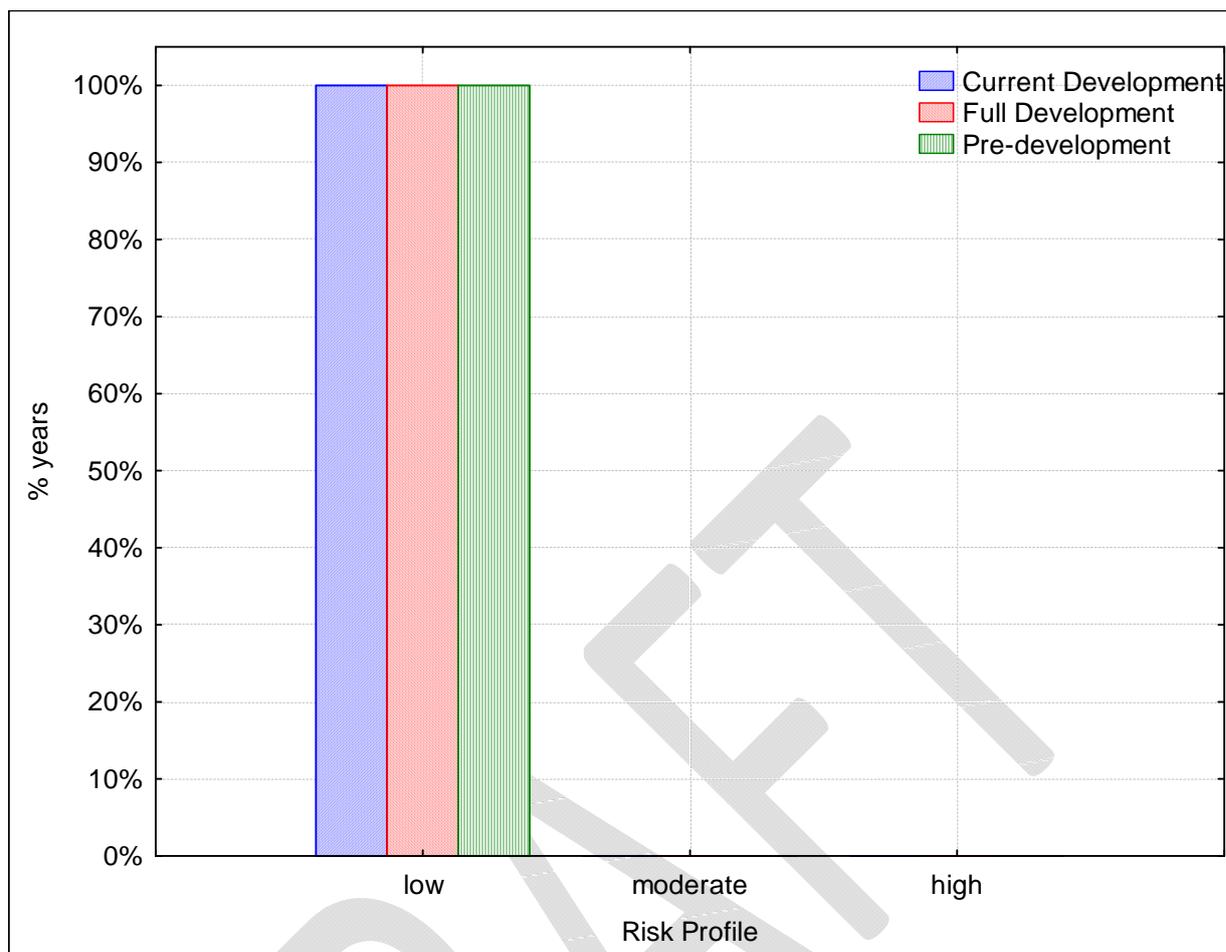


Figure 7 : Potential risk profile of *Ambassis agassizii* persistence across all sites (nodes)

Mogurnda adpersa

Individual nodes experienced increases and decreases in the total number of recruitment opportunities across the simulation period with percentage deviation from the pre-development case ranging between 103% and -68% (Table 7). Annual provision of spawning opportunities showed little variation between scenarios overall (Figure 8), or for many individual nodes (Appendix E). Exceptions included the Dawson River at Woodleigh, Dawson River at Beckers and Nogoia River downstream Fairbairn Dam where the current and full development cases provide greater recruitment opportunities than the predevelopment case. Also, the Dawson River at Glebe, Dawson River at Taroom and Mackenzie River at Carnangarra where the current development case provides reduced recruitment opportunities. The full development case did not reduce or improve spawning opportunities, with the exception of Fitzroy River at Wattlebank, Mackenzie River at Carnangarra, Dawson River at Beckers and Dawson River at Taroom, where there was a reduction in the number of spawning opportunities.

Table 7: Total percent deviation of *Mogurnda adspersa* recruitment opportunities between IQQM scenarios (green shading: 0% to ± 5%; yellow shading: ±5% to ±15%; orange shading: ±15% to ±25%; red shading: >±25%)

River	Node	<i>Mogurnda adspersa</i> total number of recruitment opportunities		
		Pre-development	Current development	Full Development
Fitzroy	Wattlebank (Node 1)	900	892	495
	% change from pre-development		-1%	-45%
	% change from current development			-45%
Mackenzie	Bingegang (Node 10)	3607	3915	3503
	% change from pre-development		9%	-3%
	% change from current development			-11%
	Carnangarra (Node 11)	1615	1136	833
	% change from pre-development		-30%	-48%
Theresa	Gregory Highway (Node 14)	8206	8897	8791
	% change from pre-development		8%	7%
	% change from current development			-1%
Nogoa	Downstream Fairbairn Dam (Node 15)	4698	9415	7873
	% change from pre-development		100%	68%
	% change from current development			-16%
Comet	Comet Weir (Node 12)	8394	8878	8539
	% change from pre-development		6%	2%
	% change from current development			-4%
	Comet Lake (Node 13)	7290	7595	7342
	% change from pre-development		4%	1%
Dawson	% change from current development			-3%
	Beckers (Node 3)	2976	4511	2966
	% change from pre-development		52%	0%
	% change from current development			-34%
	Woodleigh (Node 4)	1155	1783	2349
	% change from pre-development		54%	103%
	% change from current development			32%
	Glebe (Node 5)	5167	3964	1886
	% change from pre-development		-23%	-63%
	% change from current development			-52%
Taroom (Node 6)	4852	3716	3192	
% change from pre-development		-23%	-34%	
% change from current development			-14%	
Utopia Downs (Node 7)	2020	2226	1903	
% change from pre-development		10%	-6%	
% change from current development			-15%	

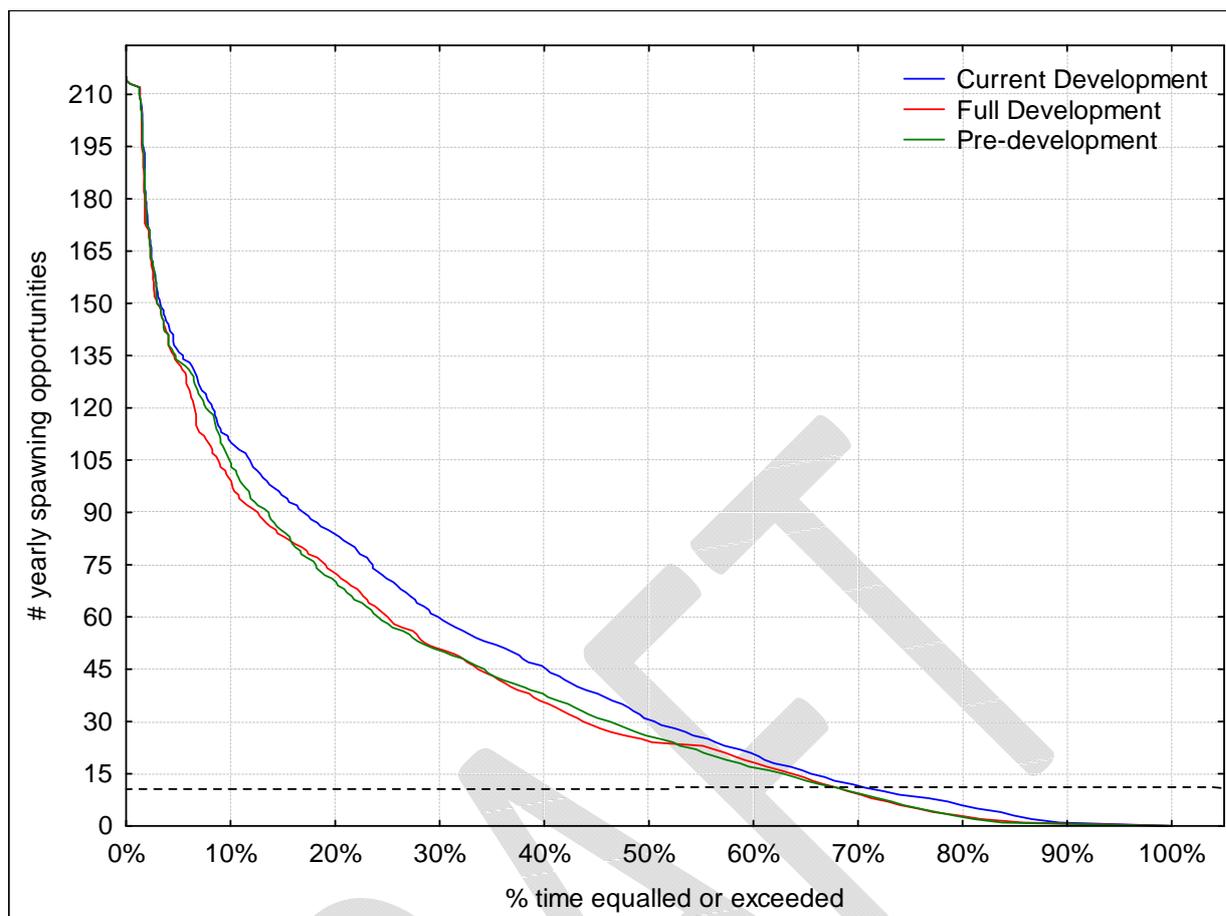


Figure 8: Cumulative frequency plot of *Mogurnda adspersa* annual recruitment opportunities across all sites (nodes). Dashed line indicates the threshold of concern (10 or more opportunities per annum), necessary to maintain population equilibrium.

The frequencies of potential local population failure in the current and full development scenarios with respect to the pre-development case were generally either reduced (green shading) or remained unchanged (no shading) (Table 8 and Table 9). Exceptions to this, where the comparative prediction was for increased potential local population failures under the development scenarios, included Mackenzie River at Carnangarra, Fitzroy River at Wattlebank and Theresa Creek at Gregory Highway.

Across the entire Fitzroy WRP area the risk to *M.adspersa* persistence from water resource management was predicted to be low for both development scenarios as there were no changes to their risk profiles from the predevelopment case (Figure 9). There were never more than 50% of nodes predicted to have simultaneous potential local population failures for any of the three scenarios.

These results suggest that the value of a persistent population of *M.adspersa* in the Fitzroy WRP area is not threatened by either of the two development scenarios evaluated.

Table 8: Differences in *Mogurnda adspersa* predicted potential local (node) population failures for the current development scenario in comparison with the predevelopment scenario (0 = no change; -1= current development with reduced prediction of population failure (green); 1 = current development with increased prediction of population failure (red)).

3 year sequence	Beckers	Bingegang	Carnangarra	Comet River	Comet Weir	dnst	Fairbairn	Glebe	Taroom	Theresa Ck	Utopia	Wattlebank	Woodleigh
1901_1903	0	0	0	0	0	0	0	0	0	0	0	0	0
1902_1904	0	0	0	0	0	0	0	0	0	0	0	0	0
1903_1905	0	0	0	0	0	0	0	0	0	0	0	0	0
1904_1906	0	0	0	0	0	0	0	0	0	0	0	0	0
1905_1907	0	0	0	0	0	0	0	0	0	0	0	0	0
1906_1908	0	0	0	0	0	0	0	0	0	0	0	0	0
1907_1909	0	0	0	0	0	0	0	0	0	0	0	0	0
1908_1910	0	0	0	0	0	0	0	0	0	0	0	0	0
1909_1911	0	0	0	0	0	0	0	0	0	0	0	0	0
1910_1912	0	0	0	0	0	0	0	0	0	0	0	0	0
1911_1913	0	0	1	0	0	0	0	1	0	0	0	0	0
1912_1914	0	0	0	0	0	0	0	0	0	0	0	0	0
1913_1915	0	0	0	0	0	0	0	0	0	0	0	0	0
1914_1916	0	0	0	0	0	0	0	0	0	0	0	0	0
1915_1917	0	0	0	0	0	0	0	0	0	0	0	0	0
1916_1918	0	0	0	0	0	0	0	0	0	0	0	0	0
1917_1919	0	0	0	0	0	0	0	0	0	0	0	0	0
1918_1920	0	0	0	0	0	0	0	0	0	0	0	0	0
1919_1921	0	0	0	0	0	0	0	0	0	0	0	0	0
1920_1922	0	0	0	0	0	0	0	0	0	0	0	0	0
1921_1923	0	0	0	0	0	0	0	0	0	0	0	0	0
1922_1924	0	0	0	0	0	0	0	0	0	0	0	0	0
1923_1925	0	0	0	0	0	0	0	0	0	0	0	0	0
1924_1926	0	0	0	0	0	0	0	0	0	0	0	0	0
1925_1927	0	0	0	0	0	0	0	0	0	0	0	0	0
1926_1928	0	0	0	0	0	0	0	0	0	0	0	0	0
1927_1929	0	0	0	0	0	0	0	0	0	0	0	0	0
1928_1930	0	0	0	0	0	0	0	0	0	0	0	0	0
1929_1931	0	0	0	0	0	0	0	0	0	0	0	0	0
1930_1932	0	0	0	0	0	0	0	0	0	0	0	0	0
1931_1933	0	0	0	0	0	0	0	0	0	0	0	0	0
1932_1934	0	0	0	0	0	0	0	0	0	0	0	0	0
1933_1935	0	0	0	0	0	0	0	0	0	0	0	0	0
1934_1936	0	0	0	0	0	0	0	0	0	0	0	0	0
1935_1937	0	0	0	0	0	0	0	0	0	0	0	0	0
1936_1938	0	0	0	0	0	0	0	0	0	0	0	0	0
1937_1939	0	0	0	0	0	0	0	0	0	0	0	0	0
1938_1940	0	0	0	0	0	0	0	0	0	0	0	0	0
1939_1941	0	0	0	0	0	0	0	0	0	0	0	0	0
1940_1942	0	0	0	0	0	0	0	0	0	0	0	0	0
1941_1943	0	0	0	0	0	0	0	0	0	0	0	0	0
1942_1944	0	0	0	0	0	0	0	0	0	0	0	0	0
1943_1945	0	0	0	0	0	0	0	0	0	0	0	0	0
1944_1946	0	0	0	0	0	0	0	0	0	0	0	0	0
1945_1947	0	0	0	0	0	0	0	0	0	0	0	0	0
1946_1948	0	0	0	0	0	0	0	0	0	0	0	0	0
1947_1949	0	0	0	0	0	0	0	0	0	0	0	0	0
1948_1950	0	0	0	0	0	0	0	0	0	0	0	0	0
1949_1951	0	0	0	0	0	0	0	0	0	0	0	0	0
1950_1952	0	0	0	0	0	0	0	0	0	0	0	0	0
1951_1953	0	0	0	0	0	0	0	0	0	0	0	0	0
1952_1954	0	0	0	0	0	0	0	0	0	0	0	0	0
1953_1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1954_1956	0	0	0	0	0	0	0	0	0	0	0	0	0
1955_1957	0	0	0	0	0	0	0	0	0	0	0	0	0
1956_1958	0	0	0	0	0	0	0	0	0	0	0	0	0
1957_1959	0	0	0	0	0	0	0	0	0	0	0	0	0
1958_1960	0	0	0	0	0	0	0	0	0	0	0	0	0
1959_1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1960_1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1961_1963	0	0	0	0	0	0	0	0	0	0	0	0	0
1962_1964	0	0	0	0	0	0	0	0	0	0	0	0	0
1963_1965	0	0	0	0	0	0	0	0	0	0	0	0	0
1964_1966	0	0	0	0	0	0	0	0	0	0	0	0	0
1965_1967	0	0	0	0	0	0	0	0	0	0	0	0	0
1966_1968	0	0	0	0	0	0	0	0	0	0	0	0	0
1967_1969	0	0	0	0	0	0	0	0	0	0	0	0	0
1968_1970	0	0	0	0	0	0	0	0	0	0	0	0	0
1969_1971	0	0	0	0	0	0	0	0	0	0	0	0	0
1970_1972	0	0	0	0	0	0	0	0	0	0	0	0	0
1971_1973	0	0	0	0	0	0	0	0	0	0	0	0	0
1972_1974	0	0	0	0	0	0	0	0	0	0	0	0	0
1973_1975	0	0	0	0	0	0	0	0	0	0	0	0	0
1974_1976	0	0	0	0	0	0	0	0	0	0	0	0	0
1975_1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1976_1978	0	0	0	0	0	0	0	0	0	0	0	0	0
1977_1979	0	0	0	0	0	0	0	0	0	0	0	0	0
1978_1980	0	0	0	0	0	0	0	0	0	0	0	0	0
1979_1981	0	0	0	0	0	0	0	0	0	0	0	0	0
1980_1982	0	0	0	0	0	0	0	0	0	0	0	0	0
1981_1983	0	0	0	0	0	0	0	0	0	0	0	0	0
1982_1984	0	0	0	0	0	0	0	0	0	0	0	0	0
1983_1985	0	0	0	0	0	0	0	0	0	0	0	0	0
1984_1986	0	0	0	0	0	0	0	0	0	0	0	0	0
1985_1987	0	0	0	0	0	0	0	0	0	0	0	0	0
1986_1988	0	0	0	0	0	0	0	0	0	0	0	0	0
1987_1989	0	0	0	0	0	0	0	0	0	0	0	0	0
1988_1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1989_1991	0	0	0	0	0	0	0	0	0	0	0	0	0
1990_1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1991_1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1992_1994	0	0	0	0	0	0	0	0	0	0	0	0	0
1993_1995	0	0	0	0	0	0	0	0	0	0	0	0	0
1994_1996	0	0	0	0	0	0	0	0	0	0	0	0	0
1995_1997	0	0	0	0	0	0	0	0	0	0	0	0	0
1996_1998	0	0	0	0	0	0	0	0	0	0	0	0	0
1997_1999	0	0	0	0	0	0	0	0	0	0	0	0	0
1998_2000	0	0	0	0	0	0	0	0	0	0	0	0	0
1999_2001	0	0	0	0	0	0	0	0	0	0	0	0	0
2000_2002	0	0	0	0	0	0	0	0	0	0	0	0	0
2001_2003	0	0	0	0	0	0	0	0	0	0	0	0	0
2002_2004	0	0	0	0	0	0	0	0	0	0	0	0	0
2003_2005	0	0	0	0	0	0	0	0	0	0	0	0	0
2004_2006	0	0	0	0	0	0	0	0	0	0	0	0	0
2005_2007	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 9: Differences in *Mogurnda adspersa* predicted potential local (node) population failures for the full development scenario in comparison with the predevelopment scenario (0 = no change; -1= current development with reduced prediction of population failure (green); 1 = current development with increased prediction of population failure (red)).

3 year sequence	Beckers	Bngegang	Camangarra	Comet River	Comet Weir	dnst Fairbairn	Glebe	Taroom	Theresa Ck	Utopia	Wattlebank	Woodleigh
1901_1903	0	0	0	0	0	0	0	0	0	0	0	0
1902_1904	0	0	0	0	0	0	0	0	0	0	0	0
1903_1905	0	0	0	0	0	0	0	0	0	0	0	0
1904_1906	1	0	0	0	0	0	0	0	0	0	0	0
1905_1907	0	0	0	0	0	0	0	0	0	0	0	0
1906_1908	0	0	0	0	0	0	0	0	0	0	0	0
1907_1909	0	0	1	0	0	0	0	0	0	0	0	0
1908_1910	0	0	0	0	0	0	0	0	0	0	0	0
1909_1911	0	0	0	0	0	0	0	0	0	0	0	0
1910_1912	0	0	0	0	0	0	0	0	0	0	0	0
1911_1913	0	0	1	0	0	0	0	0	0	0	1	0
1912_1914	0	0	0	0	0	0	0	0	0	0	0	0
1913_1915	0	0	0	0	0	0	0	0	0	0	1	0
1914_1916	0	0	0	0	0	0	0	0	0	0	1	0
1915_1917	0	0	0	0	0	0	0	0	0	0	0	0
1916_1918	1	0	0	0	0	0	0	0	0	0	0	0
1917_1919	0	0	0	0	0	0	0	0	0	0	0	0
1918_1920	0	0	0	0	0	0	0	0	0	0	0	0
1919_1921	0	0	0	0	0	0	0	0	0	0	0	0
1920_1922	0	0	0	0	0	0	0	0	0	0	0	0
1921_1923	0	0	0	0	0	0	0	0	0	0	0	0
1922_1924	0	0	0	0	0	0	0	0	0	0	0	0
1923_1925	0	0	0	0	0	0	0	0	0	0	0	0
1924_1926	0	0	0	0	0	0	0	0	0	0	0	0
1925_1927	0	0	0	0	0	0	0	0	0	0	0	0
1926_1928	0	0	0	0	0	0	0	0	0	0	0	0
1927_1929	0	0	0	0	0	0	0	0	0	0	0	0
1928_1930	1	0	0	0	0	0	0	0	0	0	0	0
1929_1931	0	0	0	0	0	0	0	0	0	0	0	0
1930_1932	0	0	0	0	0	0	0	0	0	0	0	0
1931_1933	0	0	0	0	0	0	0	0	0	0	0	0
1932_1934	0	0	1	0	0	0	0	0	0	0	0	0
1933_1935	0	0	0	0	0	0	0	0	0	0	0	0
1934_1936	0	0	0	0	0	0	0	0	0	0	0	0
1935_1937	0	0	0	0	0	0	0	0	0	0	0	0
1936_1938	0	0	0	0	0	0	0	0	0	0	0	0
1937_1939	0	0	0	0	0	0	0	0	0	0	0	0
1938_1940	0	0	0	0	0	0	0	0	0	0	0	0
1939_1941	0	0	0	0	0	0	0	0	0	0	0	0
1940_1942	0	0	0	0	0	0	0	0	0	0	0	0
1941_1943	0	0	0	0	0	0	0	0	0	0	0	0
1942_1944	0	0	0	0	0	0	0	0	0	0	0	0
1943_1945	0	0	0	0	0	0	0	0	0	0	0	0
1944_1946	0	0	0	0	0	0	0	0	0	0	0	0
1945_1947	0	0	0	0	0	0	0	0	0	0	0	0
1946_1948	0	0	1	0	0	0	0	0	0	0	0	0
1947_1949	0	0	0	0	0	0	0	0	0	0	0	0
1948_1950	0	0	0	0	0	0	0	0	0	0	0	0
1949_1951	0	0	0	0	0	0	0	0	0	0	0	0
1950_1952	0	0	0	0	0	0	0	0	0	0	0	0
1951_1953	0	0	0	0	0	0	0	0	0	0	0	0
1952_1954	0	0	1	0	0	0	0	0	0	0	0	0
1953_1955	0	0	1	0	0	0	0	0	0	0	0	0
1954_1956	0	0	1	0	0	0	0	0	0	0	0	0
1955_1957	0	0	1	0	0	0	0	0	0	0	0	0
1956_1958	0	0	1	0	0	0	0	0	0	0	0	0
1957_1959	0	0	1	0	0	0	0	0	0	0	0	0
1958_1960	0	0	1	0	0	0	0	0	0	0	0	0
1959_1961	0	0	1	0	0	0	0	0	0	0	0	0
1960_1962	0	0	0	0	0	0	0	0	0	0	0	0
1961_1963	0	0	0	0	0	0	0	0	0	0	0	0
1962_1964	0	0	0	0	0	0	0	0	0	0	0	0
1963_1965	0	0	0	0	0	0	0	0	0	0	0	0
1964_1966	0	0	1	0	0	0	0	0	0	0	0	0
1965_1967	0	0	1	0	0	0	0	0	0	0	0	0
1966_1968	0	0	1	0	0	0	0	0	0	0	0	0
1967_1969	0	0	0	0	0	0	0	0	0	0	0	0
1968_1970	0	0	0	0	0	0	0	0	0	0	0	0
1969_1971	0	0	0	0	0	0	0	0	0	0	0	0
1970_1972	0	0	0	0	0	0	0	0	0	0	0	0
1971_1973	0	0	1	0	0	0	0	0	0	0	0	0
1972_1974	0	0	1	0	0	0	0	0	0	0	0	0
1973_1975	0	0	0	0	0	0	0	0	0	0	0	0
1974_1976	0	0	0	0	0	0	0	0	0	0	0	0
1975_1977	1	0	0	0	0	0	0	0	0	0	0	0
1976_1978	1	0	0	0	0	0	0	0	0	0	0	0
1977_1979	0	0	0	0	0	0	0	0	0	0	0	0
1978_1980	0	0	0	0	0	0	0	0	0	0	0	0
1979_1981	0	0	1	0	0	0	0	0	0	0	0	0
1980_1982	0	0	1	0	0	0	0	0	0	0	0	0
1981_1983	0	0	0	0	0	0	0	0	0	0	0	0
1982_1984	0	0	0	0	0	0	0	0	0	0	0	0
1983_1985	0	0	0	0	0	0	0	0	0	0	0	0
1984_1986	0	0	0	0	0	0	0	0	0	0	0	0
1985_1987	0	0	0	0	0	0	0	0	0	0	0	0
1986_1988	0	0	0	0	0	0	0	0	0	0	0	0
1987_1989	0	0	1	0	0	0	0	0	0	0	0	0
1988_1990	1	0	0	0	0	0	0	0	0	0	0	0
1989_1991	0	0	0	0	0	0	0	0	0	0	0	0
1990_1992	0	0	0	0	0	0	0	0	0	0	0	0
1991_1993	0	0	1	0	0	0	0	0	0	0	0	0
1992_1994	0	0	0	0	0	0	0	0	0	0	0	0
1993_1995	0	0	0	0	0	0	0	0	0	0	0	0
1994_1996	0	0	0	0	0	0	0	0	0	0	0	0
1995_1997	1	0	0	0	0	0	0	0	0	0	0	0
1996_1998	1	0	0	0	0	0	0	0	0	0	0	0
1997_1999	0	0	0	0	0	0	0	0	0	0	0	0
1998_2000	0	0	1	0	0	0	0	0	0	0	0	0
1999_2001	0	0	0	0	0	0	0	0	0	0	0	0
2000_2002	0	0	0	0	0	0	0	0	0	0	0	0
2001_2003	0	0	0	0	0	0	0	0	0	0	0	0
2002_2004	0	0	0	0	0	0	0	0	0	0	0	0
2003_2005	0	0	0	0	0	0	0	0	0	0	0	0
2004_2006	0	0	0	0	0	0	0	0	0	0	0	0
2005_2007	1	0	1	0	0	0	0	0	0	0	0	0

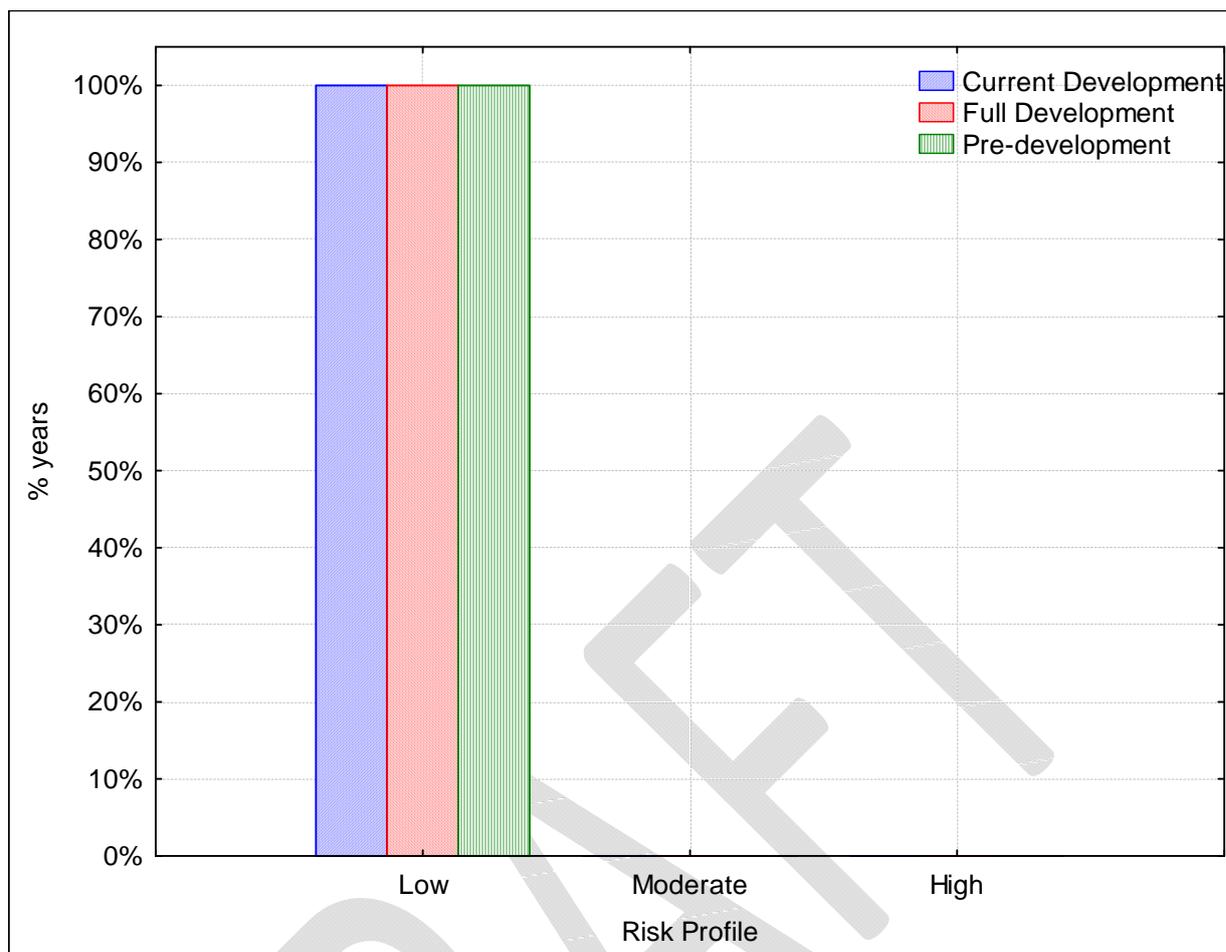


Figure 9 : Potential risk profile of *Mogurnda adspersa* persistence across all sites (nodes).

Melanotaenia splendida splendida

Individual nodes experienced increases and decreases in the total number of recruitment opportunities across the simulation period with percentage deviation from the pre-development case ranging between 81% and -51% (Table 10). Annual provision of spawning opportunities showed little variation between scenarios overall (Figure 10), or for many individual nodes (Appendix F). Exceptions included the Dawson River at Woodleigh, Dawson River at Beckers and Nogoia River downstream Fairbairn Dam where the current and full development cases provide greater recruitment opportunities than the predevelopment case. Also, the Dawson River at Glebe where the current and full development cases provide reduced recruitment opportunities.

Table 10: Total percent deviation of *Melanotaenia splendida splendida* recruitment opportunities between IQQM scenarios (green shading: 0% to ± 5%; yellow shading: ±5% to ±15%; orange shading: ±15% to ±25%; red shading: >±25%)

River	Node	<i>Melanotaenia splendida splendida</i> total number of recruitment opportunities		
		Pre-development	Current development	Full Development
Fitzroy	Wattlebank (Node 1)	2099	1608	1633
	% change from pre-development		-23%	-22%
	% change from current development			2%
Mackenzie	Bingegang (Node 10)	4729	5389	5410
	% change from pre-development		14%	14%
	% change from current development			0%
	Carnangarra (Node 11)	2640	2214	2214
	% change from pre-development		-16%	-16%
Theresa	Gregory Highway (Node 14)	9345	9796	9796
	% change from pre-development		5%	5%
	% change from current development			0%
Nogoa	Downstream Fairbairn Dam (Node 15)	5878	10635	10634
	% change from pre-development		81%	81%
	% change from current development			0%
Comet	Comet Weir (Node 12)	9906	10425	10425
	% change from pre-development		5%	5%
	% change from current development			0%
	Comet Lake (Node 13)	8683	8745	8745
	% change from pre-development		1%	1%
Dawson	% change from current development			0%
	Beckers (Node 3)	4470	5865	5107
	% change from pre-development		31%	14%
	% change from current development			-13%
	Woodleigh (Node 4)	2676	2725	4738
	% change from pre-development		2%	77%
	% change from current development			74%
	Glebe (Node 5)	7277	5372	3599
	% change from pre-development		-26%	-51%
% change from current development			-33%	
Taroom (Node 6)	6505	5190	5190	
% change from pre-development		-20%	-20%	
% change from current development			0%	
Utopia Downs (Node 7)	3410	3238	3238	
% change from pre-development		-5%	-5%	
% change from current development			0%	

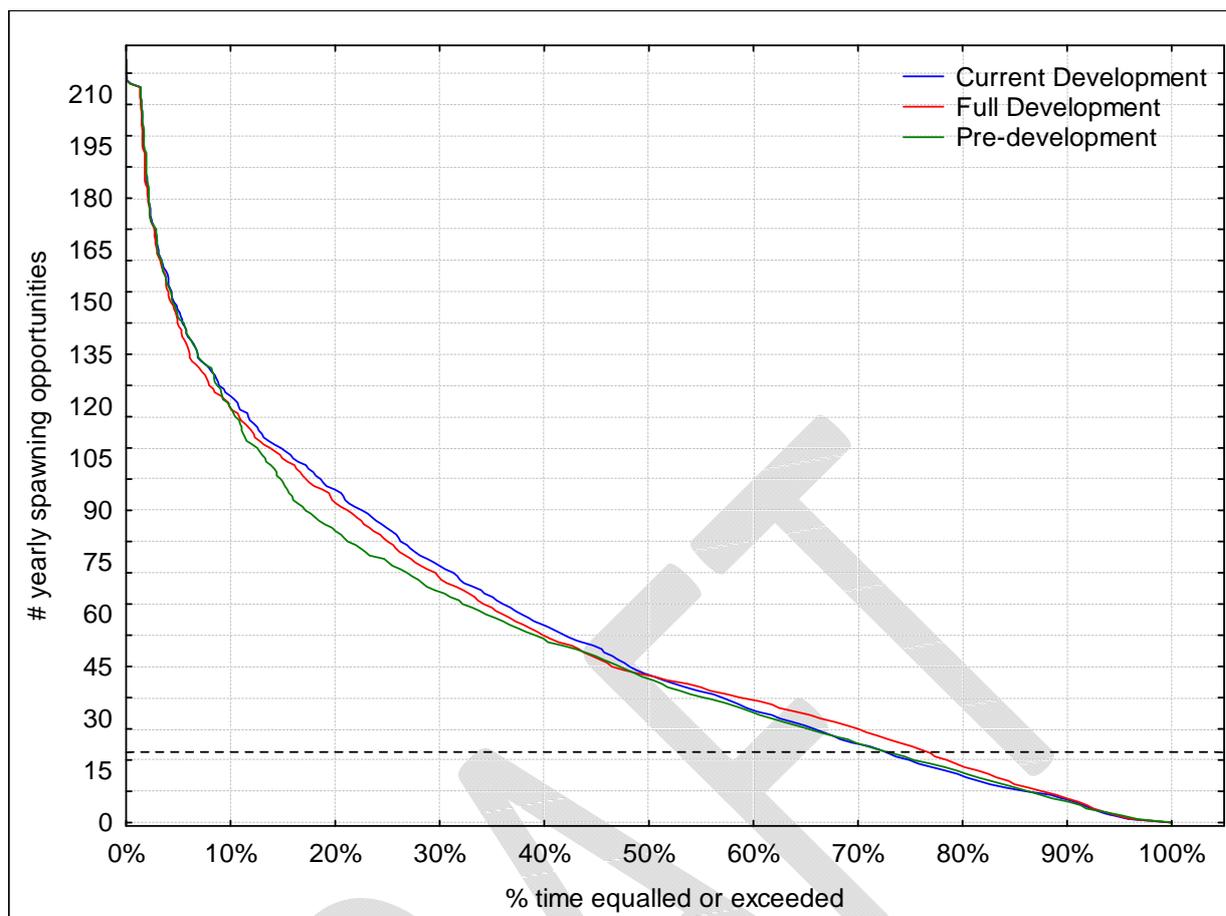


Figure 10: Cumulative frequency plot of *Melanotaenia splendida splendida* annual recruitment opportunities across all sites (nodes). Dashed line indicates the threshold of concern (17 or more opportunities per annum), necessary to maintain population equilibrium.

The frequencies of potential local population failure in the current and full development scenarios with respect to the pre-development case were generally either reduced (green shading) or remained unchanged (no shading) (Table 11 and Table 12). Exceptions to this, where the comparative prediction was for increased potential local population failures under the development scenarios, included Mackenzie River at Carnangarra, Fitzroy River at Wattlebank and Theresa Creek at Gregory Highway.

Across the entire Fitzroy WRP area the risk to *M.splendida splendida* persistence from water resource management was modelled to be low for both development scenarios as there were no changes to their risk profiles from the predevelopment case (Figure 11). There were never more than 50% of nodes predicted to have simultaneous potential local population failures for any of the three scenarios.

These results suggest that the value of a persistent population of *M.splendida splendida* in the Fitzroy WRP area is not threatened by either of the two development scenarios evaluated.

Table 11: Differences in *Melanotaenia splendida splendida* predicted potential local (node) population failures for the current development scenario in comparison with the predevelopment scenario (0 = no change; -1= current development with reduced prediction of population failure (green); 1 = current development with increased prediction of population failure (red)).

3 year sequence	Beckers	B ngegang	Camangarra	Comet River	Comet Weir	dnst Fairbairn	Glebe	Taroom	Theresa Ck	Utopia	Wattlebank	Woodleigh
1901_1903	0	0	0	0	0	0	0	0	0	0	0	0
1902_1904	0	0	0	0	0	0	0	0	0	0	0	0
1903_1905	0	0	0	0	0	0	0	0	0	0	0	0
1904_1906	0	0	0	0	0	0	0	0	0	0	0	0
1905_1907	0	0	0	0	0	0	0	0	0	0	0	0
1906_1908	0	0	0	0	0	0	0	0	0	0	0	0
1907_1909	0	0	0	0	0	0	0	0	0	0	0	0
1908_1910	0	0	0	0	0	0	0	0	0	0	0	0
1909_1911	0	0	0	0	0	0	0	0	0	0	0	0
1910_1912	0	0	0	0	0	0	0	0	0	0	0	0
1911_1913	0	0	0	0	0	0	0	0	0	0	0	0
1912_1914	0	0	0	0	0	0	0	0	0	0	0	0
1913_1915	0	0	0	0	0	0	0	0	0	0	0	0
1914_1916	0	0	0	0	0	0	0	0	0	0	0	0
1915_1917	0	0	0	0	0	0	0	0	0	0	0	0
1916_1918	0	0	0	0	0	0	0	0	0	0	0	0
1917_1919	0	0	0	0	0	0	0	0	0	0	0	0
1918_1920	0	0	0	0	0	0	0	0	0	0	0	0
1919_1921	0	0	0	0	0	0	0	0	0	0	0	0
1920_1922	0	0	0	0	0	0	0	0	0	0	0	0
1921_1923	0	0	0	0	0	0	0	0	0	0	0	0
1922_1924	0	0	0	0	0	0	0	0	0	0	0	0
1923_1925	0	0	0	0	0	0	0	0	0	0	0	0
1924_1926	0	0	0	0	0	0	0	0	0	0	0	0
1925_1927	0	0	0	0	0	0	0	0	0	0	0	0
1926_1928	0	0	0	0	0	0	0	0	0	0	0	0
1927_1929	0	0	0	0	0	0	0	0	0	0	0	0
1928_1930	0	0	0	0	0	0	0	0	0	0	0	0
1929_1931	0	0	0	0	0	0	0	0	0	0	0	0
1930_1932	0	0	0	0	0	0	0	0	0	0	0	0
1931_1933	0	0	0	0	0	0	0	0	0	0	0	0
1932_1934	0	0	0	0	0	0	0	0	0	0	0	0
1933_1935	0	0	0	0	0	0	0	0	0	0	0	0
1934_1936	0	0	0	0	0	0	0	0	0	0	0	0
1935_1937	0	0	0	0	0	0	0	0	0	0	0	0
1936_1938	0	0	0	0	0	0	0	0	0	0	0	0
1937_1939	0	0	0	0	0	0	0	0	0	0	0	0
1938_1940	0	0	0	0	0	0	0	0	0	0	0	0
1939_1941	0	0	0	0	0	0	0	0	0	0	0	0
1940_1942	0	0	0	0	0	0	0	0	0	0	0	0
1941_1943	0	0	0	0	0	0	0	0	0	0	0	0
1942_1944	0	0	0	0	0	0	0	0	0	0	0	0
1943_1945	0	0	0	0	0	0	0	0	0	0	0	0
1944_1946	0	0	0	0	0	0	0	0	0	0	0	0
1945_1947	0	0	0	0	0	0	0	0	0	0	0	0
1946_1948	0	0	0	0	0	0	0	0	0	0	0	0
1947_1949	0	0	0	0	0	0	0	0	0	0	0	0
1948_1950	0	0	0	0	0	0	0	0	0	0	0	0
1949_1951	0	0	0	0	0	0	0	0	0	0	0	0
1950_1952	0	0	0	0	0	0	0	0	0	0	0	0
1951_1953	0	0	0	0	0	0	0	0	0	0	0	0
1952_1954	0	0	0	0	0	0	0	0	0	0	0	0
1953_1955	0	0	0	0	0	0	0	0	0	0	0	0
1954_1956	0	0	0	0	0	0	0	0	0	0	0	0
1955_1957	0	0	0	0	0	0	0	0	0	0	0	0
1956_1958	0	0	0	0	0	0	0	0	0	0	0	0
1957_1959	0	0	0	0	0	0	0	0	0	0	0	0
1958_1960	0	0	0	0	0	0	0	0	0	0	0	0
1959_1961	0	0	0	0	0	0	0	0	0	0	0	0
1960_1962	0	0	0	0	0	0	0	0	0	0	0	0
1961_1963	0	0	0	0	0	0	0	0	0	0	0	0
1962_1964	0	0	0	0	0	0	0	0	0	0	0	0
1963_1965	0	0	0	0	0	0	0	0	0	0	0	0
1964_1966	0	0	0	0	0	0	0	0	0	0	0	0
1965_1967	0	0	0	0	0	0	0	0	0	0	0	0
1966_1968	0	0	0	0	0	0	0	0	0	0	0	0
1967_1969	0	0	0	0	0	0	0	0	0	0	0	0
1968_1970	0	0	0	0	0	0	0	0	0	0	0	0
1969_1971	0	0	0	0	0	0	0	0	0	0	0	0
1970_1972	0	0	0	0	0	0	0	0	0	0	0	0
1971_1973	0	0	0	0	0	0	0	0	0	0	0	0
1972_1974	0	0	0	0	0	0	0	0	0	0	0	0
1973_1975	0	0	0	0	0	0	0	0	0	0	0	0
1974_1976	0	0	0	0	0	0	0	0	0	0	0	0
1975_1977	0	0	0	0	0	0	0	0	0	0	0	0
1976_1978	0	0	0	0	0	0	0	0	0	0	0	0
1977_1979	0	0	0	0	0	0	0	0	0	0	0	0
1978_1980	0	0	0	0	0	0	0	0	0	0	0	0
1979_1981	0	0	0	0	0	0	0	0	0	0	0	0
1980_1982	0	0	0	0	0	0	0	0	0	0	0	0
1981_1983	0	0	0	0	0	0	0	0	0	0	0	0
1982_1984	0	0	0	0	0	0	0	0	0	0	0	0
1983_1985	0	0	0	0	0	0	0	0	0	0	0	0
1984_1986	0	0	0	0	0	0	0	0	0	0	0	0
1985_1987	0	0	0	0	0	0	0	0	0	0	0	0
1986_1988	0	0	0	0	0	0	0	0	0	0	0	0
1987_1989	0	0	0	0	0	0	0	0	0	0	0	0
1988_1990	0	0	0	0	0	0	0	0	0	0	0	0
1989_1991	0	0	0	0	0	0	0	0	0	0	0	0
1990_1992	0	0	0	0	0	0	0	0	0	0	0	0
1991_1993	0	0	0	0	0	0	0	0	0	0	0	0
1992_1994	0	0	0	0	0	0	0	0	0	0	0	0
1993_1995	0	0	0	0	0	0	0	0	0	0	0	0
1994_1996	0	0	0	0	0	0	0	0	0	0	0	0
1995_1997	0	0	0	0	0	0	0	0	0	0	0	0
1996_1998	0	0	0	0	0	0	0	0	0	0	0	0
1997_1999	0	0	0	0	0	0	0	0	0	0	0	0
1998_2000	0	0	0	0	0	0	0	0	0	0	0	0
1999_2001	0	0	0	0	0	0	0	0	0	0	0	0
2000_2002	0	0	0	0	0	0	0	0	0	0	0	0
2001_2003	0	0	0	0	0	0	0	0	0	0	0	0
2002_2004	0	0	0	0	0	0	0	0	0	0	0	0
2003_2005	0	0	0	0	0	0	0	0	0	0	0	0
2004_2006	0	0	0	0	0	0	0	0	0	0	0	0
2005_2007	0	0	0	0	0	0	0	0	0	0	0	0

Table 12: Differences in *Melanotaenia splendida splendida* predicted potential local (node) population failures for the full development scenario in comparison with the predevelopment scenario (0 = no change; -1= current development with reduced prediction of population failure (green); 1 = current development with increased prediction of population failure (red)).

3 year sequence	Beckers	Bingegang	Camangarra	Comet River	Comet Weir	dnst Fairbairn	Glebe	Taroom	Theresa Ck	Utopia	Wattlebank	Woodleigh
1901_1903	0	0	0	0	0	0	0	0	0	0	0	0
1902_1904	0	0	0	0	0	0	0	0	0	0	0	0
1903_1905	0	0	0	0	0	0	0	0	0	0	0	0
1904_1906	0	0	0	0	0	0	0	0	0	0	0	0
1905_1907	0	0	0	0	0	0	0	0	0	0	0	0
1906_1908	0	0	0	0	0	0	0	0	0	0	0	0
1907_1909	0	0	0	0	0	0	0	0	0	0	0	0
1908_1910	0	0	0	0	0	0	0	0	0	0	0	0
1909_1911	0	0	0	0	0	0	0	0	0	0	0	0
1910_1912	0	0	0	0	0	0	0	0	0	0	0	0
1911_1913	0	0	0	0	0	0	0	0	0	0	0	0
1912_1914	0	0	0	0	0	0	0	0	0	0	0	0
1913_1915	0	0	0	0	0	0	0	0	0	0	0	0
1914_1916	0	0	0	0	0	0	0	0	0	0	0	0
1915_1917	0	0	0	0	0	0	0	0	0	0	0	0
1916_1918	0	0	0	0	0	0	0	0	0	0	0	0
1917_1919	0	0	0	0	0	0	0	0	0	0	0	0
1918_1920	0	0	0	0	0	0	0	0	0	0	0	0
1919_1921	0	0	0	0	0	0	0	0	0	0	0	0
1920_1922	0	0	0	0	0	0	0	0	0	0	0	0
1921_1923	0	0	0	0	0	0	0	0	0	0	0	0
1922_1924	0	0	0	0	0	0	0	0	0	0	0	0
1923_1925	0	0	0	0	0	0	0	0	0	0	0	0
1924_1926	0	0	0	0	0	0	0	0	0	0	0	0
1925_1927	0	0	0	0	0	0	0	0	0	0	0	0
1926_1928	0	0	0	0	0	0	0	0	0	0	0	0
1927_1929	0	0	0	0	0	0	0	0	0	0	0	0
1928_1930	0	0	0	0	0	0	0	0	0	0	0	0
1929_1931	0	0	0	0	0	0	0	0	0	0	0	0
1930_1932	0	0	0	0	0	0	0	0	0	0	0	0
1931_1933	0	0	0	0	0	0	0	0	0	0	0	0
1932_1934	0	0	0	0	0	0	0	0	0	0	0	0
1933_1935	0	0	0	0	0	0	0	0	0	0	0	0
1934_1936	0	0	0	0	0	0	0	0	0	0	0	0
1935_1937	0	0	0	0	0	0	0	0	0	0	0	0
1936_1938	0	0	0	0	0	0	0	0	0	0	0	0
1937_1939	0	0	0	0	0	0	0	0	0	0	0	0
1938_1940	0	0	0	0	0	0	0	0	0	0	0	0
1939_1941	0	0	0	0	0	0	0	0	0	0	0	0
1940_1942	0	0	0	0	0	0	0	0	0	0	0	0
1941_1943	0	0	0	0	0	0	0	0	0	0	0	0
1942_1944	0	0	0	0	0	0	0	0	0	0	0	0
1943_1945	0	0	0	0	0	0	0	0	0	0	0	0
1944_1946	0	0	0	0	0	0	0	0	0	0	0	0
1945_1947	0	0	0	0	0	0	0	0	0	0	0	0
1946_1948	0	0	0	0	0	0	0	0	0	0	0	0
1947_1949	0	0	0	0	0	0	0	0	0	0	0	0
1948_1950	0	0	0	0	0	0	0	0	0	0	0	0
1949_1951	0	0	0	0	0	0	0	0	0	0	0	0
1950_1952	0	0	0	0	0	0	0	0	0	0	0	0
1951_1953	0	0	0	0	0	0	0	0	0	0	0	0
1952_1954	0	0	0	0	0	0	0	0	0	0	0	0
1953_1955	0	0	0	0	0	0	0	0	0	0	0	0
1954_1956	0	0	0	0	0	0	0	0	0	0	0	0
1955_1957	0	0	0	0	0	0	0	0	0	0	0	0
1956_1958	0	0	0	0	0	0	0	0	0	0	0	0
1957_1959	0	0	0	0	0	0	0	0	0	0	0	0
1958_1960	0	0	0	0	0	0	0	0	0	0	0	0
1959_1961	0	0	0	0	0	0	0	0	0	0	0	0
1960_1962	0	0	0	0	0	0	0	0	0	0	0	0
1961_1963	0	0	0	0	0	0	0	0	0	0	0	0
1962_1964	0	0	0	0	0	0	0	0	0	0	0	0
1963_1965	0	0	0	0	0	0	0	0	0	0	0	0
1964_1966	0	0	0	0	0	0	0	0	0	0	0	0
1965_1967	0	0	0	0	0	0	0	0	0	0	0	0
1966_1968	0	0	0	0	0	0	0	0	0	0	0	0
1967_1969	0	0	0	0	0	0	0	0	0	0	0	0
1968_1970	0	0	0	0	0	0	0	0	0	0	0	0
1969_1971	0	0	0	0	0	0	0	0	0	0	0	0
1970_1972	0	0	0	0	0	0	0	0	0	0	0	0
1971_1973	0	0	0	0	0	0	0	0	0	0	0	0
1972_1974	0	0	0	0	0	0	0	0	0	0	0	0
1973_1975	0	0	0	0	0	0	0	0	0	0	0	0
1974_1976	0	0	0	0	0	0	0	0	0	0	0	0
1975_1977	0	0	0	0	0	0	0	0	0	0	0	0
1976_1978	0	0	0	0	0	0	0	0	0	0	0	0
1977_1979	0	0	0	0	0	0	0	0	0	0	0	0
1978_1980	0	0	0	0	0	0	0	0	0	0	0	0
1979_1981	0	0	0	0	0	0	0	0	0	0	0	0
1980_1982	0	0	0	0	0	0	0	0	0	0	0	0
1981_1983	0	0	0	0	0	0	0	0	0	0	0	0
1982_1984	0	0	0	0	0	0	0	0	0	0	0	0
1983_1985	0	0	0	0	0	0	0	0	0	0	0	0
1984_1986	0	0	0	0	0	0	0	0	0	0	0	0
1985_1987	0	0	0	0	0	0	0	0	0	0	0	0
1986_1988	0	0	0	0	0	0	0	0	0	0	0	0
1987_1989	0	0	0	0	0	0	0	0	0	0	0	0
1988_1990	0	0	0	0	0	0	0	0	0	0	0	0
1989_1991	0	0	0	0	0	0	0	0	0	0	0	0
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1991_1993	0	0	0	0	0	0	0	0	0	0	0	0
1992_1994	0	0	0	0	0	0	0	0	0	0	0	0
1993_1995	0	0	0	0	0	0	0	0	0	0	0	0
1994_1996	0	0	0	0	0	0	0	0	0	0	0	0
1995_1997	0	0	0	0	0	0	0	0	0	0	0	0
1996_1998	0	0	0	0	0	0	0	0	0	0	0	0
1997_1999	0	0	0	0	0	0	0	0	0	0	0	0
1998_2000	0	0	0	0	0	0	0	0	0	0	0	0
1999_2001	0	0	0	0	0	0	0	0	0	0	0	0
2000_2002	0	0	0	0	0	0	0	0	0	0	0	0
2001_2003	0	0	0	0	0	0	0	0	0	0	0	0
2002_2004	0	0	0	0	0	0	0	0	0	0	0	0
2003_2005	0	0	0	0	0	0	0	0	0	0	0	0
2004_2006	0	0	0	0	0	0	0	0	0	0	0	0
2005_2007	0	0	0	0	0	0	0	0	0	0	0	0

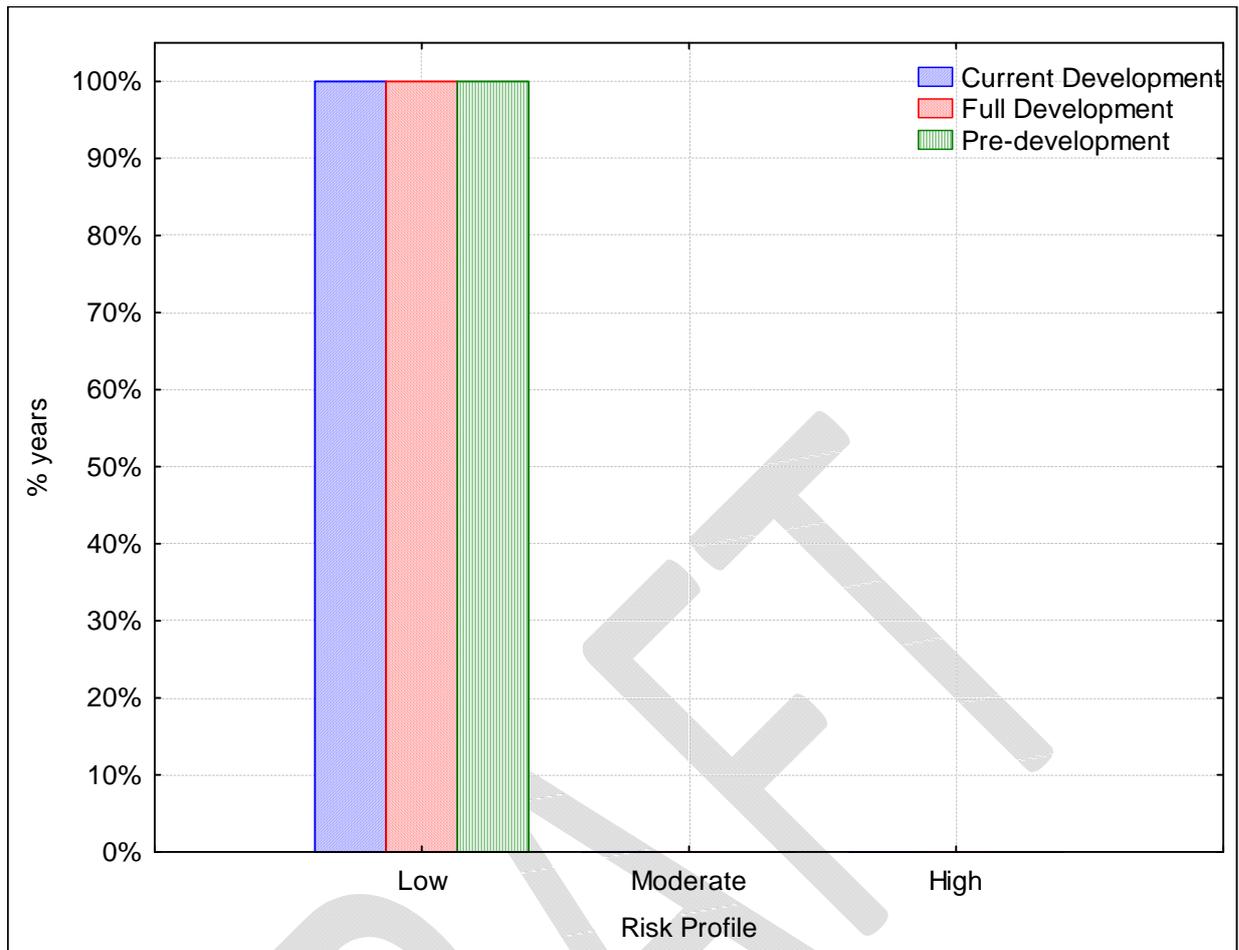


Figure 11 : Potential risk profile of *Melanotaenia splendida splendida* persistence across all sites (nodes).

4.2 Floodplain Riparian Vegetation Communities (with specific emphasis on *Eucalyptus coolabah*)

Methods

Floodplain riparian ecosystems in sub-coastal Queensland have received little attention in the literature; in particular there is a lack of quantitative information regarding their ecological and flooding requirements. However, there is a general consensus that the magnitude, frequency and duration of flood events greatly affect the distribution, maintenance and regeneration ability of riparian vegetation zones.

The method used to identify potential changes to flooding magnitude, frequency and duration on flooded riparian vegetation communities is summarised below (Figure 12) and uses *Eucalyptus coolabah* (Coolabah) as an indicator species. The method uses spatial information (contour data) and vegetation community distributional data (Regional Ecosystem data) to develop percent inundation surface models for vegetation communities at sites associated with IQQM nodes. A percent inundation rating curve is created whereby modelled flow data can be applied and a daily time series of percent inundation created for each IQQM scenario.

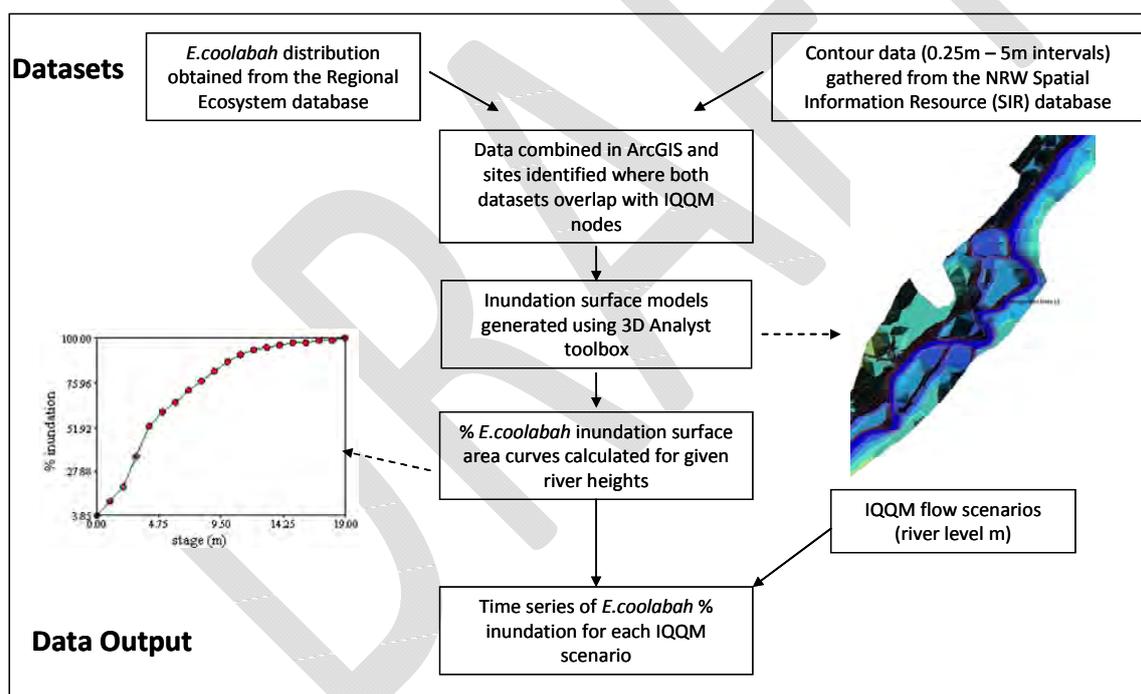


Figure 12: Process used to develop a GIS percentage *E. coolabah* inundation model.

Riparian vegetation community distribution was based on current Regional Ecosystem (RE) data (EPA, 2007). Regional ecosystems are defined as 'vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil (Sattler & Williams, 1999). Information about regional ecosystems is derived from a broad range of existing information sources including land system, vegetation and geology mapping and reports (Sattler & Williams, 1999).

Eucalyptus coolabah is widely distributed in temporarily inundated areas and is a dominant species of the riparian community which covers over 5,100 km² of the Fitzroy Basin (Figure 13). Regional Ecosystem data was accessed through the DERM Spatial Information Resource (SIR) (DERM, 2008). An assessment of these data revealed nine REs containing Coolabah (Table 13), of which three (11.3.3, 11.3.4, 11.3.25) contribute approximately 82% of the total distribution. Many of these communities are listed under both the Vegetation Management Act (1999) and EPA Biodiversity status as either "Endangered" or "Of Concern", principally as they have been either extensively modified by grazing and have had vast tracks cleared for cropping and grazing (Sattler & Williams, 1999).

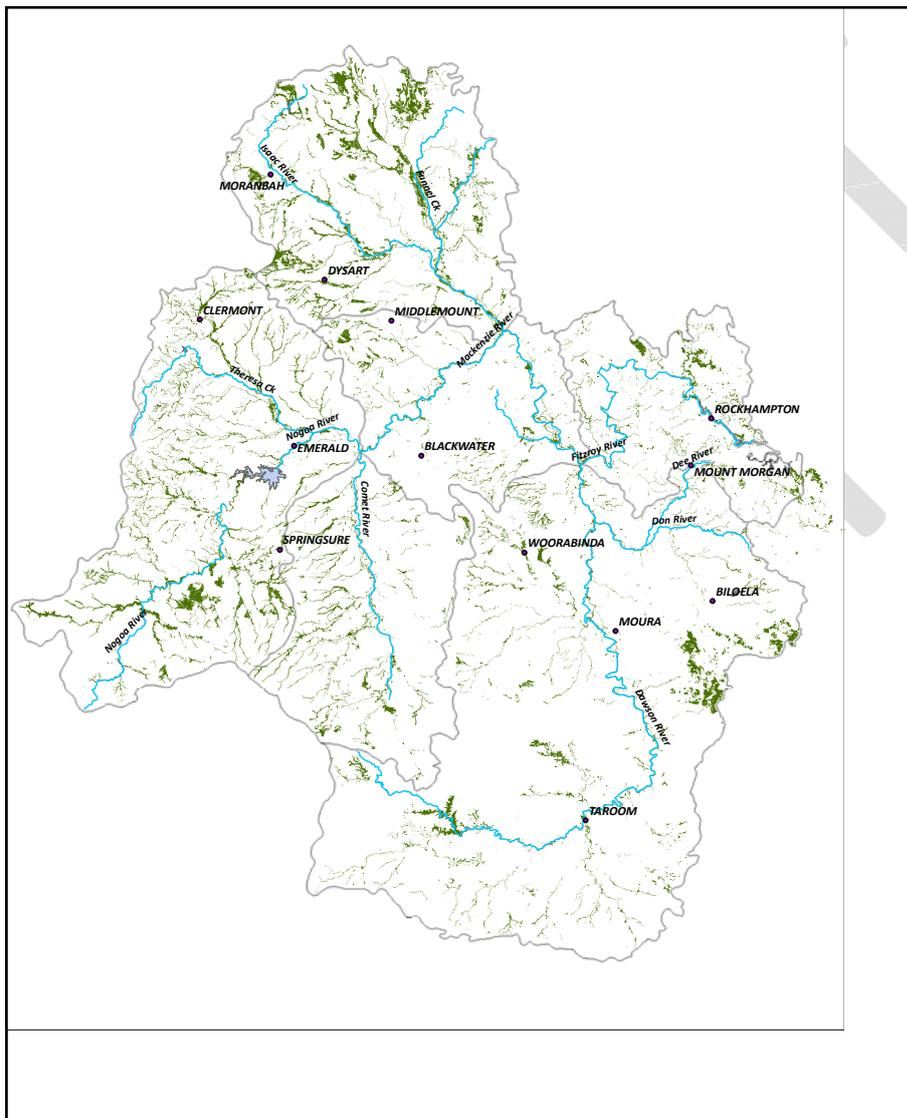


Figure 13: Distribution of *E. coolabah* dominated Regional Ecosystem communities of the Fitzroy Basin (EPA, 2007)

Table 13: Regional Ecosystem types used in the assessment of *E. coolabah* communities of the Fitzroy Basins

Regional Ecosystem	Description	Area within Fitzroy Basin (km ²)	Vegetation Management Act 1999 (VMA) status	EPA Biodiversity Status
11 3 1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	483 84	Endangered	Endangered
11 3 3	<i>Eucalyptus coolabah</i> woodland on alluvial plains	1071 99	Of Concern	Of Concern
11 3 4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp tall woodland on alluvial plains	1282 06	Of Concern	Of Concern
11 3 15	<i>Eucalyptus coolabah</i> , <i>Acacia stenophylla</i> , <i>Muehlenbeckia cunninghamii</i> fringing woodland on alluvial plains	0 02	Of Concern	Of Concern
11 3 21	<i>Dichanthium sericeum</i> and/or <i>Astrebla</i> spp grassland on alluvial plains Cracking clay soils	282 65	Endangered	Endangered
11 3 25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	1846 61	Not Of Concern	Of Concern
11 3 27	Freshwater wetlands	57 80	Not Of Concern	Of Concern
11 3 37	<i>Eucalyptus coolabah</i> fringing woodland on alluvial plains	105 82	Not Of Concern	No Concern
11 4 11	<i>Dichanthium sericeum</i> , <i>Astrebla</i> spp and patchy <i>Acacia harpophylla</i> , <i>Eucalyptus coolabah</i> on Cainozoic clay plains	7 81	Not of concern	Of concern

Source: EPA, 2007

Contour data were accessed through the DERM Spatial Information Resource (SIR) database (DERM, 2008). These contour data were generated using Digital Elevation Models (DEM) interpolated from photogrammetric digital data purchased from the Australian Surveying and Land Information Group (AUSLIG). Contour data at less than 5 metre intervals were used in the assessment as contours greater than 5 metre were considered too coarse and unable to provide the required detail.

The assessment of Coolabah populations was undertaken for ten sites throughout the Basin, including three in the Nogo/Mackenzie and Dawson Rivers and two in the Comet and Fitzroy Rivers (Table 14). In generating the percent inundation surface models the following requirements were specified:

- Coolabah distribution must be greater than 500 hectares
- Contour datasets must be with intervals less than 5 metres
- There must be an overlap between the distribution and contour datasets
- Sites must be within close proximity upstream of IQQM nodes- the method for back calculating flow (ML/day) to river height (m) is site specific and therefore only applies to that site
- A change in riverbed height must be less than 1m over the entire study site
- The lowest river bed height must be known in Australian Height Datum (AHD) - in all instances this was the cease to flow level for the gauging stations associated with each node

Table 14: Details of *E. coolabah* sites assessed

Catchment	General Location	RE Location	Coolibah stand size (ha)	Contour intervals	Riverbed Elevation (AHD)	Minimum Coolibah elevation (AHD)	Maximum Coolibah elevation (AHD)
Nogoa/Mackenzie	Lower Nogoa	Bridge Flat road	1059	0.25m	156	158	167
	Mid Mackenzie	Bingegang	1426	2m	100	100	120
	Lower Mackenzie	Duaringa Apis Rd	2614	1m	47	47	85
Dawson	Mid Dawson	Woodleigh	2923	2m	110	110	128
	Mid Dawson	Isla Delusion	1830	2m	144.3	144	159
	Lower Dawson	Beckers	824	2m	64.5	65	84
Fitzroy	Upper Fitzroy	Riversleigh	827	1m	33.5	34	71
	Lower Fitzroy	Yamba	1130	5m	5	5	25
Comet	Upper Comet	The Lake	550	2m	186	186	202
	Lower Comet	Comet Weir	2792	2m	142	140	168

The percent inundation surface models were generated in ArcGIS 3D Analyst Geoprocessing toolbox (ESRI ArcMAP 9.3). For each site, a Triangulated Irregular Network (TIN) was constructed using regional ecosystem polygon data and contour lines. Each TIN was assessed at 1 m intervals using the Surface Volume function, which calculated the surface area inundated relative to a given river height.

The inundation values were converted to a percentage of the maximum inundation value and imported into the Rating Curve function of the River Analysis Package (Version 2.0.4) (eWater, 2008). These values were applied to each of the three IQQM scenarios (scenarios back-calculated to height in m) to generate three daily time series of percent inundation for each node. This was summarised across the entire simulation period to highlight broad differences between the pre-development and each of the two development scenarios.

A threshold of concern (ToC) could not be derived as the inundation requirements of Coolabah and other riparian communities are largely unknown. Therefore only the likelihood of water resource development potentially changing the magnitude, frequency and duration of flood events was assessed for each site and across the plan area.

The magnitude of events was assessed as the proportional change between scenarios of the percent yearly maximum inundation. This was conducted on a yearly basis with a year being July 1st to June 30th the following year. The flood event duration was assessed as the proportional change between scenarios for the total number of days above the 25%, 50% and 75% riparian community inundation levels. These levels generally correspond to the instream channel riparian zone (<50% inundation), upper riparian zone (<75% inundation) and floodplain riparian zone (>75% inundation). The proportional change between scenarios for the average length of days between flood events at the 25%, 50% and 75% riparian community inundation levels was also assessed to identify any potential changes in the frequency of these flood events.

Results

Maximum percent inundation was reduced at all sites, with deviation from pre-development ranging from -2% to -41% and 0% to -39% deviation from current development to full development (Table 15). Sites experiencing the greatest deviation from pre-development include Nogoia River at Bridge Flat Road, Mackenzie River at Bingegang, Dawson River at Woodleigh and Dawson River at Isla Delusion. Overall, greatest deviation between scenarios was experienced between 5% and 80% maximum yearly inundation (Figure 14).

All sites experienced a reduction in flow duration above 25%, 50% and 75% Coolabah inundation level (Table 16). Overall deviation from predevelopment varied little between the three inundation levels, with deviations ranging from -13% to -24% and -6% to -11% deviation from current development to full development. Sites experiencing the most deviation from pre-development included Nogoia River at Bridge Flat Road, Mackenzie River at Bingegang, Dawson River at Beckers, Dawson River at Woodleigh and Dawson River at Isla Delusion.

The annual flow duration varied between IQQM scenarios, with fewer number of inundation days in the full and current development scenarios (Figure 15). This is most evident above the 10% time exceedence threshold.

The number of days between 25%, 50% and 75% inundation levels increased under the current and full development scenarios (Table 17; Figure 16). Overall deviation from predevelopment ranged from 7% to 108% for the 25% inundation level, 0% to 85% for the 50% inundation level and 0% to 52% for the 75% inundation level. Sites experiencing the greatest deviation increase included Nogoia River at Bridge Flat Road, Mackenzie River at Bingegang, Dawson River at Beckers, Dawson River at Woodleigh and Dawson River at Isla Delusion. There was a general decrease in deviation at the higher inundation levels.

These results indicate that the value of Coolabah persistence in the Fitzroy WRP area is potentially at higher risk under the two development scenario evaluated.

Table 15: Total percent deviation of *Eucalyptus coolabah* yearly maximum percent inundation between IQQM scenarios (green shading 0% to -5%; yellow shading -5% to -15%; orange shading -15% to -25%; red shading >-25%)

River	Site	Average <i>E.coolabah</i> inundation (% max/year)		
		Pre-development	Current Development	Full Development
Overall	All sites	51%	46%	43%
	% change from pre-development		-10%	-16%
	% change from current development			-6%
Fitzroy	Yamba	58%	56%	54%
	% change from pre-development		-4%	-6%
	% change from current development			-3%
Fitzroy	Riversleigh	43%	42%	40%
	% change from pre-development		-2%	-7%
	% change from current development			-5%
Mackenzie	Duaranga/Apis Rd	63%	61%	59%
	% change from pre-development		-4%	-6%
	% change from current development			-2%
Mackenzie	Bingegang	58%	46%	46%
	% change from pre-development		-21%	-21%
	% change from current development			0%
Nogoa	Bridge Flat Rd	70%	50%	50%
	% change from pre-development		-28%	-28%
	% change from current development			0%
Comet	Comet Weir	38%	34%	34%
	% change from pre-development		-11%	-11%
	% change from current development			0%
Comet	Comet Lake	50%	47%	47%
	% change from pre-development		-6%	-6%
	% change from current development			0%
Beckers	Beckers	61%	57%	54%
	% change from pre-development		-5%	-12%
	% change from current development			-6%
Dawson	Woodleigh	35%	33%	26%
	% change from pre-development		-6%	-26%
	% change from current development			-21%
Dawson	Isla Delusion	36%	35%	21%
	% change from pre-development		-3%	-41%
	% change from current development			-39%

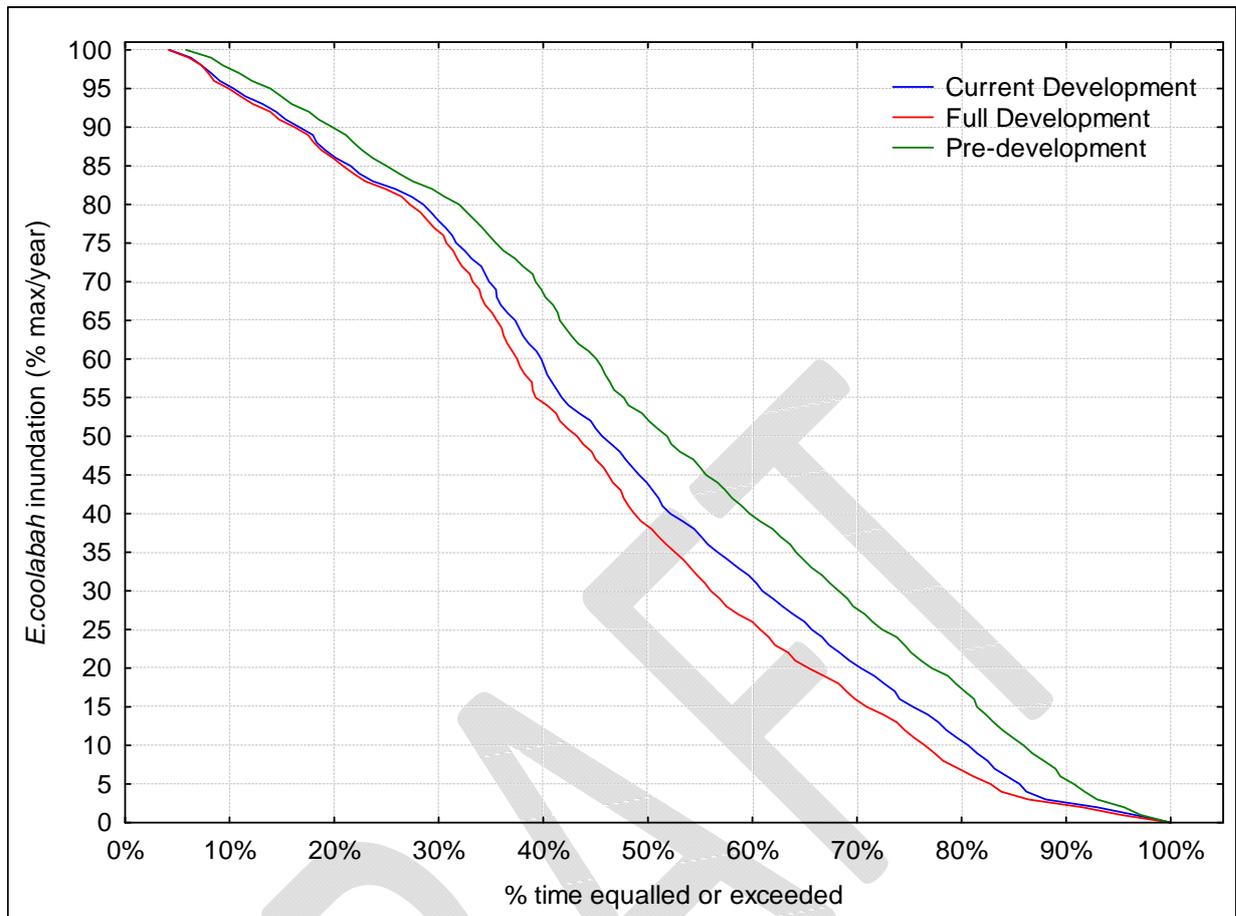


Figure 14: Cumulative frequency plot of *Eucalyptus coolabah* yearly maximum percent inundation across all sites.

Table 16: Total percent deviation of flow duration above 25%, 50% and 75% *Eucalyptus coolabah* inundation (green shading 0% to -5%; yellow shading -5% to -15%; orange shading -15% to -25%; red shading >-25%).

River	Site	Total number of days above 25% inundation			Total number of days above 50% inundation			Total number of days above 75% inundation		
		Pre-development	Current Development	Full Development	Pre-development	Current Development	Full Development	Pre-development	Current Development	Full Development
Overall	All sites	11915	10176	9016	5644	4907	4516	2947	2483	2332
	% change from pre-development		-15%	-24%		-13%	-20%		-16%	-21%
	% change from current development			-11%			-8%			-6%
Fitzroy	Yamba	2174	1951	1751	931	856	792	392	352	334
	% change from pre-development		-10%	-19%		-8%	-15%		-10%	-15%
	% change from current development			-10%			-7%			-5%
Fitzroy	Riversleigh	971	930	863	512	496	465	187	185	174
	% change from pre-development		-4%	-11%		-3%	-9%		-1%	-7%
	% change from current development			-7%			-6%			-6%
Mackenzie	Duaringa/Apis Rd	1230	1100	1029	724	651	605	455	394	368
	% change from pre-development		-11%	-16%		-10%	-16%		-13%	-19%
	% change from current development			-6%			-7%			-7%
Mackenzie	Bingegang	1304	926	926	735	586	586	424	326	326
	% change from pre-development		-29%	-29%		-20%	-20%		-23%	-23%
	% change from current development			0%			0%			0%
Nogoa	Bridge Flat Rd	1364	827	827	870	573	573	636	414	414
	% change from pre-development		-39%	-39%		-34%	-34%		-35%	-35%
	% change from current development			0%			0%			0%
Comet	Comet Weir	659	575	575	272	232	232	53	44	44
	% change from pre-development		-13%	-13%		-15%	-15%		-17%	-17%
	% change from current development			0%			0%			0%
Comet	Comet Lake	943	894	894	383	371	371	186	183	183
	% change from pre-development		-5%	-5%		-3%	-3%		-2%	-2%
	% change from current development			0%			0%			0%
Dawson	Beckers	1897	1683	1365	733	679	552	441	420	358
	% change from pre-development		-11%	-28%		-7%	-25%		-5%	-19%
	% change from current development			-19%			-19%			-15%
Dawson	Woodleigh	704	647	428	212	198	153	73	70	52
	% change from pre-development		-8%	-39%		-7%	-28%		-4%	-29%
	% change from current development			-34%			-23%			-26%
Dawson	Isla Delusion	669	643	358	272	265	187	100	95	79
	% change from pre-development		-4%	-46%		-3%	-31%		-5%	-21%
	% change from current development			-44%			-29%			-17%

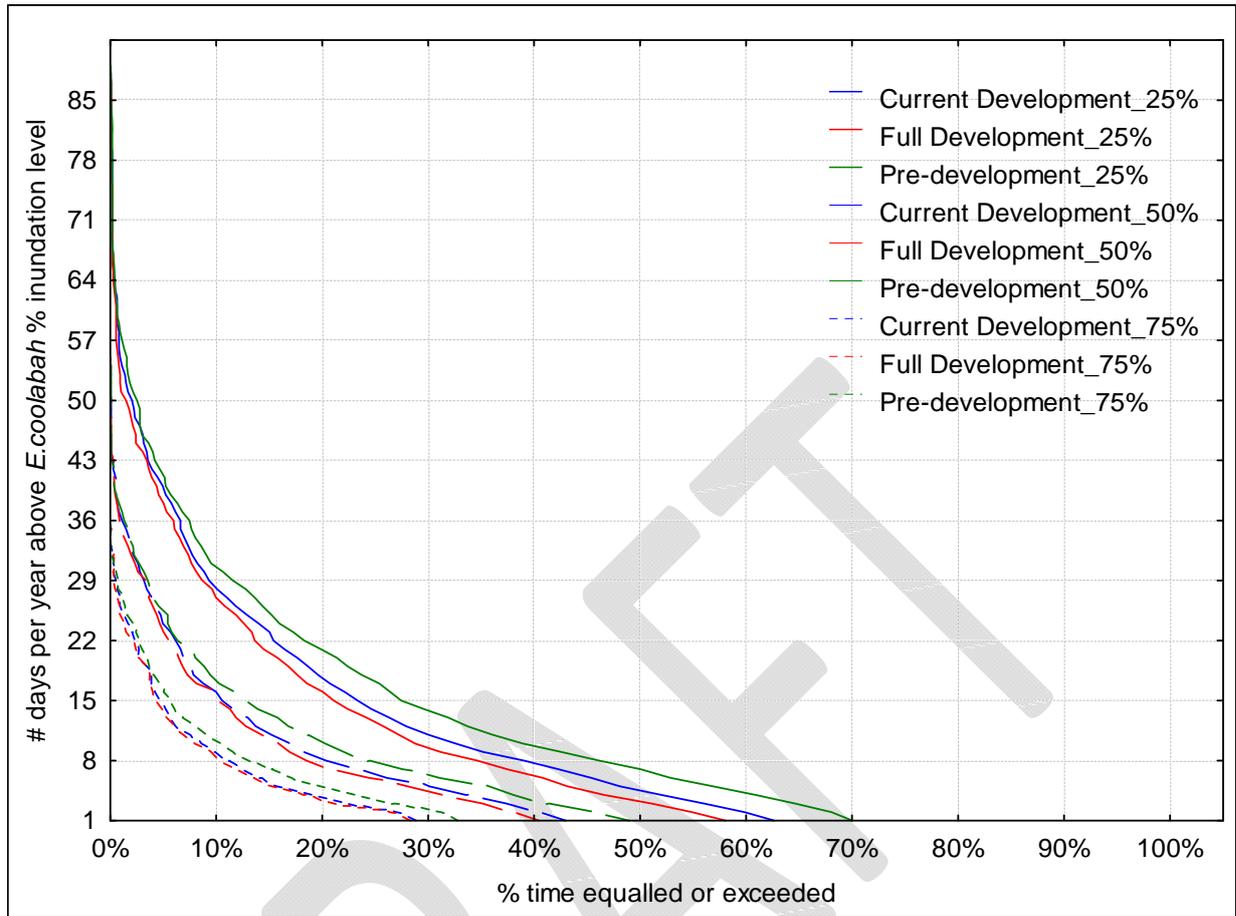


Figure 15: Cumulative frequency plot of *Eucalyptus coolabah* annual flow duration above 25%, 50% and 75% inundation levels across all sites.

Table 17 : Total percent deviation of average spell length below 25%, 50% and 75% *Eucalyptus coolabah* inundation (green shading 0% to -5%; yellow shading -5% to -15%; orange shading -15% to -25%; red shading >-25%)

River	Site	Average spell length below 25% inundation			Average spell length below 50% inundation			Average spell length below 75% inundation		
		Pre-development	Current Development	Full Development	Pre-development	Current Development	Full Development	Pre-development	Current Development	Full Development
Overall	All sites	249	296	350	478	531	599	1000	1083	1145
	% change from pre-development		19%	40%		11%	25%		8%	14%
	% change from current development			18%			13%			6%
Fitzroy	Yamba	183	195	217	381	390	420	673	711	711
	% change from pre-development		7%	19%		2%	10%		6%	6%
	% change from current development			11%			8%			0%
Fitzroy	Riversleigh	360	385	398	556	556	591	1309	1309	1403
	% change from pre-development		7%	11%		0%	6%		0%	7%
	% change from current development			3%			6%			7%
Mackenzie	Duaringa/Apis Rd	227	251	263	328	343	363	428	459	471
	% change from pre-development		11%	16%		5%	11%		7%	10%
	% change from current development			5%			6%			3%
Mackenzie	Bingegang	208	318	318	348	486	486	553	686	686
	% change from pre-development		53%	53%		40%	40%		24%	24%
	% change from current development			0%			0%			0%
Nogoa	Bridge Flat Rd	176	322	322	241	447	447	321	488	488
	% change from pre-development		83%	83%		85%	85%		52%	52%
	% change from current development			0%			0%			0%
Comet	Comet Weir	340	397	397	603	676	676	1876	2189	2189
	% change from pre-development		17%	17%		12%	12%		17%	17%
	% change from current development			0%			0%			0%
Comet	Comet Lake	206	224	224	403	425	425	689	701	701
	% change from pre-development		9%	9%		5%	5%		2%	2%
	% change from current development			0%			0%			0%
Dawson	Beckers	160	190	203	320	324	391	467	500	539
	% change from pre-development		19%	27%		1%	22%		7%	15%
	% change from current development			7%			21%			8%
Dawson	Woodleigh	311	338	489	914	959	1158	1972	2076	2467
	% change from pre-development		9%	57%		5%	27%		5%	25%
	% change from current development			45%			21%			19%
Dawson	Isla Delusion	318	341	664	689	701	1035	1714	1714	1796
	% change from pre-development		7%	109%		2%	50%		0%	5%
	% change from current development			95%			48%			5%

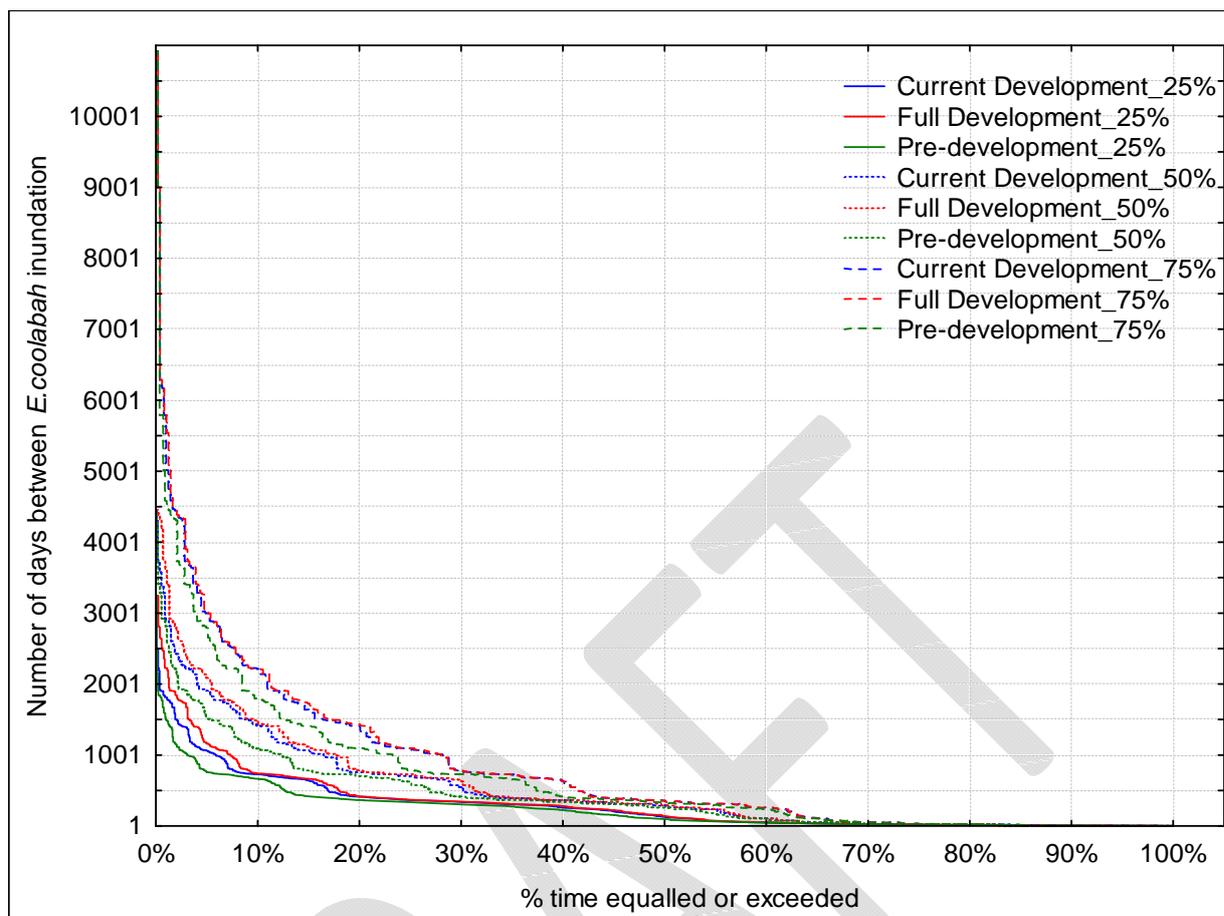


Figure 16: Cumulative frequency plot of spell length below 25%, 50% and 75% *Eucalyptus coolabah* inundation across all sites.

4.3 *Lates calcarifer* (Barramundi)

Methods

Lates calcarifer (Barramundi) are widely distributed throughout northern Australia, occurring in rivers from Shark Bay (Western Australia) to the Mary River (Queensland). Barramundi are a long lived species; their longevity is commonly 9-10 years (Pusey *et al.* 2004), with records of fish living up to 32 years in the Fitzroy estuary (Halliday *et al.* 2007). Barramundi are catadromous, typically migrating from freshwater to saltwater to spawn. Although access to freshwater habitats is not obligatory (Pender and Griffin, 1996), it can be advantageous in promoting juvenile growth (Milton *et al.* 2007). Barramundi are protandrous hermaphrodites, beginning life as a male and changing into females soon after spawning (Pusey *et al.* 2004). In Australia, barramundi spawn during spring and summer, although the timing of spawning activity is known to vary between catchments and years (Robins *et al.* 2007).

The persistence of barramundi in the Fitzroy basin and surrounding creek systems is influenced by a variety of activities. The development of water infrastructure, most notably the Fitzroy Barrage, has significantly impacted natural populations of freshwater barramundi. Cotterell & Jackson (1999) highlighted that there is ample evidence (both qualitative and quantitative) to

suggest that the Fitzroy Barrage (completed in 1970) has significantly prevented migration of the species to its former range. Barramundi were once collected as far upstream as the Connors River, Mackenzie/Comet/Nogoa River junction and Dawson River at Theodore, and are now extensively stocked in order to satisfy recreational demand.

Habitat quantity and quality along the coastal and floodplain regions have also been affected. Extensive development of some 16,000 ha of ponded pasture systems in or adjacent to coastal wetlands (such as supralittoral habitats) of central Queensland has dramatically changed the structure of these habitats and impeded fish migration (Hyland, 2002). Floodplain lagoons and wetlands have also been substantially impacted through loss of river connectivity through levees and bund walls, degradation of habitat structure and water quality through grazing and invasion of weed species, such as Para Grass (*Brachiaria mutica*) and Water Hyacinth (*Eichhornia crassipes*).

The Fitzroy estuary and surrounding creek systems, is one of a few worldwide which have had detailed research conducted on the effects of freshwater flows on barramundi populations. This is despite numerous aspects of barramundi life history suggesting that populations are likely to be highly responsive to freshwater flows (Robins *et al.* 2007).

One such project, led by the Queensland Department of Primary Industries and Fisheries (DPIF), was entitled 'Environmental flows for sub-tropical estuaries: understanding the freshwater needs of estuaries for sustainable fisheries production and assessing the impacts of water regulation' (Halliday and Robins, 2007). This multifaceted project investigated a range of important fisheries species with the main objectives to:

- Review the current knowledge of the relationship between freshwater flows and estuarine fisheries production.
- Develop a logical framework for investigating:
 - (i) the role of freshwater flow; and
 - (ii) the effects of modified flows, on estuarine fisheries production.
- Correlate historical flow and fisheries production data of sub-tropical estuaries.
- Develop procedures for assessing the changes in Queensland's estuarine fisheries production that result from water abstraction and regulation.
- Develop and communicate guidelines on environmental flows for estuarine fisheries to water managers, water users, the fishing industry and the general community.

Results of this project provided quantitative evidence that there are substantial benefits to barramundi production from allowing freshwater flows to reach the estuary. These benefits include providing lateral connectivity to facilitate the movement of fish from freshwater reaches to estuarine sections, newly recruited fish from marine spawning areas to estuarine and freshwater habitats, and delivering nutrients into the estuary that may be attributed to the increases in growth rates of fisheries species (Halliday & Robins, 2007) (Table 18).

Table 18: Summary of DPIF research investigating the effects of freshwater flows on Fitzroy River estuarine fisheries.

Chapter	Hypotheses specific to freshwater flows	Outcomes	Reference
Chapter 3- Commercial catch and Flow	<ul style="list-style-type: none"> Investigate potential relationships between catch and freshwater flow for the major estuarine fishery species in central Queensland 	<ul style="list-style-type: none"> Barramundi catch increased in proportion with summer freshwater flow and rainfall. The relationship was both within year and over a 3 and 4 year lag period (i.e. catch rates were improved by high flows 3 and 4 years prior) Within year banana prawn catch increased in proportion with summer freshwater flow Correlations between mud crab catch and freshwater flow were ambiguous. 	Robins <i>et al</i> (2007a); Robins <i>et al</i> (2005)
Chapter 4- Climate impacts on barramundi and banana prawn fisheries	<ul style="list-style-type: none"> Examine the effects of short-term (inter-annual) climate variability on the commercial catch of wild barramundi and banana prawn (Princess Charlotte Bay) 	<ul style="list-style-type: none"> Barramundi survival is enhanced by warm sea surface temperatures (Jan–Mar), high rainfall (July–Sept & Jan–Mar), increased freshwater flow (Jan–Mar) and low annual evaporation There were no correlations between seasonal and annual climate variables and banana prawn catch 	Balston (2007)
Chapter 5 - Effects of stream flows on selected recreational fisheries	<ul style="list-style-type: none"> Examine the influence of freshwater flows on catch of a recreational fishing club 	<ul style="list-style-type: none"> Fish catch rates over thirteen years were positively influenced by annual flows above 1GL 	Platten (2007)
Chapter 6 - Using age-structure of commercial catch to investigate the importance of freshwater flows in maintaining barramundi and king threadfin populations	<ul style="list-style-type: none"> Investigate whether variation in year class strength (YCS) of barramundi and threadfin salmon was related to patterns in the freshwater flowing into the estuary 	<ul style="list-style-type: none"> The YCS of both species fluctuated and was significantly and positively correlated with freshwater flow and coastal rainfall in spring and summer 	Halliday <i>et al</i> (2007a); Staunton-Smith <i>et al</i> (2004)
Chapter 7 - Effects of freshwater flow on growth rates of barramundi	<ul style="list-style-type: none"> Assess the length differences in tagged-recaptured barramundi and after accounting for seasonal growth, quantify the relationships between growth and freshwater flow conditions. 	<ul style="list-style-type: none"> Growth rates were significantly and positively related to freshwater flowing to the estuary 	Robins <i>et al</i> (2007b)
Chapter 8 - Otolith micro-chemistry of barramundi	<ul style="list-style-type: none"> Assess the role of freshwater flows for providing connectivity for barramundi that have accessed freshwater by analysing fish from the fished estuarine population during a flood event Determine whether enhanced growth or survival are related to freshwater access 	<ul style="list-style-type: none"> Coastal freshwater systems are the major freshwater habitat for barramundi and their flooding has a significant role in maintaining barramundi recruitment Fish that had accessed more productive coastal freshwater habitats as juveniles had enhanced growth rates 	Milton <i>et al</i> (2007)
Chapter 9 - Effects of freshwater flows on banana prawns	<ul style="list-style-type: none"> investigate the effects of freshwater flows on growth rates and recruitment of juvenile banana prawns on an annual basis 	<ul style="list-style-type: none"> Growth rates were significantly and positively related to freshwater flow and water temperature 4 weeks prior to sampling Abundance of juvenile banana prawns was highest during high flow years 	Robins <i>et al</i> (2007c)

The report titled 'Use of 12 Mile Creek by Barramundi: Effects of Local Climate 1984-2007' (Sawynok and Platten, 2008) also documents aspects of barramundi recruitment within the Fitzroy estuary and surrounding creek, wetland and lagoon systems. The report was the culmination of 23 years of research collected under a number of monitoring and tagging programs and research organisations (e.g. InfoFish, CapReef, Suntag), with the objectives to (Sawynok and Platten, 2008):

1. Describe the use of 12 Mile Creek by Barramundi over the 23 year period.
2. Describe the influence of local climatic conditions, especially rainfall, on the use of the habitat by barramundi.
3. Review long term trends on the use of 12 Mile Creek by Barramundi in relation to changes in the local climate.

The outcomes of this report were that climate change resulted in a reduction of waterhole habitat use, an increase in time between peak recruitments, a decrease in the survival of first year post-winter recruits, a reduction in overall growth rates of barramundi and a reduction in the distribution of Barramundi genetics to other populations, especially those to the south

(Sawynok and Platten, 2008). A clear and strong relationship between barramundi recruitment and the timing and magnitude of freshwater flow events from the Fitzroy River was identified (Sawynok and Platten, 2008).

The outcomes of these studies were utilised to identify the risk to the growth and recruitment of barramundi populations in both the Fitzroy estuary and surrounding creek systems. The results of these projects were discussed during separate meetings with Dr Ian Halliday (DPIF Senior Fisheries Biologist), Bill Sawynok (InfoFish Services) and Dr John Platten (DERM and Capricorn Bunker Consulting). Details were provided concerning the approach that DERM were taking in assessing the risk posed to the ecological assets. Further information pertaining to the reports and general information about barramundi in the Fitzroy estuary were also discussed. A series of models on barramundi recruitment and growth were then provided which could be applied to IQQM modelled datasets (see below).

Relationship between Barramundi Year Class Strength (YCS) and freshwater flow

The methods and data presented below are summarised from Chapter 6 of the DPIF project detailed above. For further details consult Halliday et al (2007a). The year class strength (YCS) of Fitzroy estuary Barramundi were determined using the age-structures of the commercial catch of barramundi collected over five consecutive years in the Fitzroy estuary.

In total 2112 barramundi were aged using sagittal otoliths during the five consecutive 'sampling years' (year-1 = 2000/01, year-2 = 2001/02, year-3 = 2002/03, year-4 = 2003/04 and year-5 = 2004/05). Sampling occurred twice each 'sampling year', once in the week(s) preceding the seasonal fishing closure (October) and then again in the week(s) after the opening of the fishery (February).

The barramundi catch ranged in age from 2 years old to 32 years old; 8.3% of the sampled catch aged as two years old, 88.4% of the catch aged between 3 and 11, 2.0% of the catch aged between 12 and 20 years old and 1.3% of the sampled catch aged as greater than 20 years old. The standardised residuals from the catch-curve regressions were used to give an indication of relative YCS for barramundi aged between 3 to 11 years old. When compared against summer flow, the year-class strength of barramundi fluctuated and was significantly and positively correlated ($p < 0.001$), however the goodness-of-fit was relatively low ($R^2 = 0.3732$) (Figure 17; Figure 18). The resulting linear equation (Figure 18) was applied to log₁₀ summer (December-February) IQQM modelled data (Pre-development, Current Development, Full Development) to generate three yearly time series of YCS.

A threshold of concern (ToC) was defined to establish the consequence of altering YCS on barramundi populations. A theoretical relationship between YCS and population maintenance was calculated using the thresholds described in Halliday *et al* (2007a) where strong (> 0.5 YCS index), moderate (0.5 to -0.5 YCS index) and poor (< -0.5 YCS index) years were identified. The proportional change between scenarios was calculated to identify changes between years of strong, moderate and poor YCS.

Strong recruitment years were considered to be those required to maintain a healthy barramundi population and the greater the number of years between these events, the higher potential risk to barramundi populations. A high risk profile (i.e. potential local population failure) was defined as any year where the number of consecutive years without strong recruitment exceeded the longevity of most barramundi of 11 years. A moderate risk profile was defined as any year where the number of consecutive years without strong recruitment was between the average age of protandry of 5 years (Pusey *et al.* 2004, Sawynok pers com) and the high risk profile. All other years were deemed as being low risk to barramundi populations. Overall risk from water resource development was interpreted as a change in the risk profiles (i.e. relative proportion of each risk category) between the pre-development scenario and the two development scenarios.

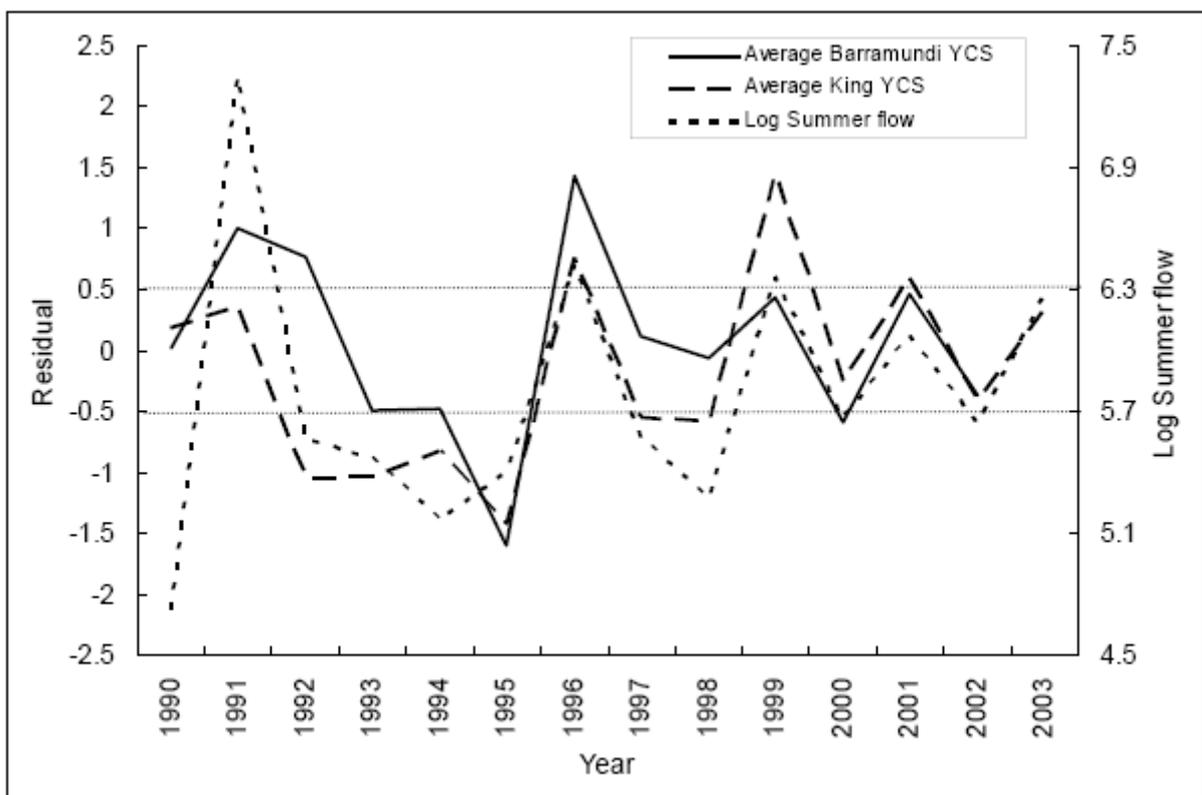


Figure 17 : Residuals from catch-curve regressions of barramundi and king threadfin against summer freshwater flows from the Fitzroy River estuary

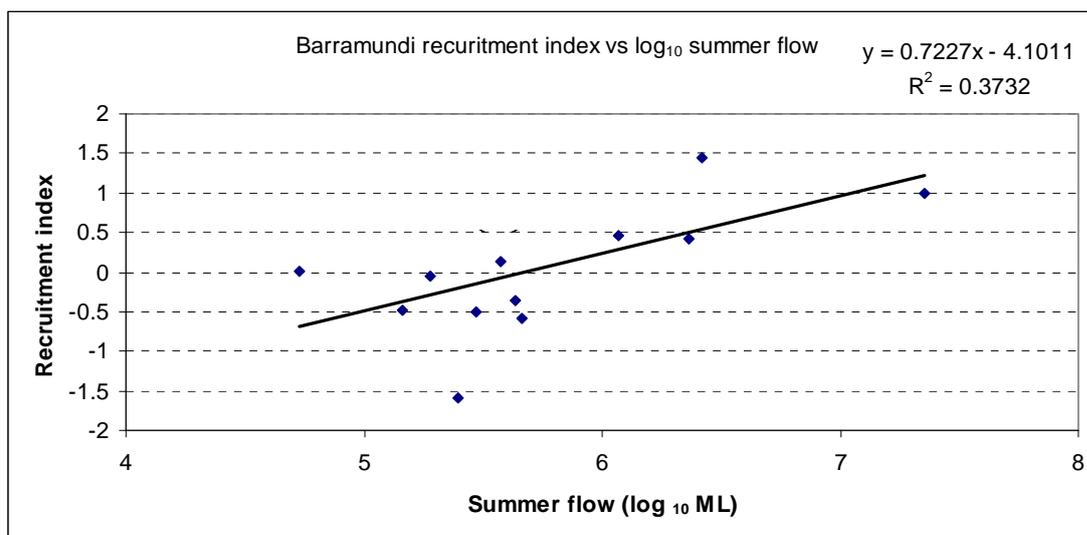


Figure 18: Scatter plot of catch-curve regressions of Barramundi against summer freshwater flows from the Fitzroy River estuary.

Relationship between Barramundi growth and freshwater flow

The methods and data presented below are summarised from Chapter 7 of the DPIF project details above. For further details consult Robins *et al.* (2007b).

Tag-recapture data were obtained from the Suntag Program of the Australian National Sport Fishing Association Queensland Inc. (ANSA Qld). A total of 1,168 tagged and recaptured barramundi between October 1984 and November 2004 were used in the assessment. Time-at-liberty, length-at-release, length-at-recapture, release year, release month, recapture year, recapture month, release location type, and recapture location type were calculated. Only Fitzroy River catchment records, time-at-liberty (in days) >30 and <366 and change in total length >0 mm were selected for analysis. Barramundi growth was estimated using the seasonal form of the von Bertalanffy equation, with the equation directly incorporating the effects of time-at-liberty, seasonality, and length-at-release. The effects of flow on growth rates were incorporated into the growth coefficient.

The resulting barramundi growth equations were split over a number of size classes and seasons. For the purpose of this assessment the growth equation for barramundi <420 mm were applied, which was of the form:

Barramundi Growth (mm/day) = a + b*LN (weekly flow in ML) where:

	Summer	Autumn	Winter	Spring
a	-0.31159	-0.17263	-0.01014	-0.1511
b	0.107743	0.059681	0.003506	0.052243

The equation was applied after flow reached 1,300 ML per week as growths prior to this threshold were constant (Figure 19).

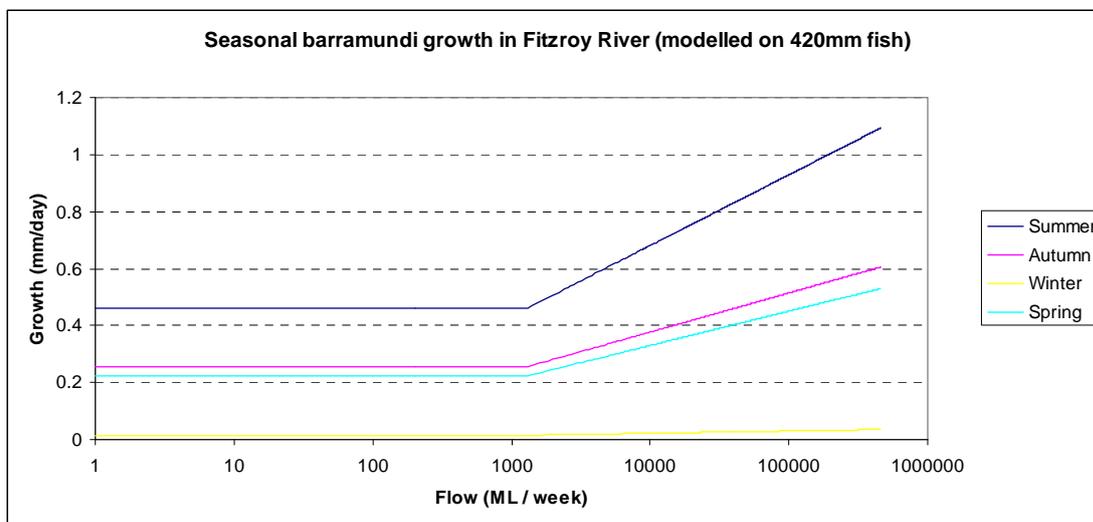


Figure 19: Thresholds of the effect of freshwater flow-during-liberty on seasonal growth rates of juvenile barramundi within the Fitzroy River estuary (note x-axis as log10 scale)

The seasonal equations were applied to respective weekly IQQM modelled data (Pre-development, Current Development, Full Development) to generate three daily time series of weekly barramundi growth.

A threshold of concern (ToC) could not be applied as the link between barramundi growth, survivorship and abundance has not been quantified. Therefore only the likelihood of water resource development potentially affecting barramundi growth was assessed for each season and on a yearly basis using growth frequency duration graphs and as a proportional change between scenarios.

Relationship between juvenile Barramundi recruitment and freshwater flow

Juvenile barramundi (<250 mm) recruitment in the 12 Mile creek system was identified from 23 years of fish tagging (1984 to 2008; including recaptures), cast netting (1999 to 2008) and electrofishing data (2006 to 2008), and collections following major fish kill events (early winter 2001, November 2005, late 2006).

Recruitment of barramundi into 12 Mile Creek was found to be dependent on the success of spawning in the adjacent Fitzroy River delta, the timing and volume of Fitzroy River flows and localised coastal rainfall events (Figure 20; Figure 18). Strong recruitment was observed when the total volume of wet season flows were > 1500 GL, the timing of the maximum flow events occurred during January and February, at least one monthly wet season flow exceeded 400 GL and when the localised rainfall during January and February exceeded 140 mm (green shading; Figure 18). In years when either the timing or the flow volume were outside the range (red shading; Figure 18) then recruitment was significantly low. In the remaining years when

conditions were close to the range (yellow/green shading; Figure 18) there was a moderate level of recruitment.

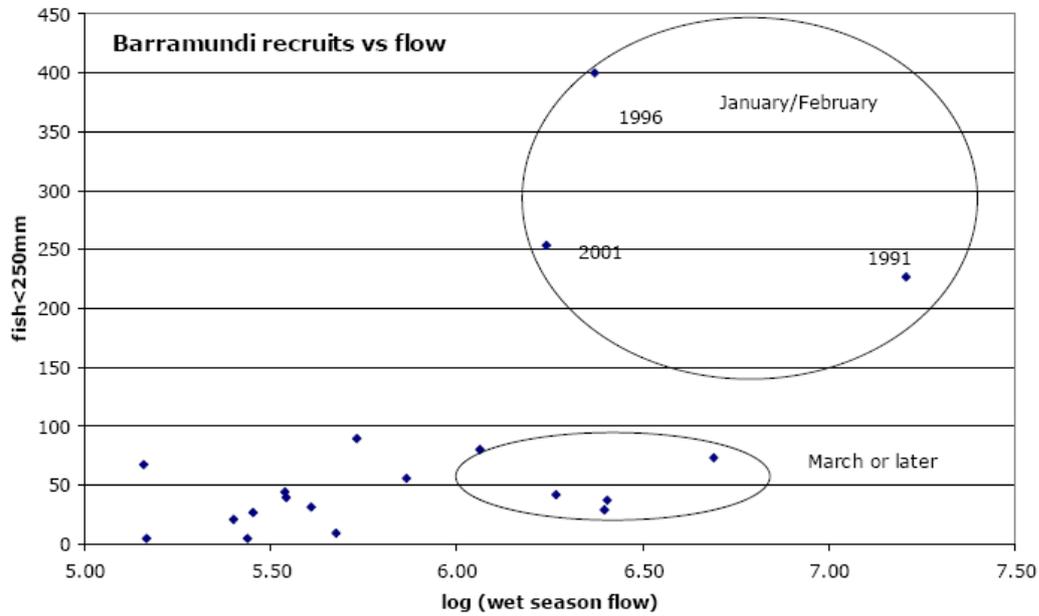


Figure 20: Recruitment of Barramundi in 12 Mile Creek related to log wet season flows (November-March). [Note the reduction in scale of 1996 recruitment which was actually 1,271] (adapted from Sawynok & Platten, 2008)

Table 19: Relationship between Barramundi recruitment, river flows in the Fitzroy River, rainfall at 12 Mile Creek and timing of flows (adapted from Sawynok & Platten, 2008).

YEAR	FLOW AND TIMING				RECRUITS		FITZROY RIVER			12 MILE	
	monthly flow > 0.4GL	wet season flow > 1.5GL	Max flow Jan/Feb	monthly 12 mile rain > 140 mm in Jan/Feb	Fitzroy recruits < 250mm	12mile recruits < 250mm	wet season flow	monthly flow	flow timing	12 mile rain	rain timing
1988	✓	✓			73	41					
1989	✓	✓	✓	✓	56	0					
1990				✓	9	0					
1991	✓	✓	✓	✓	227	117					
1992					27	0					
1993			✓		5	0					
1994	✓	✓		✓	29	0					
1995			✓	✓	21	5					
1996	✓	✓	✓	✓	1271	1236					
1997	✓	✓			37	18					
1998			✓		5	0					
1999	✓	✓			80	49					
2000			✓	✓	31	9					
2001	✓	✓	✓	✓	253	193					
2002			✓		44	7					
2003	✓	✓		✓	42	14					
2004	✓		✓	✓	189	11					
2005			✓	✓	140	24					
2006					68	6					
2007					29	0					
	Conditions outside range										
	Conditions close to range										
	Conditions inside range										

The flow parameters of the barramundi recruitment model were applied to the log10 wet season (November to March) IQQM modelled data (Pre-development, Current Development, Full Development) to generate three yearly time series juvenile barramundi recruitment.

A threshold of concern (ToC) was defined to establish the consequence of altering juvenile recruitment on 12 Mile Creek barramundi populations. A relationship between juvenile recruitment and population maintenance was calculated using the number of flow parameters which were met during each year. The proportional change between scenarios was calculated to identify changes between years of strong recruitment (all three flow parameters met), moderate recruitment (1 or 2 flow parameters met) and poor recruitment (no flow parameters met).

The strong juvenile barramundi recruitment was adopted as the threshold of concern (ToC). A high risk profile (i.e. potential local population failure) was defined as any year where the number of consecutive years without strong recruitment exceeded the most common longevity of barramundi, 11 years. A moderate risk profile was defined as any year where the number of consecutive years without strong recruitment was between the average age of protandry of five years (Pusey et al. 2004, Sawynok pers com) and the high risk profile. All other years were

deemed as being low risk to barramundi populations. Overall risk from water resource development was interpreted as a change in the risk profiles (i.e. relative proportion of each risk category) between the pre-development scenario and the two development scenarios.

Results

Relationship between Barramundi Year Class Strength (YCS) and freshwater flow

Assessment of the pre-development scenario revealed up to 67% of years in the IQQM simulation period contained flows which would result in moderate barramundi recruitment (Table 20). Less than 5% of the total years modelled resulted in poor recruitment with the remainder years (28%) containing strong recruitment.

Comparisons between pre-development and development scenarios revealed a decrease in strong recruitment years, minor decrease in moderate recruitment years and an increase in poor recruitment years (Table 20). Likewise, comparisons between current development and full development scenarios revealed a decrease in strong recruitment years and an increase in the number of poor recruitment years. Most differences between IQQM scenarios were observed between 0.4 to -0.7 YCS regression residuals (Figure 21), with the greatest deviation occurring around the -0.1 YCS with a 15% deviation in time exceedence.

Risk to barramundi persistence from water resource management varied between scenarios, with an increased risk to barramundi persistence under the full development scenario (Figure 22). There was little variation in risk between pre-development and current development scenarios, with the vast majority of years (>95%) at either low or moderate risk (Figure 22). The risk to barramundi YCS was greatest in the full development scenario, with 17% of the modelled years at high risk (Figure 22).

These results indicate that the value of a persistent population of barramundi in the Fitzroy WRP area is at higher risk under the full development scenario evaluated.

Table 20: Total percent deviation of *Lates calcarifer* Year Class Strength (YCS) for strong, moderate and poor recruitment years (green shading 0% to ±5%; yellow shading ±5% to ±15%; orange shading ±15% to ±25%; red shading >±25%)

Fitzroy Estuary Barramundi YCS	% of years		
	Pre-development	Current Development	Full Development
Strong YCS	28%	25%	23%
% change from pre-development		-10%	-17%
% change from current development			-7%
Moderate YCS	67%	66%	66%
% change from pre-development		-1%	-1%
% change from current development			0%
Poor YCS	5%	8%	10%
% change from pre-development		80%	120%
% change from current development			22%

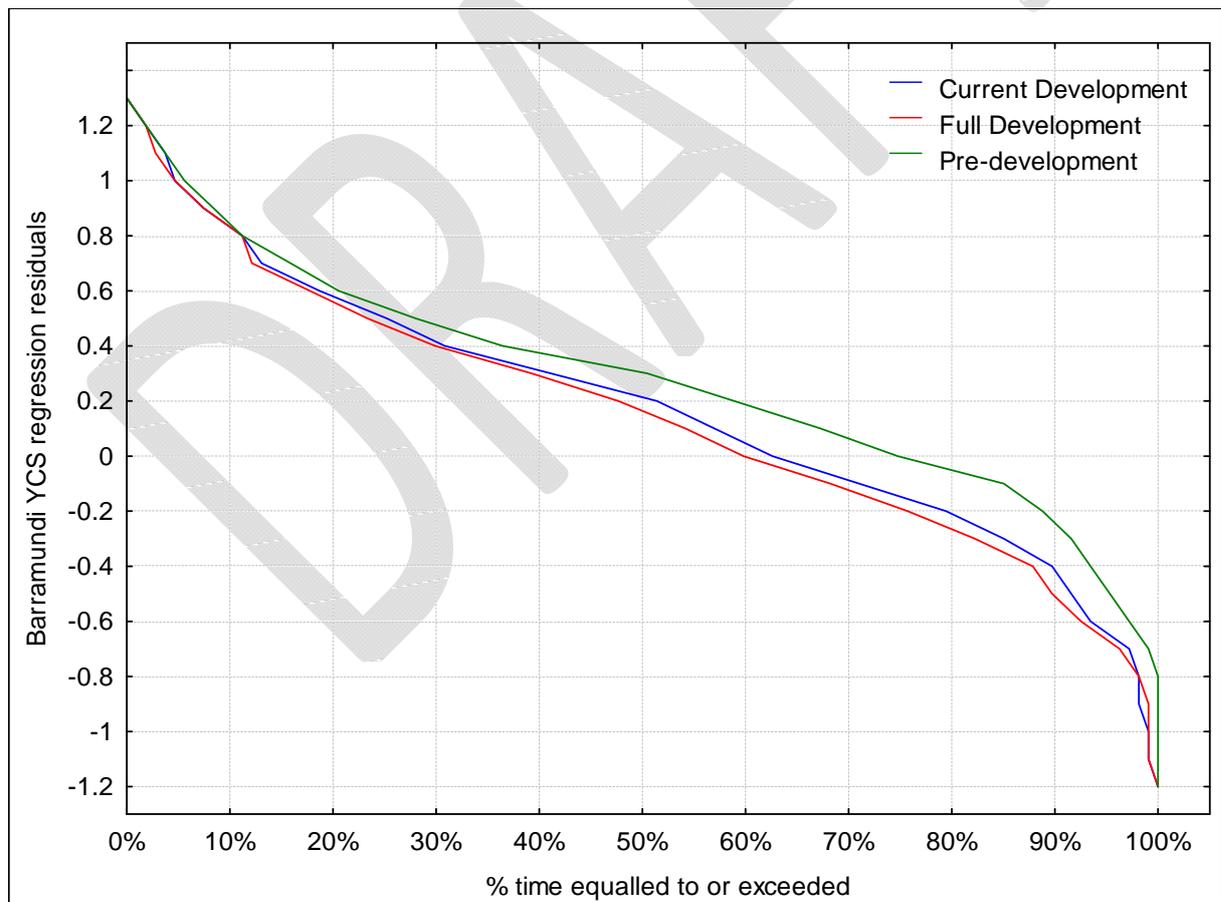


Figure 21: Cumulative frequency plot of *Lates calcarifer* Year Class Strength (YCS)

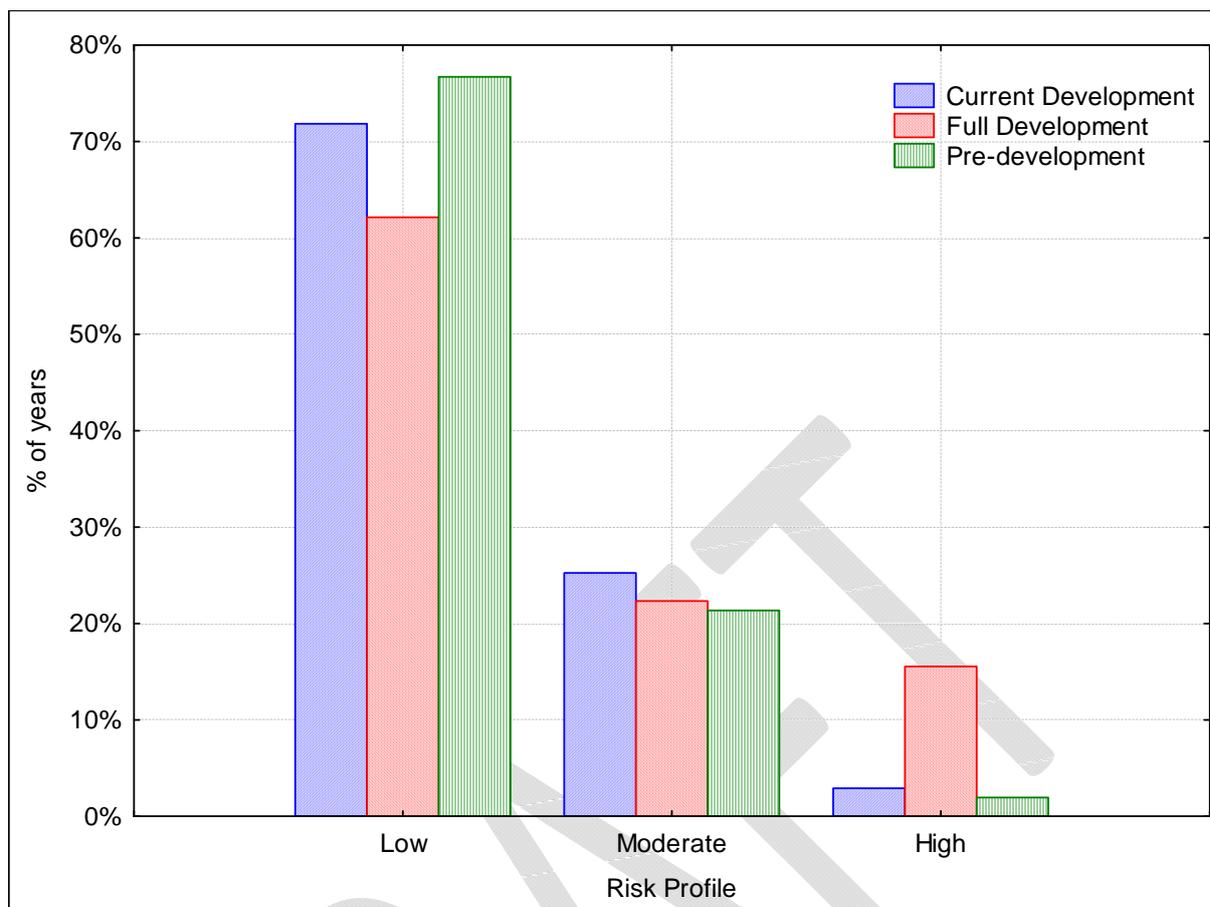


Figure 22 : Potential risk profile of *Lates calcarifer* persistence based upon assessment of Year Class Strength (YCS).

Relationship between Barramundi growth and freshwater flow

There was a negligible reduction in barramundi growth between pre-development and development scenarios, with differences ranging from 0% to -7% (Table 21; Figure 23). Reduced growth was observed mostly during summer with a -0.7% decrease between pre-development and the full development scenario (Table 21; Figure 23).

These results indicate that the value of Barramundi growth in the Fitzroy WRP area is unlikely to be threatened by either of the two development scenarios evaluated.

Table 21: Total percent deviation of *Lates calcarifer* growth (mm/day) on an annual and seasonal basis (green shading 0% to -5%; yellow shading -5% to -15%)

Season	Average Weekly Barramundi growth (mm)		
	Pre-development	Current Development	Full Development
All seasons	0.37	0.36	0.35
% change from pre-development		-4%	-5%
% change from current development			-1%
Summer	0.80	0.76	0.75
% change from pre-development		-6%	-7%
% change from current development			-1%
Autumn	0.39	0.39	0.38
% change from pre-development		-2%	-3%
% change from current development			-1%
Winter	0.02	0.02	0.02
% change from pre-development		0%	-1%
% change from current development			-1%
Spring	0.28	0.27	0.27
% change from pre-development		-3%	-3%
% change from current development			0%

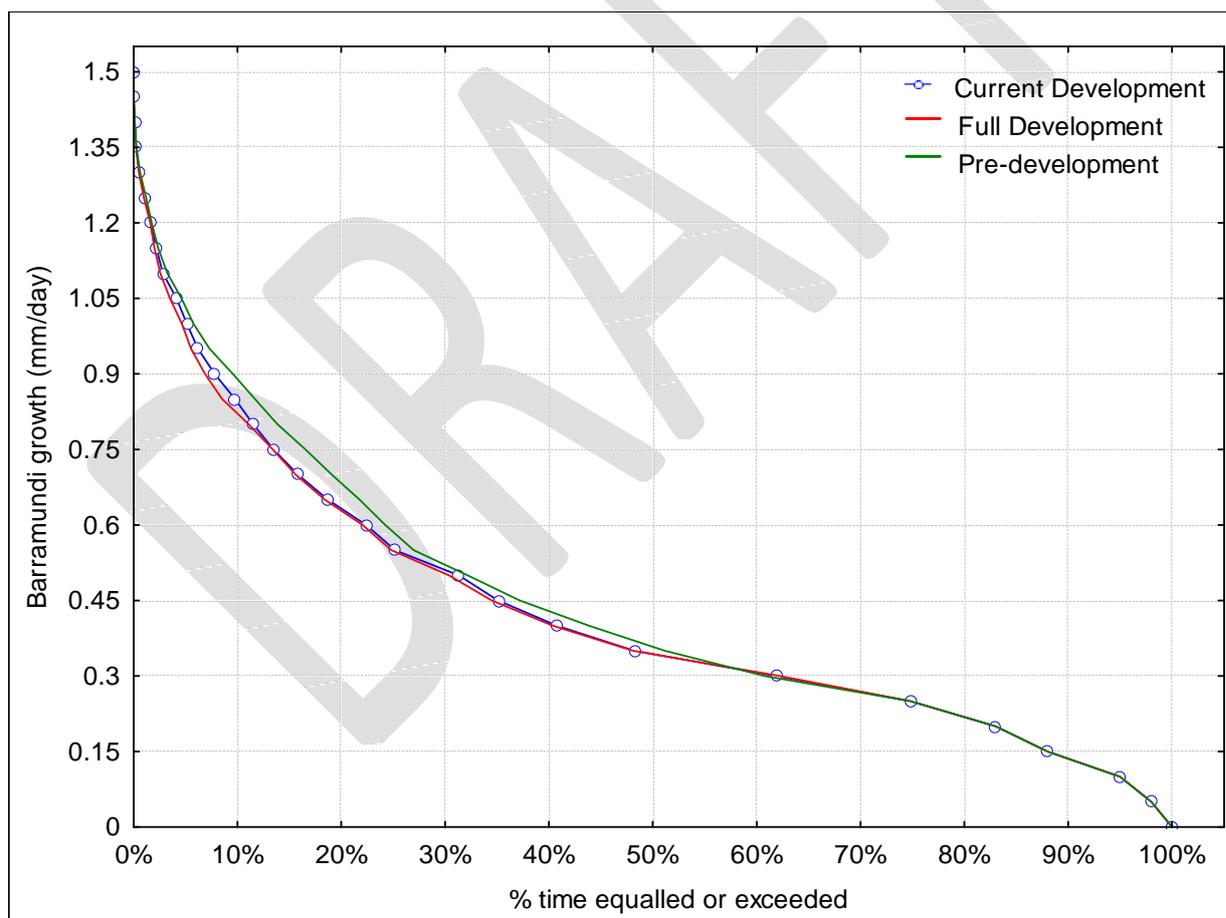


Figure 23: Cumulative frequency plot of *Lates calcarifer* growth (mm/day) across all years and seasons

Relationship between juvenile Barramundi recruitment and freshwater flow

The percent of years with strong barramundi recruitment into 12 Mile Creek decreased by up to 24% between pre-development and development scenarios (Table 22). This decrease in strong years saw an increase in the number of years with moderate or poor recruitment. There were negligible differences between the two development scenarios, except for an increase of 10 % of poor recruitment years under the full development scenario.

The maximum spell length between strong recruitment years was seven for the predevelopment scenario and 12 for both development scenarios (Figure 24). There was little variation between both development scenarios.

Overall risk to barramundi populations was low for the pre-development case, with over 90% of the modelled years having a low risk profile (Figure 25). The risk profiles for both development cases were the same and showed a higher risk as a result of water resource management. Approximately 3% of years were at high risk (i.e. the number of years between strong recruitment opportunities exceeded barramundi longevity) and 18% at moderate risk (i.e. the number of years between strong recruitment opportunities exceeded the age at protandry, but less than barramundi longevity). Fewer than 80% of years were under low risk.

These results indicate that the value of a persistent population of Barramundi in 12 Mile Creek is at higher risk under both development scenarios evaluated.

Table 22: Total percent deviation of *Lates calcarifer* recruitment into 12 Mile Creek for strong, moderate and poor recruitment years (green shading 0% to ±5%; yellow shading ±5% to ±15%; orange shading ±15% to ±25%)

12 Mile Ck Juvenile Barramundi recruitment	% of years		
	Pre-development	Current Development	Full Development
Strong recruitment	38%	30%	29%
% change from pre-development		-22%	-24%
% change from current development			-3%
Moderate Recruitment	45%	51%	50%
% change from pre-development		15%	13%
% change from current development			-2%
Poor Recruitment	17%	19%	21%
% change from pre-development		11%	22%
% change from current development			10%

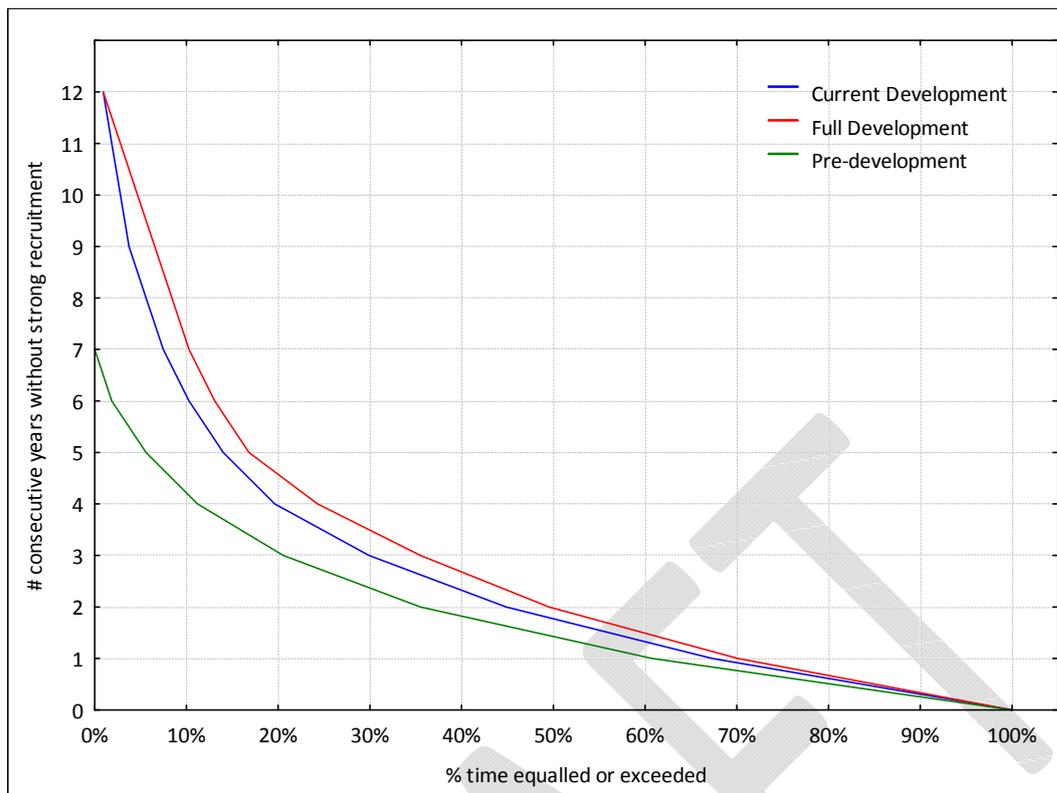


Figure 24: Cumulative frequency plot of the number of consecutive years without strong recruitment of juvenile *Lates calcarifer* into 12 Mile Creek.

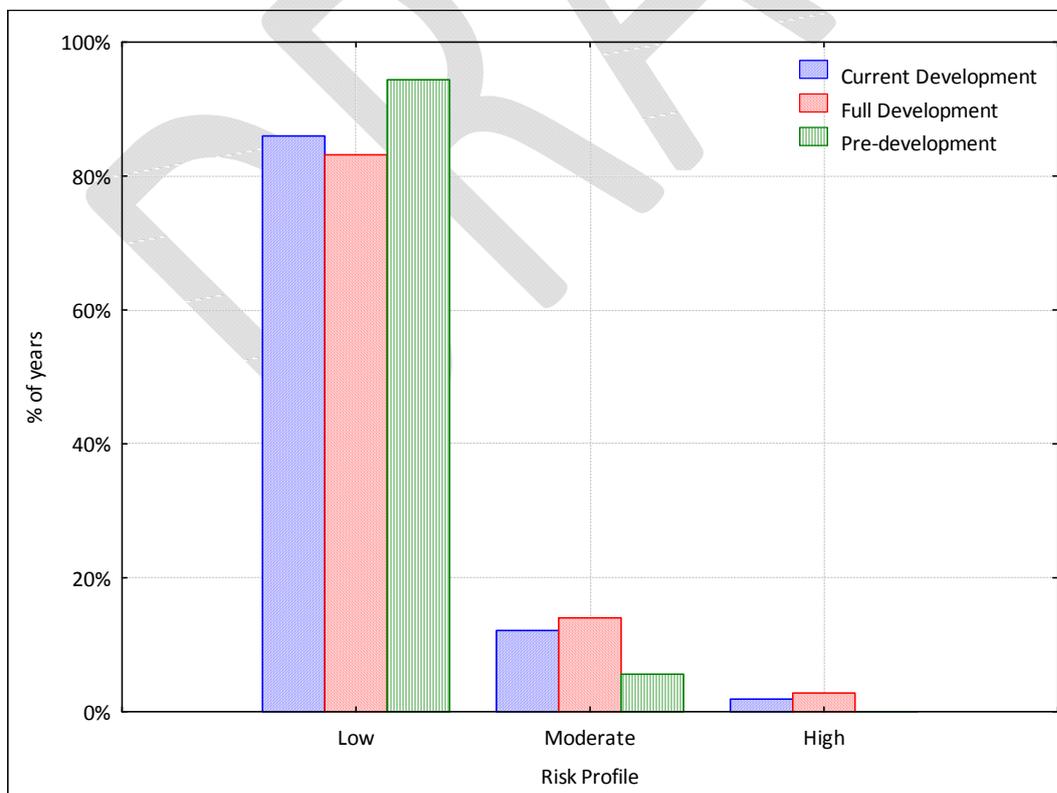


Figure 25 : Potential risk profile of *Lates calcarifer* persistence in 12 Mile Creek.

4.4 *Penaeus merguensis* (Banana Prawn)

Methods

Penaeus merguensis (Banana prawn) is a significant target species in the trawl fisheries of northern Australia. Banana prawn is an estuarine and coastal species occurring in waters up to 20 km from the coast and up to 45 m water depth (Robins *et al.* 2007; Grey *et al.* 1983). Banana prawns are a short lived species, completing their entire lifecycle within 12 months. Spawning occurs in marine environments throughout the year, with a peak spawning effort occurring during spring and autumn. Mangrove lined creeks are the preferred habitat of post-larvae and juveniles where recruitment and growth occur. Downstream migration of adolescent banana prawns outside of the estuary is associated with seasonal rainfall and flow events.

Banana prawns are relatively well researched with most studies demonstrating total commercial catch increasing in proportion to summer freshwater flow (Robins *et al.* 2007; Browder 1985; Vance *et al.* 1985; Evans *et al.* 1997; Vance *et al.* 1998; Galindo-Bect *et al.* 2000). Two studies have been undertaken in the Fitzroy estuary investigating this relationship. Robins *et al.* (2007) found a positive correlation between commercial catch and freshwater flow and proposed that increased flows improve catchability and recruitment of banana prawns. Robins *et al.* (2007) further explored this relationship and identified that juvenile prawn growth is significantly related to increased freshwater flows. The outputs of the research undertaken by Robins *et al.* (2007) has been used in the method implemented to identify the potential risk to prawn growth and recruitment in response to changes in flow regime.

Fitzroy estuary banana prawn populations were collected over four 'sample years' (year 1 = 2001/02; year 2 = 2002/03; year 3 = 2003/4; year 4 = 2004/05) and comprised of 51 separate sample trips. Four regions were sampled on a fortnightly basis from October to May. Shallow water areas (i.e. <1 m deep) adjacent to creeks and drainage channels of banks in the main river were sampled on the low tide using a beam trawl net (1 m high, 0.5 m wide, 6 mm mesh). All banana prawns caught were measured to a truncated 1 mm carapace length size class.

Banana prawn growth was estimated using the nonlinear von Bertalanffy equation of the form:

$$\text{Length}_2 = \text{Length}_1 + (L_\infty - \text{Length}_1) * [1 - \exp (-\{ a + kc * \text{temp} + kd * \text{temp}^2 + ke * \text{flow}_0 + kf * \text{flow}_0^2 + kg * \text{flow}_4 \} * \text{Days} + b)]$$

with the constants:

days	Length1	L ∞	a	b	kc	kd	ke	kf	kg
42	5	38	-0.0344	-0.0249	0.00297	-0.0000604	9.32E-08	-5.79E-13	5.57E-08

Water temperature data (temp) were calculated for each month using mean daily water temperatures over the given period of gauged records at Fitzroy River at The Gap (130005a) (Appendix A). Temp2 was the square of these values.

For each IQQM scenario (Pre-development, Current Development, Full Development), flow data were summed to give total freshwater inflow to the estuary for the period between dates when each cohort was sampled (flow0). There was a possible delay between the timing of a freshwater flow event and subsequent effects on the growth rates of banana prawns (i.e. a lagged effect) as a consequence of nutrient input and trophic transfer. To include potential lagged effects in the model freshwater flows were aggregated for the four weeks prior to the first sampling date of a cohort (flow4). Three daily time series of fortnightly banana prawn growth were generated.

A threshold of concern (ToC) could not be applied as the link between banana prawn growth, survivorship and abundance has not been quantified. Therefore only the likelihood of water resource development potentially affecting banana prawn growth was assessed for each season and on a yearly basis using growth frequency duration graphs and as a proportional change between scenarios.

Results

There was a significant reduction in juvenile banana prawn growth between pre-development and development scenarios, with percent deviation ranging from -11% to -30% (Table 23). There was little reduction in growth between the two development scenarios. Summer growth was the most effected, followed by spring, winter and autumn.

The greatest deviation of banana prawn growth occurred between the 0.75 to 2.5 mm/week growth, with a maximum deviation of 20% time exceedence at 1 mm/week growth (Figure 26). Banana prawn growth outside of this range varied little between scenarios.

These results indicate that the value of Banana prawn growth in the Fitzroy WRP area is potentially at higher risk under both development IQQM scenarios evaluated.

Table 23: Total percent deviation of average weekly *Penaeus merguensis* growth (green shading 0% to ±5%; yellow shading ±5% to ±15%; orange shading ±15% to ±25%; red shading >±25%)

	Average Weekly Growth (mm)		
	Pre-development	Current Development	Full Development
All seasons	1.38	1.13	1.09
% change from pre-development		-19%	-22%
% change from current development			-4%
Summer	1.85	1.35	1.29
% change from pre-development		-27%	-30%
% change from current development			-4%
Autumn	2.02	1.79	1.71
% change from pre-development		-11%	-15%
% change from current development			-4%
Winter	0.87	0.71	0.68
% change from pre-development		-18%	-22%
% change from current development			-5%
Spring	0.95	0.77	0.76
% change from pre-development		-20%	-20%
% change from current development			-1%

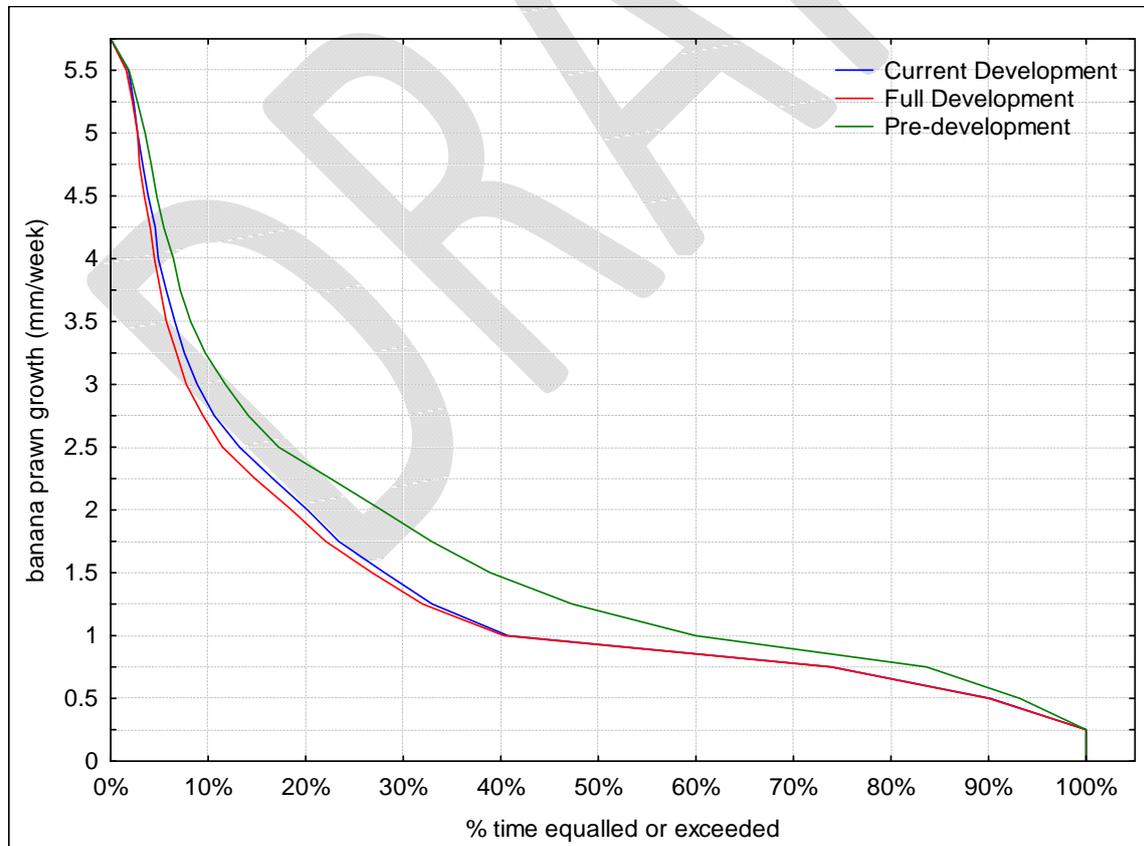


Figure 26: Cumulative frequency plot of *Penaeus merguensis* weekly growth over the IQQM simulation period.

4.5 Offshore reef fisheries

Methods

The method used to identify potential risk to offshore reef fisheries in response to changes in flow regime is based on research undertaken by Platten & Sawynok (2008). This study examined the catch records of two fishing clubs fishing in three locations; the Wanderers Fishing Club (Cape Capricorn and Gladstone Harbour) and Yaralla Fishing Club (Capricorn Bunker Group of the Great Barrier Reef). The long term datasets of catches (1976 to 2008) from two recreational fishing clubs were used to develop predictive numerical models of fisheries response (through catch rates) to river flow.

The results from the Capricorn Bunker Group were used in this investigation. The catch is multi-species but dominated by the Redthroat Emperor (*Lethrinus miniatus*). The initial analyses showed that catch rates increased, in response to increased river flows, especially above a flow threshold of greater than mean wet season flows. It also indicated that catch rates remained elevated for several years after large flow events. There may also be a limit to the positive correlation between flow and catch rate, as there is little increase in catch rates once flows exceed a certain level as circled in Figure 27 (Platten & Sawynok, 2008).

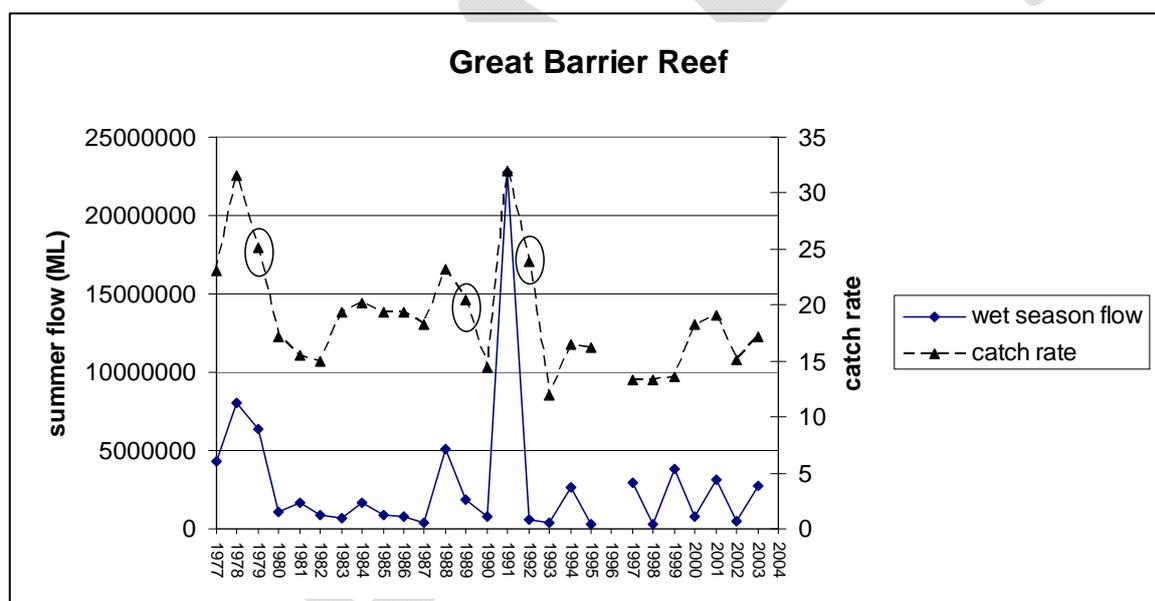


Figure 27: Time series of catch rates (fish/person/trip) and wet season flow (ML) of the Fitzroy River at the Gap gauging station (Platten & Sawynok, 2008)

Based on these analyses numerical models consisting of two parts were developed (Platten & Sawynok, 2008). The first model was a logistic equation and included all years, apart from those following high flow years, and was of the form:

$$\text{Catch rate} = f / (a + b \cdot e^{-((m(\text{wet season flow}) + c)/g)}) + d$$

with the constants:

a	b	c	d	f	m	g
12120.44	3312455.74	-210028.55	16.53	190548.16	1.08	1083205.75

Due to the lagged effect demonstrated, the second model included years following above average wet season flows (Figure 29) and was of the form:

$$\text{Catch rate following high flow year} = 0.6473(\text{catch rate in high flow year}) + 4.0969$$

The models provided a good representation of the data (Figure 28 and Figure 29), with the logistic curve and linear equation describing 78% and 89% of the variance, respectively.

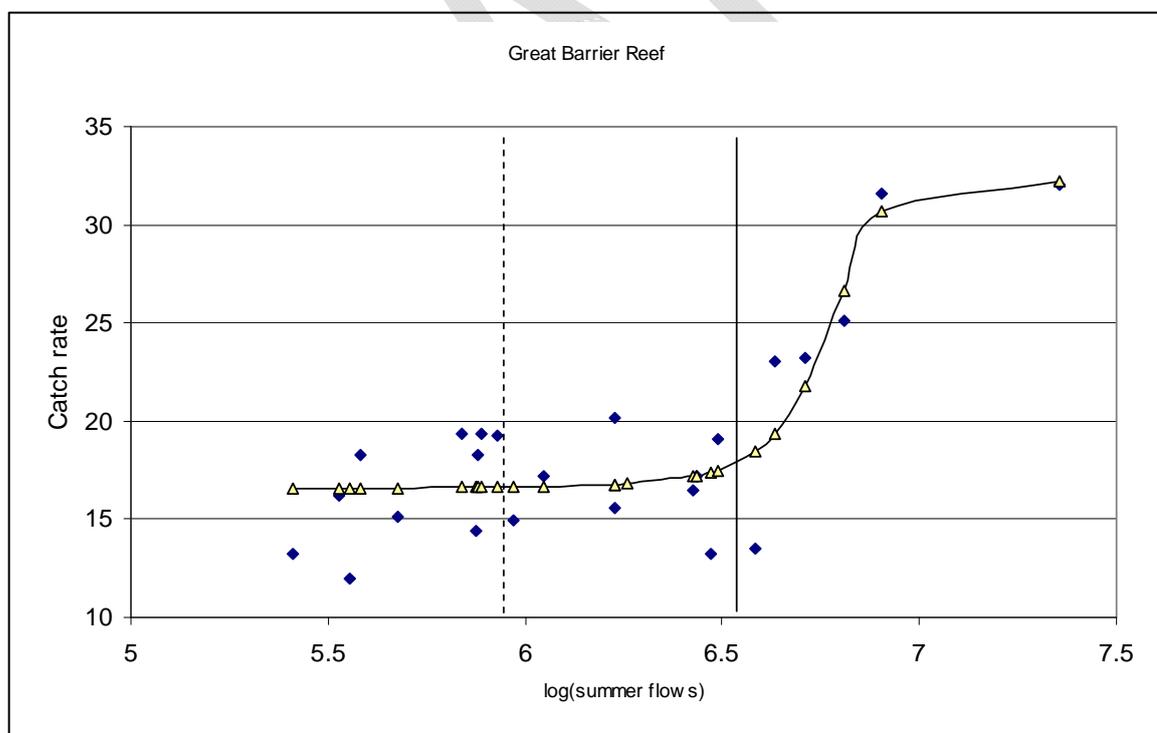


Figure 28 : Modelled (triangles) and observed catch rates for the Great Barrier Reef site compared with wet season flows of the Fitzroy River. Solid vertical line represents mean wet season flow; dashed line represents median wet season flows.

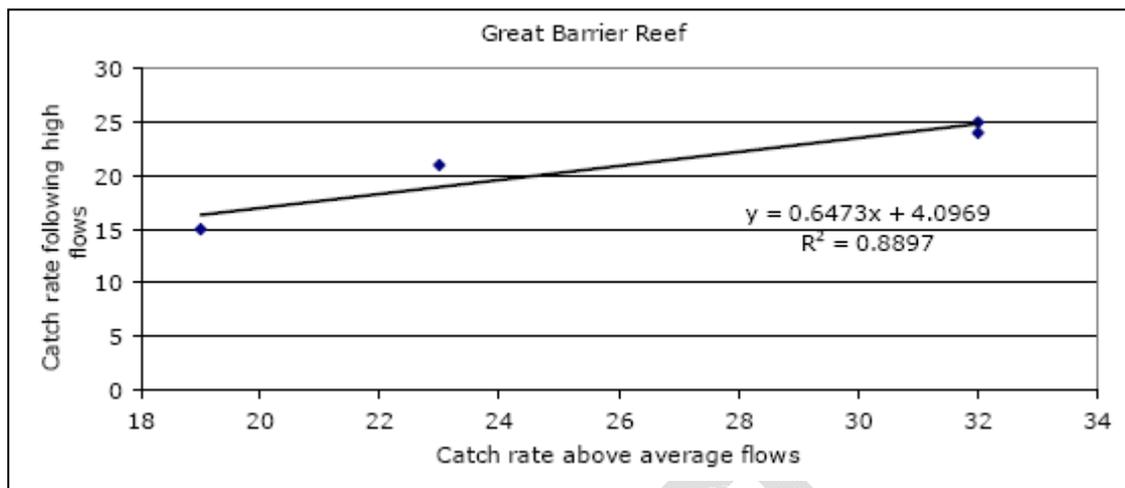


Figure 29: Modelled relationship between catch rates the year following above average wet season flows and the catch rates of years with above average flows for the Capricorn Bunker Group

Each equation was applied to respective wet season IQQM modelled data (Pre-development, Current Development, Full Development) to generate three daily time series of annual offshore reef catch rate. A threshold of concern (ToC) could not be applied as the effect of time between high catch years has not been quantified. Therefore only the likelihood of water resource development potentially affecting the number high catch years was assessed as a proportional change between scenarios. The time series of catch rates was also examined to determine potential differences on the number of years between high catch years (i.e. spell analysis of non-high catch years).

Results

The numbers of high catch years at the Capricorn Bunker group decreased by five years (12% deviation) between pre-development and development scenarios (Table 24). The maximum number of years with consecutive high catch rates were seven years from 1905/06 to 1911/12 and 1973/74 to 1979/80 (Appendix G; Figure 30). The maximum spell length between modelled high catch years for all scenarios was 16 years from 1923/24 through until 1938/39. The next greatest spell between high catch years was from 1992/03 to 2006/07, where 15 years passed without modelled high catch rates. During this period there were three years where high catch years were predicted to occur.

These results indicate that the chances of high catch years at the Capricorn Bunker are potentially reduced and the spell length between high catch years are increased under both development scenarios evaluated.

Table 24: Total percent deviations of offshore reef fisheries (Capricorn Bunker Group) high catch years (green shading 0% to ±5%; yellow shading ±5% to ±15%)

	Number of high catch years		
	Pre-development	Current Development	Full Development
Offshore Catch- Capricorn Bunker Group	43	38	38
% change from pre-development		-12%	-12%
% change from current development			0%

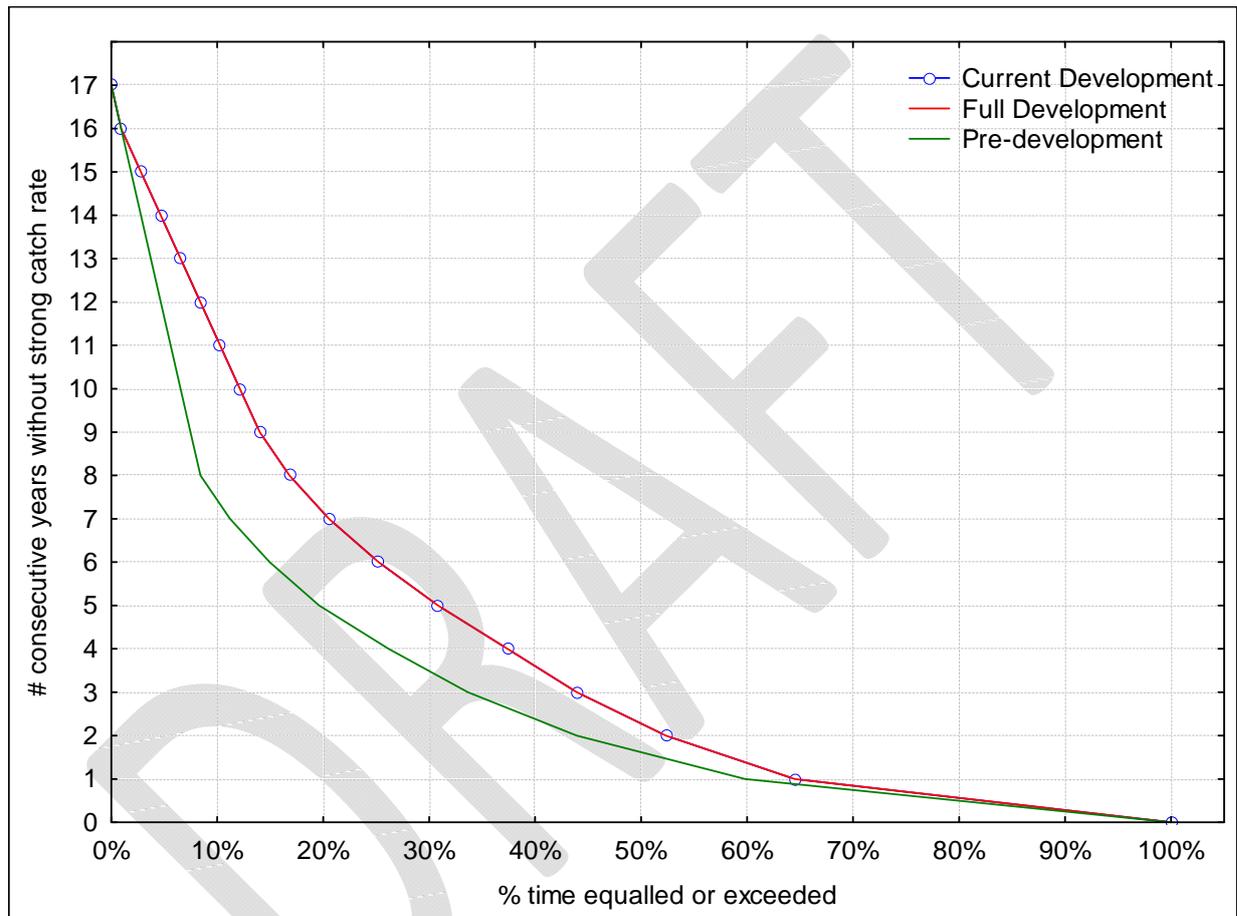


Figure 30: Cumulative frequency plot of the number of consecutive years without high catch rates from the Capricorn Bunker Group.

4.6 *Polydactylus macrochir* (King Threadfin Salmon)

Methods

Polydactylus macrochir (King threadfin salmon) are widely distributed throughout northern Australia, occurring in tropical waters from Northern Territory/Western Australia border to Noosa River (Queensland). King threadfin are a long lived species, living up to 14 years (Garrett, 1997), but more commonly to 11 years (Halliday *et al.* 2007a). King threadfin are protandrous hermaphrodites, beginning life as a male, changing into females and completing their entire lifecycle in estuarine and associated marine foreshore environments. Most King threadfin reach spawning maturity between two to five years and change from male to females between six and ten years (Robins *et al.* 2007). Spawning occurs in high salinity waters, from winter to spring, however timing varies between 'northern' and southern' Queensland stocks.

The research conducted by Halliday *et al.* (2007a) is the only documented study linking freshwater flows and King threadfin populations. This study provided quantitative evidence to support that there are substantial benefits to King threadfin production from allowing freshwater flows to reach the estuary. Evidence is seen in increasing catch, which represents enhanced King threadfin growth as a result of increased biological productivity within estuaries. Juvenile King threadfin benefit from increased biological productivity, as lowered salinities in favourable habitats affect the energy budgets and/or create turbid conditions which, in turn, reduce the threat of predation (Halliday *et al.* 2007a) (Table 18).

The outcomes of this study were utilised to identify risk to King threadfin population's growth and recruitment in both the Fitzroy and surrounding estuaries. The results of this study and general information about King threadfin in the Fitzroy estuary were discussed during a meeting with Dr Ian Halliday (DPIF Senior Fisheries Biologist). As a result of this meeting the recruitment model developed in Halliday *et al.* (2007a) was provided such that it could be applied to IQQM modelled datasets (see below).

The recruitment model uses the age-structures of the commercial catch collected over five consecutive years in the Fitzroy estuary to determine year class strength (YCS) of King threadfin (Halliday *et al.* 2007a). In total 716 King threadfin were aged using sagittal otoliths during the five consecutive 'sampling years' (year-1 = 2000/01, year-2 = 2001/02, year-3 = 2002/03, year-4 = 2003/04 and year-5 = 2004/05). Sampling occurred twice each 'sampling year', once in the week(s) preceding October and then again in the week(s) in February. The King threadfin catch ranged in age from 1 year old to 19 years old, with 3.1% of the sampled catch aged as one year old, 86.3% of the catch aged between 2 and 11 and 10.6% of the catch aged between 12 and 19 years-old.

The standardised residuals from the catch-curve regressions were used to give an indication of relative YCS for King threadfin aged between 2 to 11 years old. When compared against summer flow, the year-class strength of King threadfin fluctuated and was significantly and positively correlated ($p < 0.001$), however the goodness-of-fit was relatively low ($R^2 = 0.3488$) (Figure 17; Figure 31). The resulting linear equation was applied to log₁₀ summer (December-

February) IQQM modelled data (Pre-development, Current Development, Full Development) to generate three yearly time series of YCS.

A threshold of concern (ToC) was defined to establish the consequence of altering YCS on King threadfin populations. A theoretical relationship between YCS and population maintenance was calculated using the thresholds described in Halliday *et al.* (2007a) where strong (>0.5 YCS index), moderate (0.5 to -0.5 YCS index) and poor (<-0.5 YCS index) years were identified. The proportional change between scenarios was calculated to identify changes between years of strong, moderate and poor YCS.

Strong recruitment years were considered to be those required to maintain a sustainable King threadfin population and the greater the number of years between these events, the higher potential risk to King threadfin populations. A high risk profile (i.e. potential local population failure) was defined as any year where the number of consecutive years without strong recruitment exceeded the most common longevity of King threadfin, 11 years. A moderate risk profile was defined as any year where the number of consecutive years without strong recruitment was between the minimum age of protandry of six years (Robins *et al.* 2007) and the high risk profile. All other years were deemed as being low risk to King threadfin populations. Overall risk from water resource development was interpreted as a change in the risk profiles (i.e. relative proportion of each risk category) between the pre-development scenario and the two development scenarios.

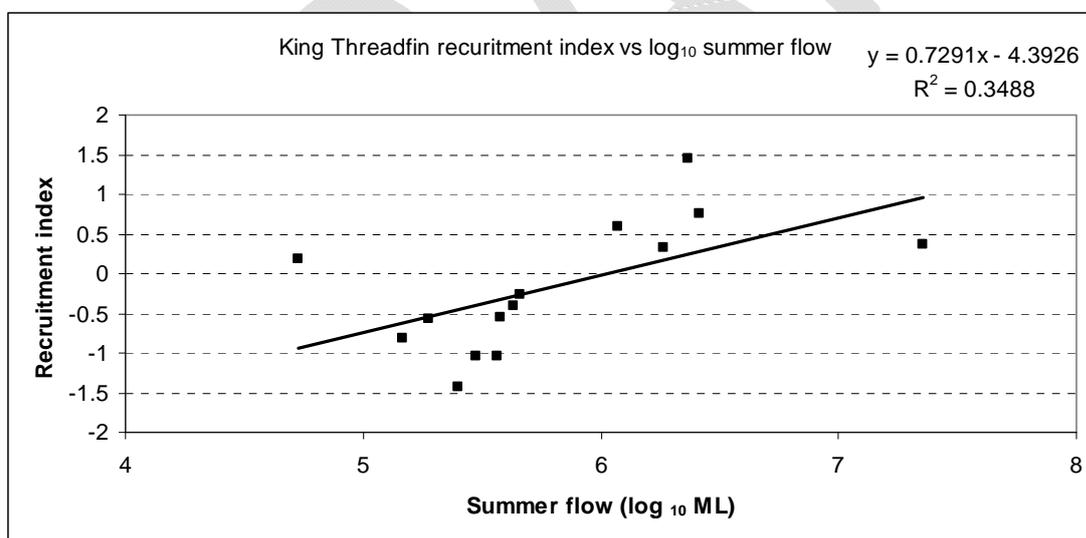


Figure 31: Scatter plot of catch-curve regressions of king salmon against summer freshwater flows from the Fitzroy River estuary.

Results

Assessment of the pre-development scenario revealed that more than 7 out of 10 years contained flows which would result in moderate King threadfin recruitment (Table 25). Of the remaining years, 17% were modelled as strong years and 11% as poor recruitment years.

Comparisons between pre-development and development scenarios revealed a decrease in strong and moderate recruitment years and a substantial increase in poor recruitment years (Table 25). Deviation between current and full development scenarios remained relatively unchanged for strong or moderate recruitment years, but increased in poor recruitment years. Most differences between IQQM scenarios were between 0.3 to -0.8 YCS regression residuals (Figure 32), with the greatest deviation occurring around the -0.3 YCS where a 16% deviation in time exceedence was observed.

Risk to King threadfin persistence from water resource management varied between pre-development and development scenarios, with an increased risk to King threadfin persistence in development scenarios (Figure 33). There was little change in risk profile between current and full development scenarios. Over half (56%) of the pre-development years were within the low risk profile, whilst 42% of years were low risk in the development scenarios. There was little difference between scenarios in the moderate risk category which accounted for 26% (pre-development) to 29% (current development and full development) of the total modelled years. The risk to King threadfin YCS was greatest in the development scenarios, with 29% of the modelled years at high risk compared to 17% for the pre-development scenario.

These results indicate that the value of a persistent population of King Threadfin in the Fitzroy WRP area is at higher risk under the development scenarios evaluated.

Table 25: Total percent deviation of *Polydactylus macrochir* Year Class Strength (YCS) for strong, moderate and poor recruitment years (green shading 0% to ±5%; yellow shading ±5% to ±15%; orange shading ±15% to ±25%; red shading >±25%)

Fitzroy Estuary <i>Polydactylus macrochir</i> YCS	% of years		
	Pre-development	Current Development	Full Development
Strong YCS	17%	12%	12%
% change from pre-development		-28%	-28%
% change from current development			0%
Moderate YCS	72%	68%	65%
% change from pre-development		-5%	-9%
% change from current development			-4%
Poor YCS	11%	20%	22%
% change from pre-development		75%	100%
% change from current development			14%

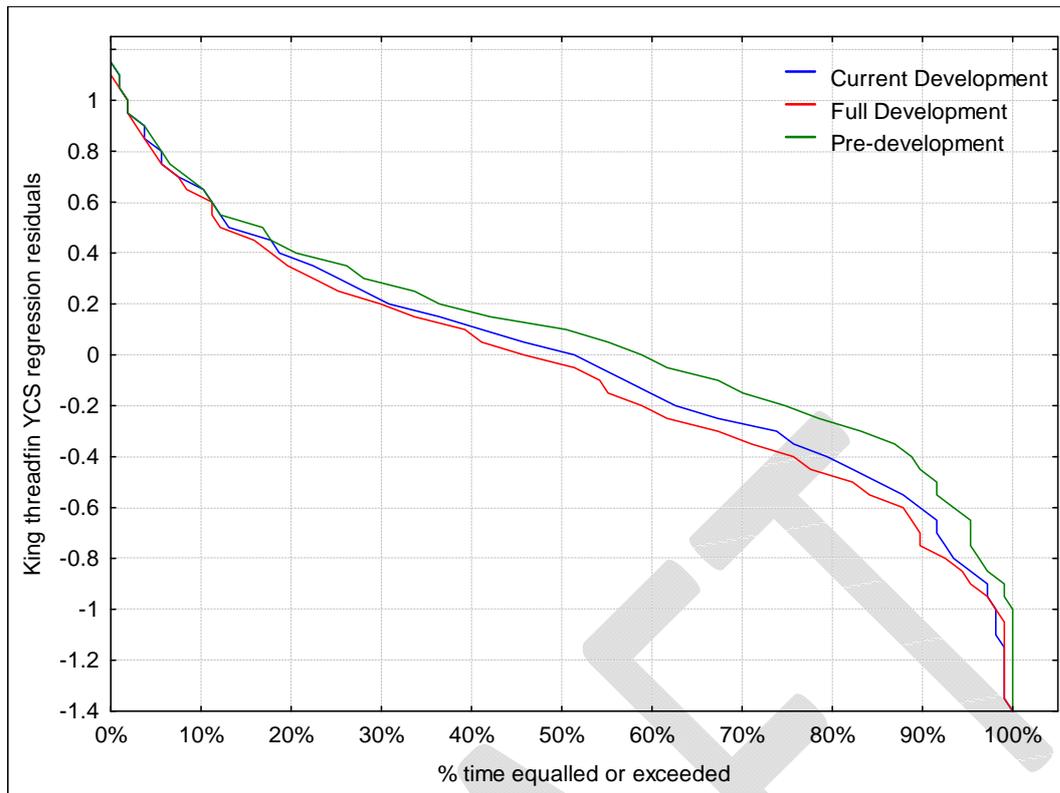


Figure 32: Cumulative frequency plot of *Polydactylus macrochir* Year Class Strength (YCS)

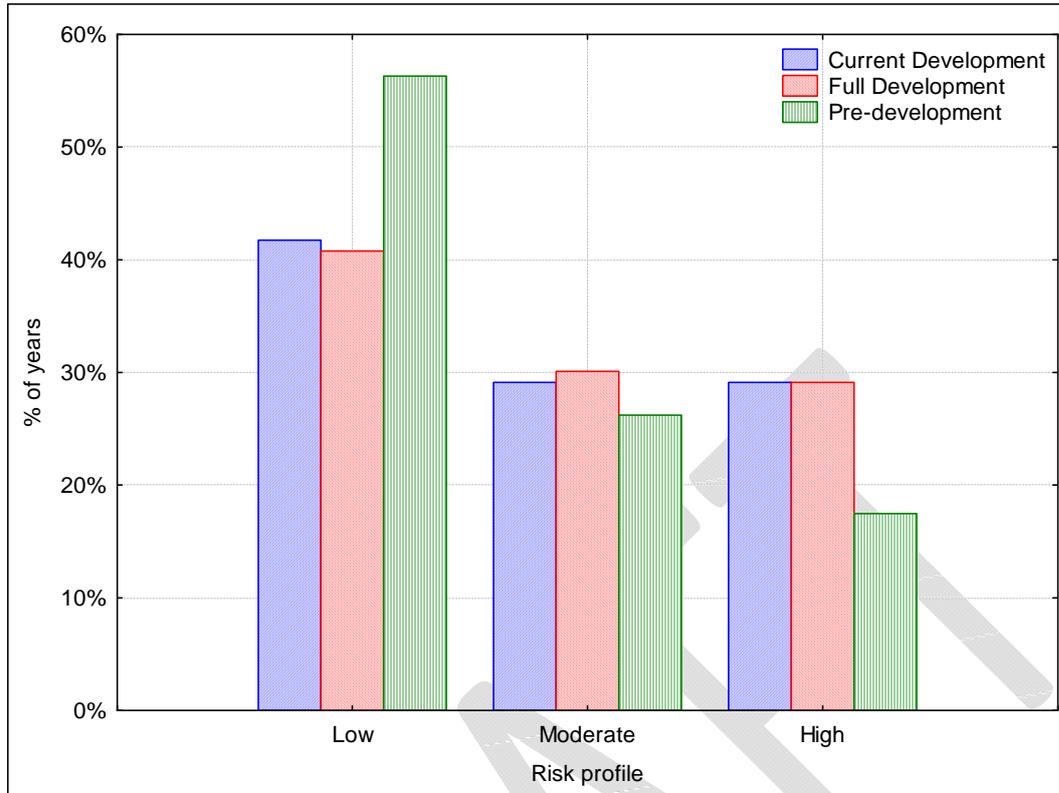


Figure 33 : Potential risk profile of *Polydactylus macrochir* persistence based upon assessment of Year Class Strength (YCS).

4.7 Riffles as habitat

Methods

Riffles are generally the most productive of riverine habitats, supporting a complex diversity of plants (e.g. macrophytes and benthic algae, fungi and bacteria) and animals (e.g. macroinvertebrates, fish, reptiles and amphibians). Riffles are often covered in many obligate and sometimes rare and sensitive rheophilic taxa (i.e. taxa which only occur in flowing water) specially adapted to cope with the fast flowing conditions. Their occupancy is primarily due to higher dissolved oxygen concentrations (caused by water turbulence), high availability of food resources (due to a concentration of drifting food such as invertebrates and detritus and rheophilic prey), improved level of light penetration (due to shallow water levels) and higher nutrient supply through groundwater/surfacewater connectivity.

Riffles are often cited as habitats at high risk due to flow modification (DNR, 1998 *WAMP TAP Technical Report 4*), and are sensitive to too little or too much flow. The worst case scenario is a complete loss of riffles through either drowning out of riffles or the complete cessation of flows. This would almost certainly result in a localised extinction of the obligate rheophilic taxa. Riffles are more commonly altered through a change in the duration, timing and magnitude of flows and changes between spell duration and timing of dry/drown-out periods. The ecological impacts will vary depending upon the nature of change, and will be influenced by the natural/historic flow pattern (riffles that dry/drown out more often will have a community adapted to these conditions), local climatic conditions (the more severe the dry/drown out period the greater the impact to the ecology) and location relative to recolonisation sources (the closer the recolonisation source, the less likely impact).

The method undertaken to identify potential changes to flows affecting riffles is summarised below in Figure 34 and uses rheophilic aquatic macroinvertebrate taxa as indicator species. The method uses riffle macroinvertebrate data and velocity and depth profiles at riffles associated with IQQM nodes. A percent riffle inundation rating curve is created whereby modelled flow data can be applied and a daily time series of percent riffle inundation created for each IQQM scenario.

Longitudinal and cross-sectional survey data were gathered from 13 riffles associated with WRP and IQQM nodes (Figure 35). In June 2008, five cross-sections and one longitudinal section were surveyed at nine sites in the Dawson River, Nogoia River and Theresa Creek. No surveys were conducted in the Mackenzie and Fitzroy Rivers as all riffles visited were flooded due to releases from upstream dams and weirs, and mine water releases. Survey data stored in Hydstra and collected as a part of the first Fitzroy WRP were used at these sites, (Figure 35).

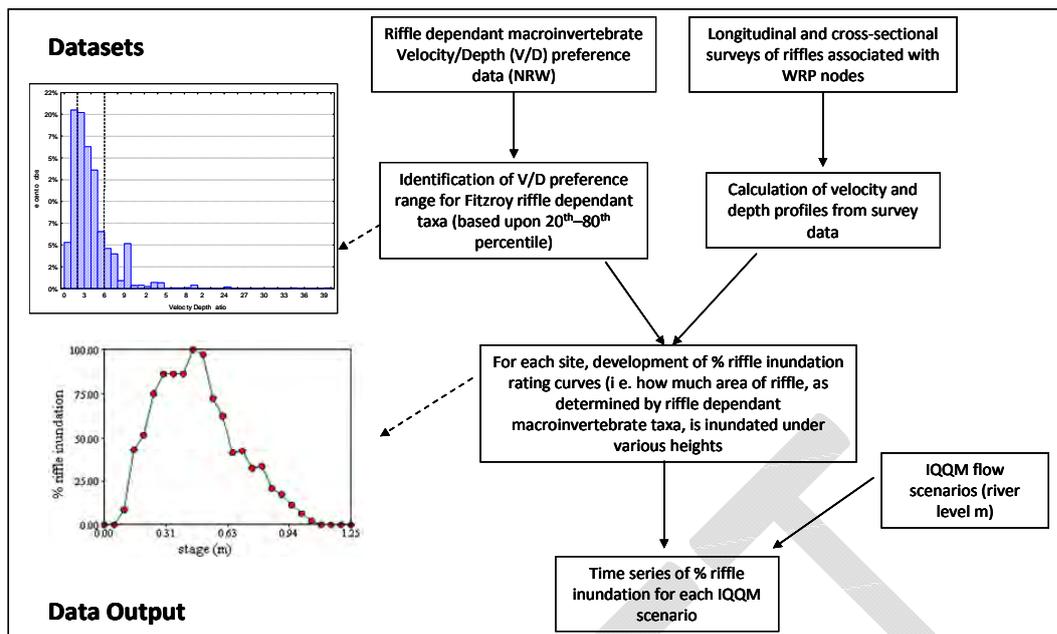


Figure 34: Flow diagram of the process undertaken to develop a % riffle inundation models

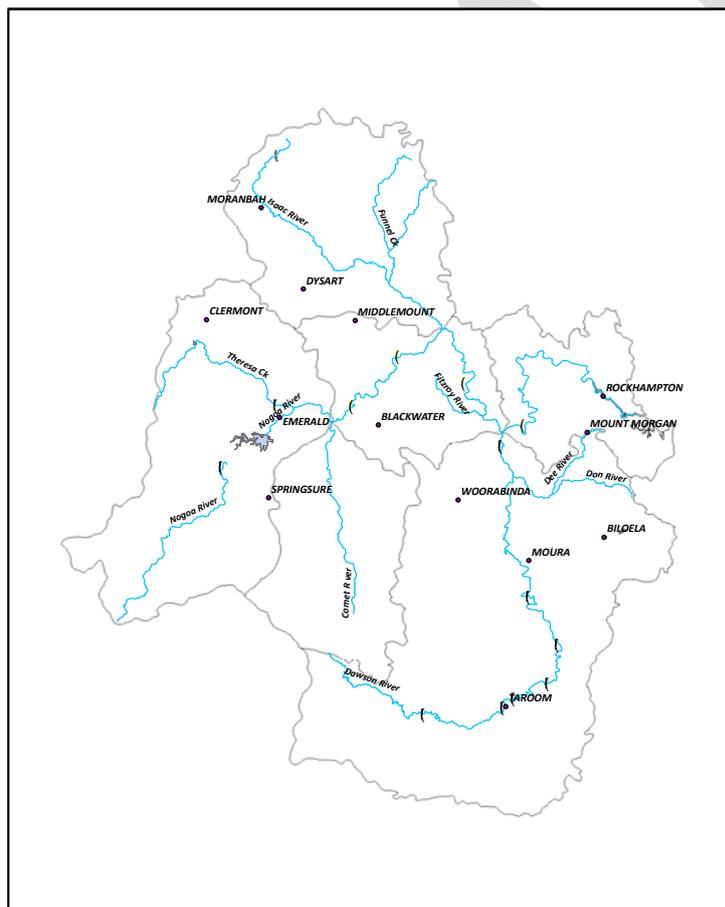


Figure 35: Location of riffles assessed as a part of this review. Black circles indicate sites surveyed during June 2008; Yellow circles indicate site survey data accessed through the DERM Hydstra database.

The Slope/Area method was utilised to calculate water depth and velocity profiles at cells along the riffle cross-sections (Bird, 1992). The method, based on Mannings Equation, uses river slope (m/m) and riverbed roughness (Mannings n) to estimate the hydrological parameters of the riffle cross-section, including discharge, surface area, relative water height and velocity.

Figure 36 demonstrates how velocity and depth data were calculated for each riffle. At any given water height, velocity, depth and width were estimated at a number of intervals ('cells') across the riffle cross-section. Estimates were undertaken at 0.05 m intervals from 0 m to 2 m river height, whilst the number and width of 'cells' across the cross-section was irregular and determined by changes in riverbed height. At each 'cell' velocity/depth ratio (V/D) was calculated for further assessment. All analyses were undertaken in RATE1 (v1.1) computer software and exported and edited in Excel©.

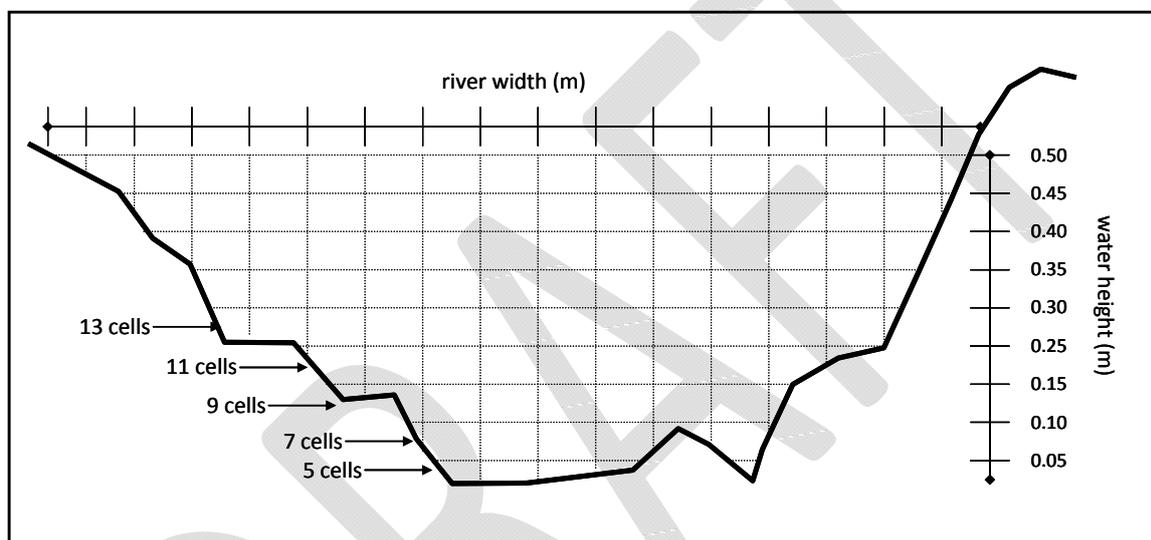


Figure 36: Riffle cross-section demonstrating how water depth and velocity parameters were calculated across riffle cross-section profiles.

A habitable riffle was determined using preference ranges of rheophilic macroinvertebrate taxa collected as a part of the DERM Statewide macroinvertebrate biological monitoring program and Fitzroy WRP pilot monitoring program (Figure 37). Marshall *et al.* (2000) identified macroinvertebrate flow preferences for all taxa collected from around the state and identified 22 rheophilic taxa. Of these 18 were found to occur in the Fitzroy Basin, with 14 taxa occurring at or near sites associated with WRP nodes.

The V/D preference range was calculated for all 14 rheophilic taxa based upon the 20th to 80th percentile range of occurrence. From a total of 731 samples, V/D ratio's ranged from 0.05 to 40, with the 20th to 80th percentile from two to six (Figure 38).

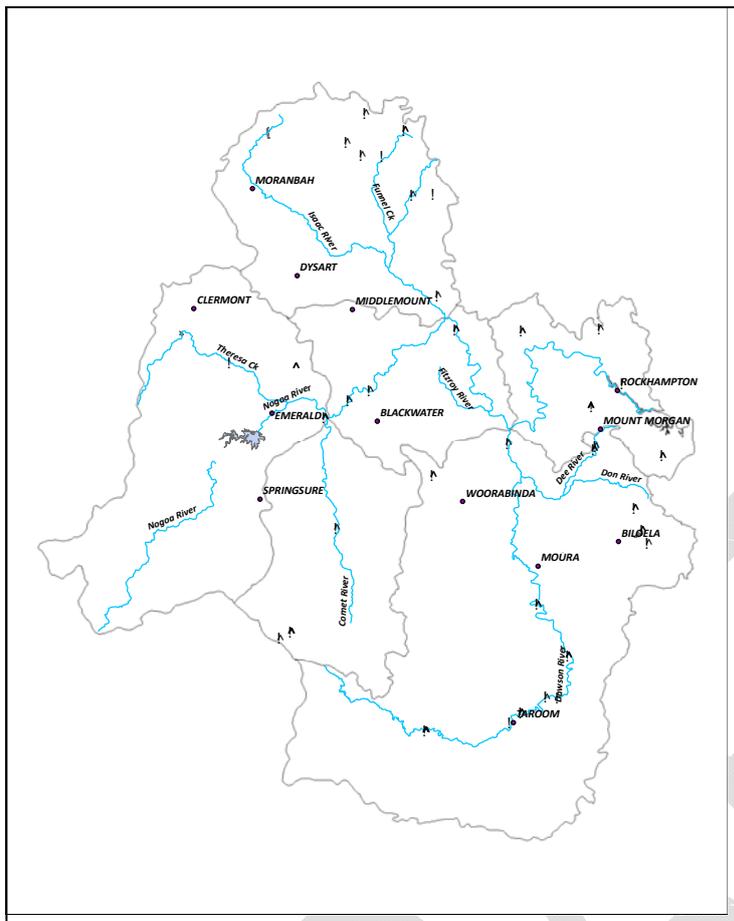


Figure 37: Location of riffles sampled for macroinvertebrates as a part of the DERM biological monitoring programs (1994-present) and WRP pilot monitoring project (2003-2004).

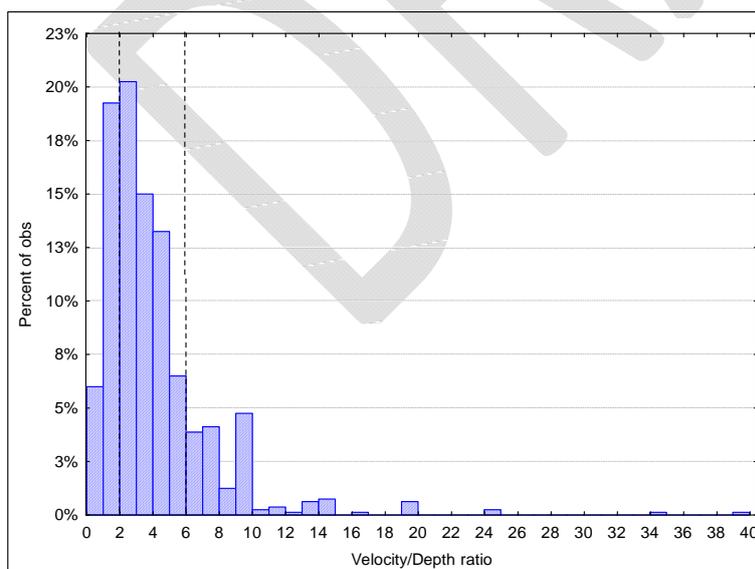


Figure 38: Frequency analysis of the velocity/depth ratio for 14 rheophilic macroinvertebrate taxa found in the Fitzroy Basin. Dashed lines indicate the 20th (V/D=2) and 80th (V/D=6) percentiles.

Each 'cell' V/D ratio identified in the cross-section survey analysis was assessed against the macroinvertebrate V/D preference range. For any given river height, the width of each 'cell' within the macroinvertebrate preference range (V/D 2-6) was summed to provide an estimated width of habitable riffle across the riffle cross-section. The percent riffle inundation rating curve was created for each riffle when performed for all 0.05 m river heights between 0-2 m.

Each rating curve was converted to a percentage of the maximum % riffle inundation value and imported into the Rating Curve function of the River Analysis Package (RAP Version 2.0.4; eWater (2008)). These were applied to each of the three IQQM scenarios (scenarios back-calculated to height (m)) to generate three daily time series of % riffle inundation for each node. This was summarised across the entire simulation period to highlight broad differences between the pre-development and each of the two development scenarios.

A threshold of concern (ToC) could not be applied as the specific flow duration requirements of rheophilic macroinvertebrate taxa are largely unknown. Therefore only the likelihood of water resource development potentially changing the frequency and duration of flow events was assessed for each site and across the plan area. The total percentage of time as a habitable riffle, dry riffle and inundated riffle was assessed as a proportional change between scenarios. The average duration and frequency between riffle forming flow events was assessed as a proportional change between scenarios.

Results

The percent of time when riffle forming flows occurred varied considerably around the basin, with values in the pre-development scenario ranging from 27% (Bingegang) to 90% (Baroondah) (Table 26). The remaining time was mostly dry, with values in the pre-development scenario ranging between 5% (Baroondah) and 58% (Bingegang). The percent of time where the riffles were drowned out did not exceed 22%.

With the exception of one site (Dawson River at Isla Delusion), the percent of time where flows maintained habitable riffles decreased from pre-development to development scenarios, with the current development containing the least number of days (Table 26). The sites where most deviation was modelled included Dawson River at Woodleigh, Dawson River at Boolburra, Mackenzie River at Coolmaringa and Mackenzie River at Bingegang. In most cases the full development scenario increased the number of days when compared against the current development scenario, particularly at the Dawson River sites. The reduction in habitable days stems from an increase in the number of dry periods and a decrease in the number of days where the riffles were drowned.

In the pre-development scenario, the average duration of riffle forming flows ranged from 15 (Bingegang) to 67 (Baroondah) days, with an average of 29 days (Table 27). With the exception of one site (Isla Delusion), a reduction in average duration was modelled between pre-development and current development scenarios, with the Dawson River at Boolburra and

Dawson River at Woodleigh displaying the most reduction. A similar pattern was modelled between pre-development and full development scenarios, with the exception of Dawson River at Woodleigh which experienced a significant increase in riffle duration.

The average spell length between riffle forming flows was significantly lower than riffle duration, with an average spell length ranging between 7 and 17 days (Table 27). Individual nodes experienced both increases and decreases in spell length across the simulation period with percentage deviation from the pre-development case ranging from -183% to 34%. In most instances this equated to less than five days difference. In the full development scenario for Dawson River at Isla Delusion and Dawson River at Woodleigh there was a three-fold increase and decrease in spell length, respectively.

These results indicate that the value of riffles as habitat in the Fitzroy WRP area is potentially at higher risk under the development scenarios evaluated.

Table 26: Total percent deviation of riffles as habitat for % time as habitable riffles, % time and % drowned (green shading 0% to ±5%; yellow shading ±5% to ±15%; orange shading ±15% to ±25%; red shading >±25%)

River	Node	% time as a habitable riffle			% time dry			% time drowned		
		Pre-development	Current development	Full development	Pre-development	Current development	Full development	Pre-development	Current development	Full development
Overall		46%	42%	45%	40%	48%	45%	14%	10%	10%
	% change from pre-development		-9%	-2%		19%	12%		-23%	-29%
	% change from current development			8%			-6%			-8%
Fitzroy	Riversleigh	44%	40%	38%	37%	45%	45%	20%	15%	17%
	% change from pre-development		-7%	-12%		23%	22%		-26%	-14%
	% change from current development			-5%			0%			16%
Mackenzie	Coolmaringa (Node 8)	55%	45%	46%	28%	41%	41%	17%	14%	12%
	% change from pre-development		-18%	-15%		48%	48%		-20%	-28%
	% change from current development			3%			0%			-9%
	Bingegang (Node 10)	27%	21%	21%	58%	68%	68%	15%	11%	11%
	% change from pre-development		-22%	-22%		18%	18%		-29%	-29%
	% change from current development			0%			0%			0%
	Carnangarra (Node 11)	34%	30%	30%	55%	62%	62%	11%	7%	7%
	% change from pre-development		-12%	-12%		13%	13%		-30%	-30%
	% change from current development			0%			0%			0%
Dawson	Boolburra	27%	18%	24%	51%	65%	61%	22%	17%	14%
	% change from pre-development		-33%	-10%		29%	21%		-26%	-36%
	% change from current development			35%			-6%			-14%
	Woodleigh (Node 4)	39%	29%	47%	47%	60%	44%	15%	11%	9%
	% change from pre-development		-26%	21%		29%	-5%		-22%	-40%
	% change from current development			64%			-26%			-24%
	Isla Delusion	63%	68%	75%	27%	24%	20%	10%	8%	5%
	% change from pre-development		7%	19%		-12%	-27%		-16%	-49%
	% change from current development			11%			-17%			-39%
	Taroom (Node 6)	35%	35%	35%	57%	58%	58%	8%	6%	6%
	% change from pre-development		0%	0%		3%	3%		-22%	-22%
	% change from current development			0%			0%			0%
	Baroondah	90%	88%	88%	5%	7%	7%	5%	5%	5%
	% change from pre-development		-2%	-2%		35%	35%		-2%	-2%
	% change from current development			0%			0%			0%

Table 27: Total percent deviation of riffles as habitat for average spell length and total number of days above 50% riffle forming flows (green shading 0% to ±5%; yellow shading ±5% to ±15%; orange shading ±15% to ±25%; red shading >±25%)

River	Node	Average duration of riffle forming flows			Average spell length between riffle forming flows		
		Pre-development	Current development	Full development	Pre-development	Current development	Full development
Overall		29	25	29	10	12	11
	% change from pre-development		-13%	-1%		20%	15%
	% change from current development			14%			-4%
Fitzroy	Riversleigh	27	26	24	14	17	17
	% change from pre-development		-6%	-12%		24%	20%
	% change from current development			-6%			-3%
Mackenzie	Coolmaringa (Node 8)	33	26	27	6	5	6
	% change from pre-development		-21%	-17%		-13%	-5%
	% change from current development			6%			9%
	Bingegang (Node 10)	15	12	12	12	16	16
	% change from pre-development		-22%	-22%		31%	31%
	% change from current development			0%			0%
	Carnangarra (Node 11)	20	18	18	10	11	11
	% change from pre-development		-13%	-13%		10%	10%
	% change from current development			0%			0%
Dawson	Boolburra	16	11	14	17	25	14
	% change from pre-development		-34%	-12%		49%	-17%
	% change from current development			35%			-44%
	Woodleigh (Node 4)	22	13	28	7	5	2
	% change from pre-development		-42%	27%		-28%	-66%
	% change from current development			117%			-53%
	Isla Delusion	40	44	58	7	11	20
	% change from pre-development		10%	44%		49%	183%
	% change from current development			31%			90%
	Taroom (Node 6)	21	21	21	7	7	7
	% change from pre-development		0%	0%		-1%	-1%
	% change from current development			0%			0%
	Baroondah	67	59	59	9	9	9
	% change from pre-development		-12%	-12%		4%	4%
	% change from current development			0%			0%

4.8 Waterholes as refugia

Methods

The Fitzroy River experiences a tropical to sub-tropical, subhumid to semi-arid climate, dominated by summer rainfall, and high rainfall variability (Nix 1977). As a result stream flow is also variable, with flow ceasing in many areas for most of the year (Gunn 1977, Kelly 1996) and the system contracting to a series of disconnected in-channel pools termed waterholes. During periods of rainfall, disconnected waterholes are replenished and re-connected.

These waterholes provide the primary source of surface water during dry periods and are particularly important for riverine biota because they provide drought refuge. This allows species to persist through these otherwise harsh conditions. For obligate freshwater species (those entirely restricted to freshwater for their entire lifecycle), waterhole refugia are absolutely essential for their long term survival.

The persistence of a waterhole (i.e. the period of time that a waterhole can retain water) determines the maximum time it can function as a refuge. As such, estimating persistence is the first step in understanding and managing refugial waterholes. Despite their obvious importance and the increasing pressures from climatic and anthropogenic sources, few studies (e.g., Costelloe *et al.*, 2007), have attempted to estimate waterhole persistence.

The drying out of waterhole is not the sole mechanism by which waterholes can lose their function of supporting aquatic biota. Loss of habitat quality is equally important (Figure 39). As the depth of water remaining in a waterhole decreases the amount of habitat available to support biota also decreases and the quality of the water diminishes. These processes pose a threat to the survival of biota living in the waterhole.

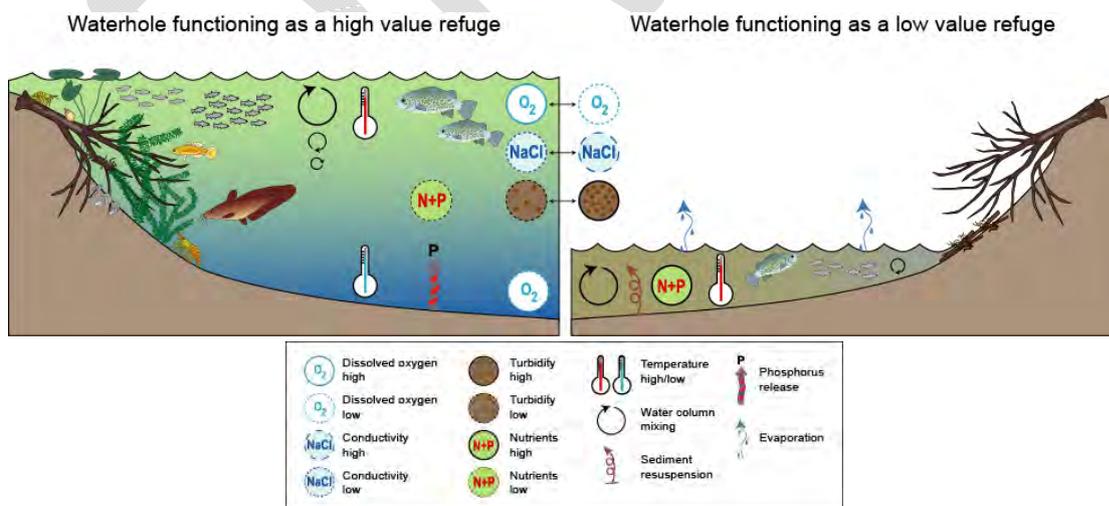


Figure 39: Changes in waterhole habitat quality due to decreasing depth

Biota that rely upon waterholes as refugia are fragmented into local populations within waterholes during times without flow. These local populations suffer extinction whenever an individual waterhole dries or becomes unsuitable in some other way. Such events naturally occur in dryland river systems. The survival of species within dryland river catchments depends upon the number of waterholes that continue to function as refugia during dry times and repopulation of the system following reconnection. Therefore, the number of waterholes simultaneously losing the ability to support local populations can be used as an estimate of risk to the viability of catchment-wide populations of aquatic species.

Waterhole depth was modelled for 14 waterholes within the Fitzroy WRP area (IQQM flow nodes used for each site are listed in Table 28) by firstly conducting surveys and developing digital elevation models and secondly by modelling water loss in the absence of flow and other water inputs. The latter was based on SILO Data Drill lake evaporation rates. These models were then applied to IQQM scenarios to calculate daily estimates of waterhole depth. When there was flow at the waterhole (based on an IQQM scenario) waterholes were considered to be full. Once flow ceased the waterhole model was invoked.

Table 28: Waterhole persistence modelling sites and associated IQQM flow nodes

Waterhole	Closest Node	
	IQQM Number	IQQM Name
Boolburra	na	End Dawson
Burke	na	Inflow Eden Bann
Buttcroft	na	Inflow Eden Bann
Comanche	na	Inflow Eden Bann
Coolmaringa	8	Tartrus
Duaringa	8	Tartrus
Edgar	na	Inflow Eden Bann
Farmers	na	Inflow Eden Bann
Koch	na	Inflow Eden Bann
Pelican	na	Inflow Fairbairn
Reilys	11	Carnangarra
Riversleigh	na	Inflow Eden Bann
Taroom	6	Taroom
Waddington	4	Woodleigh

Time-series of waterhole depth were analysed to estimate two aspects; the frequency and duration of empty waterhole spells and the frequency and duration of spells below the ToC. There have not been any studies of these phenomena in the Fitzroy to enable an empirical ToC to be set. Therefore a ToC of 0.5 m below cease to flow was adopted to reflect the current cease to flow threshold in the Fitzroy WRP. Occurrences of simultaneous spells across multiple waterholes were used in both cases to estimate risk to the function of refugia resulting from the three IQQM scenarios.

Results

Of the 14 waterholes studied, only one completely dried during the model simulation period (Pelican Waterhole) and this occurred under all three IQQM scenarios indicating there is no increased risk to the system from water management in this regard.

When the Threshold of Concern (ToC) of 0.5 m below cease to flow was applied to the IQQM scenarios there was some, minor change between the pre-development case and the two development cases (Figure 40 and Figure 41). Under the current development case simultaneous breeches of the ToC occurred on nine occasions as a result of flow management. The durations of these breeches were generally weeks to months and ranged from approximately 14 to 80 days (see Table 29 and Appendix H). For the full development case there were six such occasions and the breeches ranged from approximately 15 to 63 days. It should also be noted that in both cases the development for some individual waterholes (e.g. Reilys Waterhole) prevented water levels dropping below the ToC when they were modelled to do so under the pre-development case.

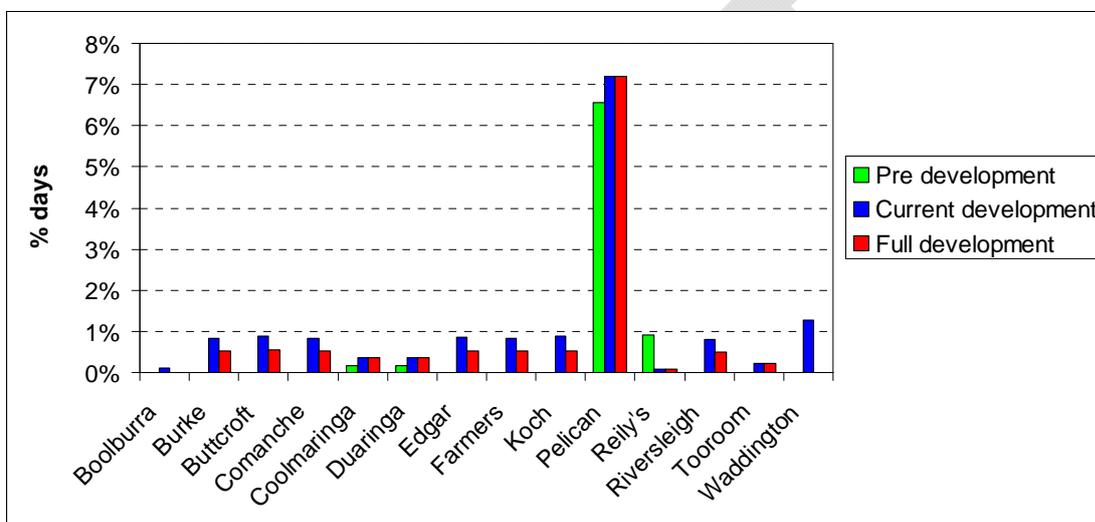


Figure 40: Percentage of days over the simulation period that the depth of each waterhole was modelled to fall below the ToC for the three IQQM scenarios.

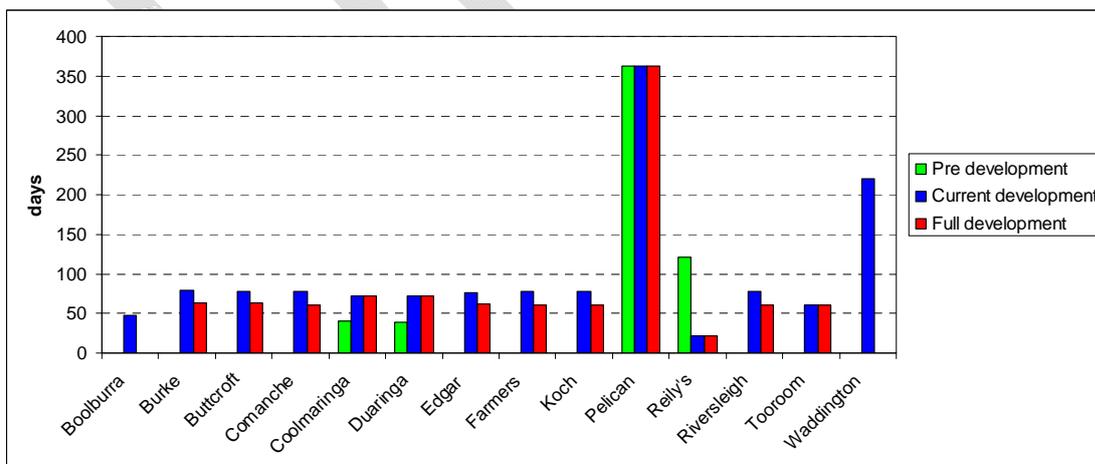


Figure 41: Duration of the longest spell when the depth of each waterhole was modelled to be below the ToC for the three IQQM scenarios.

Table 29 : Summary of number of spells and spell length that each waterhole was below 0.5M cease to flow level. Probability of below ToC is the proportion of days out of the simulation period that the water level of was below the ToC (0.5m CTF).

Waterhole	IQQM Scenario	Probability of Below ToC	Longest Spell Below ToC (days)	Average Spell Below ToC (days)	No. Spells Below ToC
Boolburra	Pre-development	0.000%	na	na	0
	Current Development	0.119%	47	47.000	1
	Full Development	0.000%	na	na	0
Burke	Pre-development	0.000%	na	na	0
	Current Development	0.826%	79	29.636	11
	Full Development	0.525%	63	29.571	7
Buttcroft	Pre-development	0.000%	na	na	0
	Current Development	0.890%	78	31.909	11
	Full Development	0.553%	63	31.143	7
Comanche	Pre-development	0.000%	na	na	0
	Current Development	0.834%	78	29.909	11
	Full Development	0.522%	61	29.429	7
Coolmaringa	Pre-development	0.177%	40	23.333	3
	Current Development	0.360%	72	47.333	3
	Full Development	0.360%	72	47.333	3
Duaringa	Pre-development	0.175%	39	23.000	3
	Current Development	0.363%	72	47.667	3
	Full Development	0.363%	72	47.667	3
Edgar	Pre-development	0.000%	na	na	0
	Current Development	0.849%	76	30.455	11
	Full Development	0.535%	62	30.143	7
Farmers	Pre-development	0.000%	na	na	0
	Current Development	0.826%	77	29.636	11
	Full Development	0.515%	60	29.000	7
Koch	Pre-development	0.000%	na	na	0
	Current Development	0.880%	77	31.545	11
	Full Development	0.537%	61	30.286	7
Pelican	Pre-development	6.565%	362	53.958	48
	Current Development	7.198%	362	57.959	49
	Full Development	7.198%	362	57.959	49
Reilys	Pre-development	0.900%	121	32.273	11
	Current Development	0.071%	22	14.000	2
	Full Development	0.071%	22	14.000	2
Riversleigh	Pre-development	0.000%	na	na	0
	Current Development	0.806%	78	28.909	11
	Full Development	0.502%	61	28.286	7
Taroom	Pre-development	0.000%	na	na	0
	Current Development	0.230%	61	30.333	3
	Full Development	0.230%	61	30.333	3
Waddington	Pre-development	0.000%	na	na	0
	Current Development	1.260%	220	124.500	4
	Full Development	0.000%	na	na	0

Because the deviation from the pre-development was very minor, they made very little difference to the risk profile of waterhole habitat across the plan area (Figure 42). There were no high risk events (i.e > 75% of waterholes with simultaneous depths less than the ToC) under any of the three scenarios. Almost all of the time there was low risk under all scenarios with moderate risk (50% to 75% of waterholes with simultaneous depths less than the ToC) occurring less than 1% of days under the two development scenarios and never under the pre-development scenario.

These results indicate that values associated with waterhole persistence and habitat in the Fitzroy WRP area are not threatened by either of the two development scenarios evaluated.

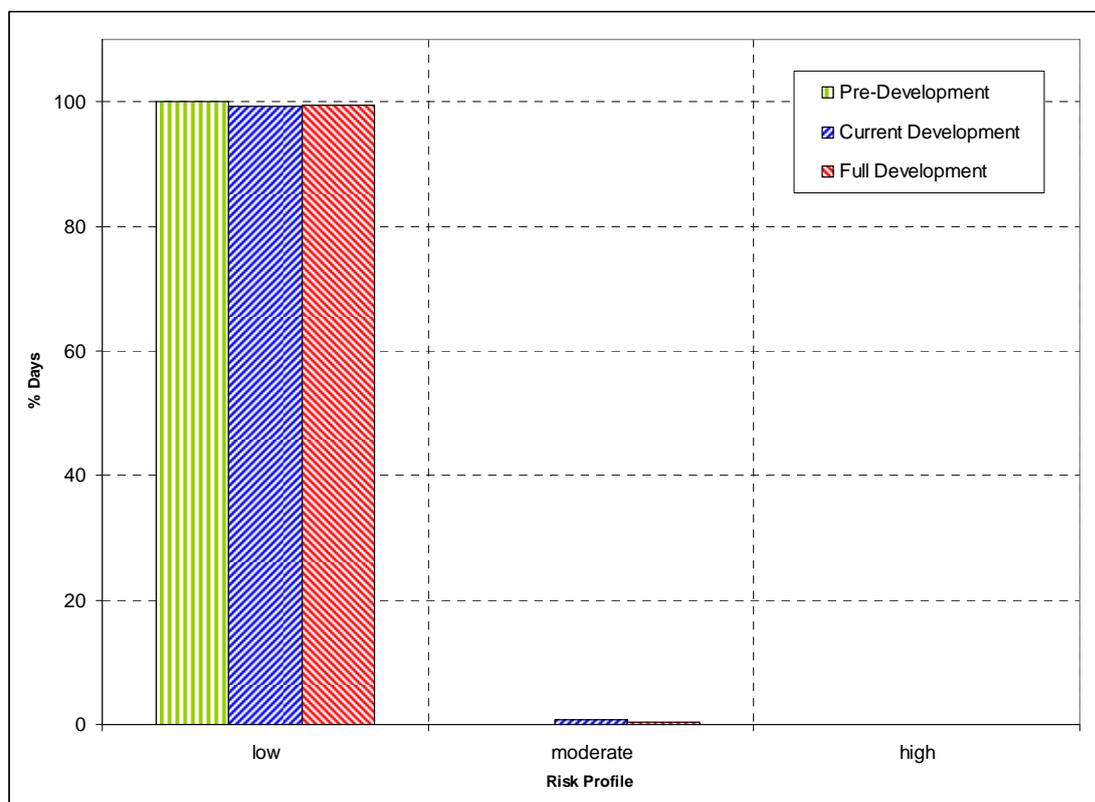


Figure 42: Potential risk profile of waterhole habitat across all sites.

4.9 Wetlands

Methods

It is estimated that there are over 14,300 wetlands occurring in the Fitzroy Basin, comprising of estuarine (64%), riverine (21%), palustrine (8%) and lacustrine (7%) wetlands. This includes a World Heritage Area (Great Barrier Reef), a Ramsar listed Internationally Important Wetland (Shoalwater and Corio Bays Area), 20 Nationally Important Wetlands (Directory of Important Wetlands in Australia (DIWA)) and numerous unlisted local and regionally significant wetlands (EPA, 2009).

The ecological significance of wetlands of the Fitzroy Basin can not be underestimated. They support a diverse range of plants and animals; provide habitat and refuge for many migratory and threatened species; play an essential role in natural hydrological cycles and act as a filter against nutrients and sediments. There are over 360 wetland indicator species recorded in the Fitzroy Basin; 22 of which are listed as rare, endangered or threatened species (EPA, 2009). Many of the wetlands, particularly including those of the Fitzroy River Floodplain and Delta, are recognised both nationally and internationally as important waterbird habitat. These and other wetlands of the Basin are also important fishery habitat (Sawynok, 2003; 2004; Sawynok

and Platten, 2005; Hyland, 2002). Many wetland biota are opportunistic; utilising resources when available and/or avoiding periods of unfavourable conditions.

Patterns of wetting and drying determine species diversity and richness (Boulton & Brock, 1999). Wetlands receive water from a variety of sources, including groundwater, overland flow, tributary inflow and the river. Whilst the relative importance of these water sources will vary between wetlands; wetland ecosystem functioning relies on the exchange of water, nutrients and biota between the river and wetland.

Estimations of flows that inundate different wetland features were made for the original WAMP process (Roberts, 1998). This report utilised modelling nodes to segment the basin, and characterised the flows required to inundate the basic features of the segment, such as main river channel (backwaters and waterholes), middle terraces (flood runners and smaller ephemeral wetlands), higher alluvial terraces (oxbow lakes, billabongs, lagoons and floodplain wetlands); and wetland features indicative of each segment.

The estimations of flows that inundate the indicative wetland features that have been used to query the IQQM are presented in Table 30. Not all indicative wetlands are tabulated; rather only those under potential risk have been assessed. For each wetland the flow estimates were applied to its respective node for all three IQQM scenarios to generate three daily time series of daily flow above the inundation flow level. All analyses were undertaken in the River Analysis Package (RAP Version 2.0.4; eWater (2008)).

A threshold of concern (ToC) could not be applied as the specific ecological requirements of the taxa inhabiting the wetlands are largely unknown. Therefore only the likelihood of water resource development potentially changing the frequency of wetland inundating flow events was assessed for each wetland across the plan area. Likelihood was measured through the proportional change of percent daily exceedence above inundation flow levels and the average spell length between these events.

Table 30: Wetland features of the Fitzroy Basin included in the assessment and the corresponding flow magnitudes that are necessary to inundate each wetland.

River	Feature	Flow ML/day	IQQM Node
Fitzroy	Fitzroy Floodplain (Frogmore)	156000	Barrage (Node 0)
Fitzroy	Fitzroy Floodplain (Yeppen)	348000	Barrage (Node 0)
Fitzroy	Horseshoe Lagoon Fitzroy River/Marlborough Creek Confluence	302400	Eden Bann (Node 1)
Mackenzie	Lower Dawson/Mackenzie Confluence (extensive inundation)	216000	Eden Bann (Node 1) minus 4%
Mackenzie	10 Mile & Associated Flood Plain	95040	Coolmaringa (Node 8)
Mackenzie	Lake Mary & Associated Flood Plain (Lake Mary)	111197	Coolmaringa (Node 8)
Mackenzie	Lake Mary & Associated Flood Plain (Pink Lily)	423360	Coolmaringa (Node 8)
Mackenzie	Lake Mary & Associated Flood Plain (Lake McDonald)	803520	Coolmaringa (Node 8)
Nogoa	Duckponds Lagoons (LHB)	4000	Theresa Ck + downstream Fairbairn Dam
Nogoa	Duckponds Lagoons (RHB)	65500	Theresa Ck + downstream Fairbairn Dam
Dawson	Bears Lagoon - Amdt 142 - Dawson River	129600	Woodleigh (Node 4)
Dawson	Maloney's Creek - Amdt 152 - Dawson River	129600	Woodleigh (Node 4)
Dawson	Isla Delusion floodplain wetlands and lagoons (Dawson)	69120	Isla Delusion
Dawson	Boam Creek Anabranh (Dawson River)	3024	Isla Delusion
Dawson	Eurombah Crossing - Amdt 425 Dawson River (Anabranches, Billabong Storages & Floodplain)	37152	Utopia Downs (Node 7)

Results

The percent of daily exceedence above wetland filling thresholds varied considerably around the basin, with values in the pre-development case ranging from 0.10% (Lake McDonald) to 7.05% (Duckponds lagoon (LHB)) (Table 31). The majority (8 out of 14) of the wetlands had less than 1% daily exceedence above the wetland filling threshold.

With the exception of one wetland (Eurombah Crossing), the percent of daily exceedence above the filling thresholds decreased from pre-development to development scenarios (Table 31). The degree of variation between pre-development and current development ranged from -40% to 0%, with most (12 of 14) having percent variation less than -13%. The exceptions to these were the Duckponds Lagoons (both left and right hand banks) where -37% and -40% deviations were modelled.

The full development scenario further reduced the days above the filling threshold (Table 31). Wetlands where there was further significant reduction in the days above filling flows include Yeppen Lagoon, Frogmore and Woolwash lagoons, Bears Lagoon/Maloney Creek, Isla Delusion floodplain and Boam Creek anabranh. This reduction in filling flows was most apparent at Dawson River sites.

The average spell length between filling thresholds varied around the basin, with values in the pre-development case ranging from 99 days (Duckponds lagoon (LHB)) to 2815 (Lake McDonald) (Table 31). There was an increase in spell length for both development scenarios, with the degree of variation varying from 0% to 80%. For the current development scenario, the sites most affected included Duckponds Lagoons (both left and right bank). In the full development scenario there was an increase in spell length for the majority of sites, with those most affected including Bears Lagoon/Maloney Creek, Isla Delusion floodplain and Boam Creek anabranh.

These results indicate that the value of wetlands as habitat in the Fitzroy WRP area is potentially at higher risk under the two development scenarios evaluated.

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Table 31: Total percent deviation of wetlands % daily exceedence and average spell length between wetland filling thresholds (green shading 0% to ±5%; yellow shading ±5% to ±15%; orange shading ±15% to ±25%; red shading >±25%)

River	Wetland Feature	Threshold (ML/day)	% daily exceedence			Average spell length between filling flow events		
			Pre-development	Current Development	Full Development	Pre-development	Current Development	Full Development
Fitzroy	Yeppen Lagoon	348000	0.72%	0.63%	0.58%	876	938	961
	% change from pre-development		-13%	-19%	7%		10%	
	% change from current development			-7%		2%		
	Frogmore & Woolwash Lagoon	156000	2.07%	1.89%	1.72%	396	429	445
	% change from pre-development		-9%	-17%	8%		12%	
	% change from current development			-9%		4%		
	Horseshoe Lagoon	302400	0.92%	0.83%	0.78%	674	767	815
	% change from pre-development		-10%	-15%	14%		21%	
	% change from current development			-6%		6%		
	Dawson/Mackenzie floodplain confluence	216000	1.36%	1.34%	1.24%	534	541	574
% change from pre-development	-2%		-9%	1%	7%			
% change from current development			-7%		6%			
Mackenzie	10 Mile & associated floodplain	95000	2.19%	1.97%	1.88%	297	315	331
	% change from pre-development		-10%	-14%	6%		11%	
	% change from current development			-5%		5%		
	Lake Mary	111200	1.95%	1.77%	1.66%	326	338	341
	% change from pre-development		-9%	-15%	4%		5%	
	% change from current development			-6%		1%		
	Pink Lily	423360	0.40%	0.36%	0.35%	958	1,092	1,123
	% change from pre-development		-9%	-13%	14%		17%	
	% change from current development			-3%		3%		
	Lake McDonald	803520	0.10%	0.10%	0.10%	2,815	2,815	2,815
% change from pre-development	-1%		-1%	0%	0%			
% change from current development			0%		0%			
Nogoa	Duckponds Lagoons (LHB)	4000	7.05%	4.48%	4.48%	99	159	159
	% change from pre-development		-37%	-37%	61%		61%	
	% change from current development			0%		0%		
	Duckponds Lagoons (RHB)	65500	0.71%	0.43%	0.43%	643	1157	1157
% change from pre-development	-40%		-40%	80%	80%			
% change from current development			0%		0%			
Dawson	Bears Lagoon/Maloney Creek	129600	0.18%	0.16%	0.13%	936	983	1193
	% change from pre-development		-8%	-30%	5%		27%	
	% change from current development			-23%		21%		
	Isla Delusion floodplain wetlands and lagoons	69120	0.44%	0.42%	0.33%	1009	1036	1231
	% change from pre-development		-4%	-24%	3%		22%	
	% change from current development			-21%		19%		
	Boam Creek Anabranch	3024	6.62%	5.86%	4.01%	118	141	189
	% change from pre-development		-12%	-39%	19%		60%	
	% change from current development			-32%		34%		
	Eurombah Crossing anabranches, billabong & floodplain	37152	0.17%	0.17%	0.17%	968	968	968
% change from pre-development	0%		0%	0%	0%			
% change from current development			0%		0%			

4.10 Flow spawning fish species

Methods

The ecological assets which relate to the flow spawning fish species guild include the Fitzroy Golden Perch (*Macquaria ambigua orientalis*), Black catfish (*Neosilurus ater*), Hyrtl's catfish (*Neosilurus hyrtlii*) and Leathery grunter (*Scortum hillii*). A model-based risk assessment approach was used to compare the relative risk to Fitzroy Golden Perch population viability from water resource development scenarios. Fitzroy Golden Perch is a long-lived, flow-spawning fish species. Its complex environmental flow dependencies are relatively well known from a combination of population surveys and expert observations and knowledge. As such, Fitzroy Golden Perch was considered representative of other assets with similar life history requirements.

A population viability analysis was conducted utilising a suite of population models that take biological information about a particular species (i.e. habitat requirements, birth and death rates, population size, etc.) to make predictions about future population sizes. This was modelled using a dynamic Bayesian Belief Network (BBN) simulation and a projection model to simulate temporal and spatial processes including migration, and quantify population viability over space and time. As well as changes to the flow regime, the analysis takes into account barriers to fish migration which plays a critical role in recruitment and re-colonisation. Details of the modelling and assessment approach are given in Menke *et al.* (2009).

Results

Clusters of nodes emerge in the basins mid-elevation streams, where the Golden Perch population is most affected (Figure 43). These zones of higher impact on the population are located near dams and weirs, which hinder or block Golden Perch migration, and are separating parts of the lower catchment and the upper catchment, which are less affected by development. The impacts of pre-development and current development scenarios, and also the full development scenario including the Nathan Dam project, can be clearly distinguished and ranked by the analysis (Figure 43).

The model produces quantitative results based on existing population estimates. Thresholds of Concern (ToC) for the population are identified with the help of estimates of minimum viable population size from international-level research.

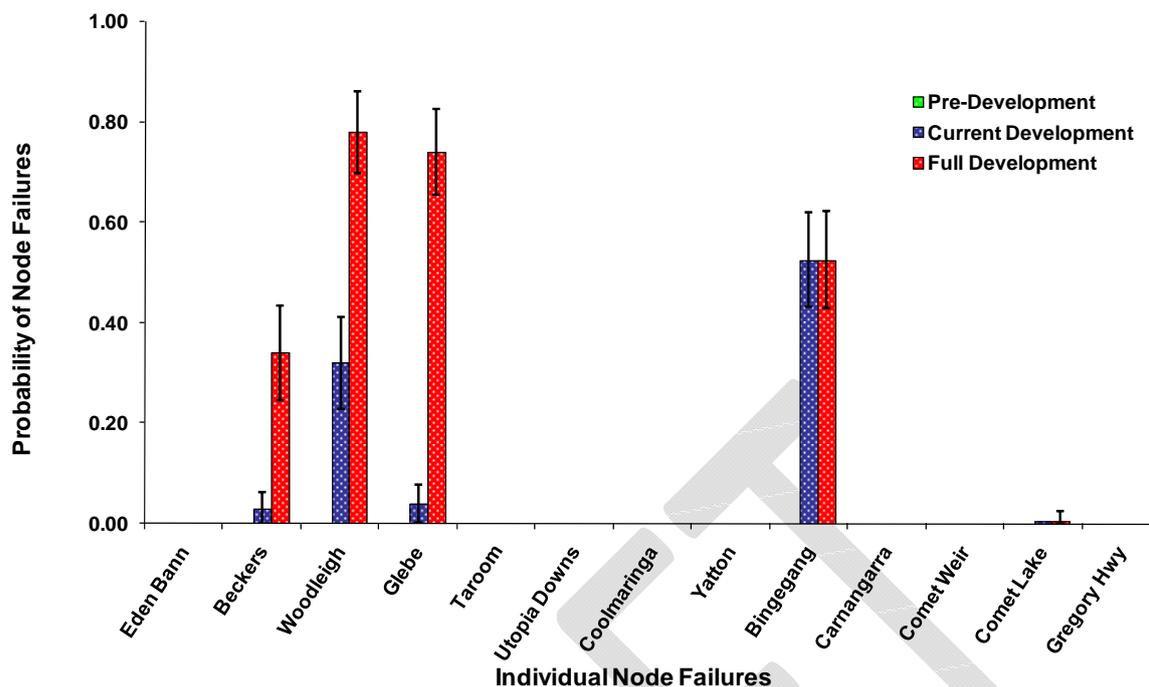


Figure 43: Frequency of node failures per node during the simulation period for pre-development, current development and full development scenarios.

The relative change in population survival probabilities from the pre-development to both development scenarios is shown in Table 32. All changes resulting from the development scenarios are reductions, but some, shown in green, are insignificant.

The results of this dynamic projection model are shown in terms of the number of simultaneous node failures in Figure 44. None of the development scenarios are reaching the Threshold of Concern regarding the viability of the Golden Perch population.

Table 32: (Total) Percent deviation of Fitzroy Golden Perch population survival between development scenarios (green shading: decrease to 5 %, red shading: > 30 %).

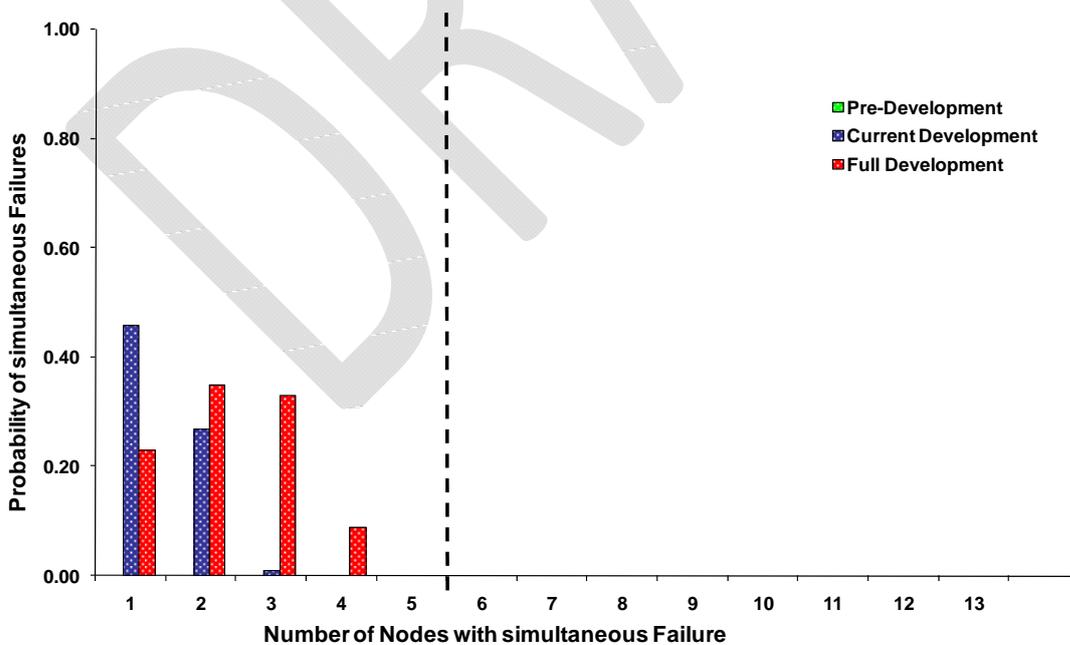
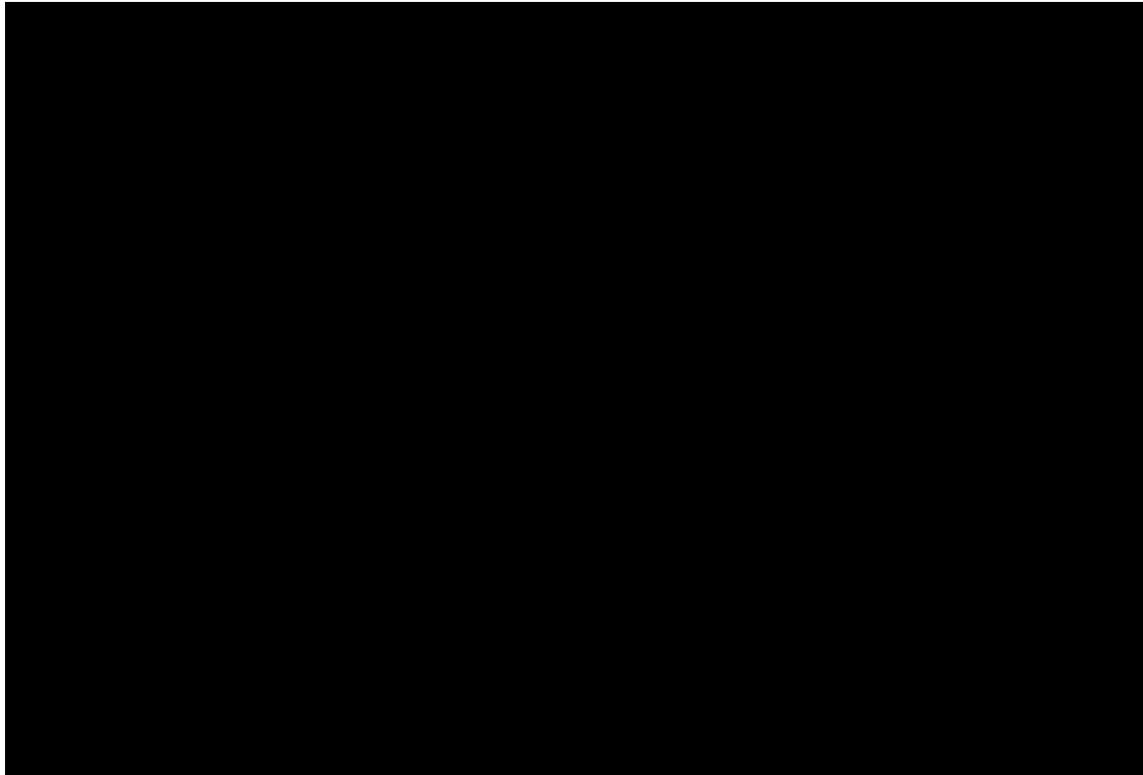


Figure 44: Frequency of joint failures of populations during the simulation period for predevelopment, current development and full development scenarios.

The spatial relationship between the sub-populations is clearly shown in Figure 45. The spatial relationship of severely affected nodes to dams & weirs is obvious for Woodleigh and Bingegang under the current development scenario and for Glebe with the proposed Nathan Dam project under full development. A construction of Nathan Dam is shown to affect additional nodes downstream (Woodleigh and Beckers). These sites are in close proximity to each other on the middle Dawson River, therefore the ability of these sites to be repopulated from neighbouring, unaffected sites is limited if local extinctions occur at sites affected by barriers to migration. Bingegang is the only node representing the heavily developed upper part of the Mackenzie River, and also shows a higher rate of population viability failure.

These results suggest that the value of a persistent population of Fitzroy Golden Perch in the Fitzroy WRP area is at higher risk under the two development scenarios evaluated.

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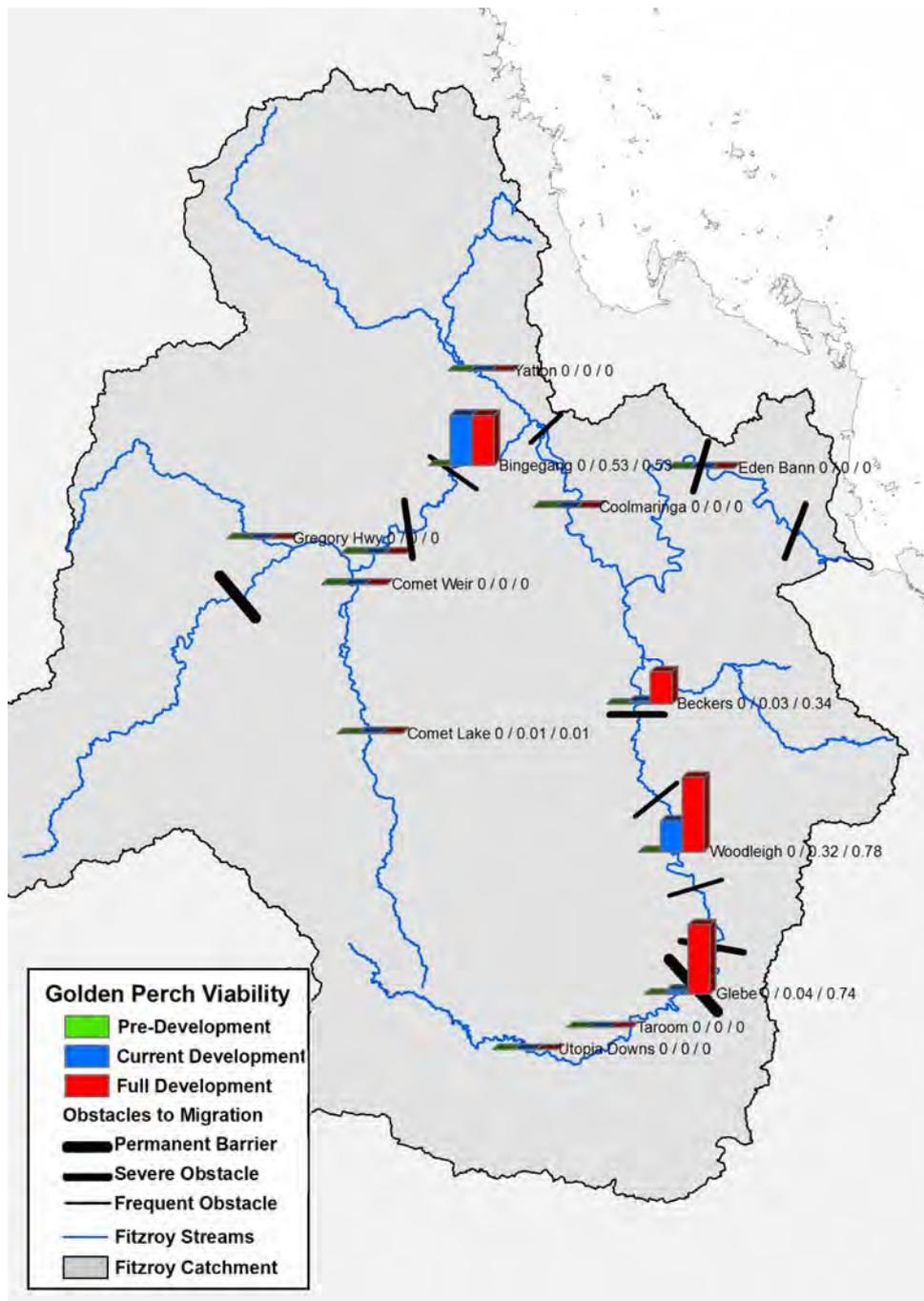


Figure 45: Pattern of population viability of Golden Perch for the reporting nodes in the Fitzroy basin. This is a relative assessment between all three scenarios, and the taller the bar, the higher the probability of local extinction. None of the nodes experienced any extinctions under the pre-development scenario. Black bars represent weirs and dams. The proposed Nathan Dam is shown as a barrier at Glebe.

5. Discussion

The risk assessment of ecological assets for the Fitzroy WRP and their potential risk trajectory under development scenarios are summarised in Table 33.

5.1 Ecological assets at low risk

Five of the 14 assets were assessed at low risk, with the majority of these (four) being low flow assets. Stable flow conditions necessary for spawning of low flow spawning fish (glassfish, purple spotted gudgeons and rainbowfish) was generally similar between predevelopment and development scenarios. The modelled development scenarios therefore represent a low risk to the spawning of these species. For some sites (e.g. Beckers, Woodleigh, Bingegang weir and Fairbairn Dam) the flow conditions under the development scenarios were more stable and therefore provided more spawning opportunity. It is likely that a combination of factors resulted in more spawning opportunity at these sites e.g. continual water releases from Fairbairn Dam and the occurrence of small naturally occurring freshes at Woodleigh and Beckers.

Similarly, risk to waterholes was assessed as low. Most of the waterholes tested were large and occurred in the supplemented water supply area where water releases from upstream storages maintain water levels. One point worth considering is that only two unsupplemented waterholes were assessed (i.e. Taroom and Pelican). Waterholes in unsupplemented areas are potentially at higher risk as they are relatively small and do not receive the top-up flows that waterholes in water supply schemes receive. Pressure on these waterholes is further increased from extraction by water allocations granted pre-WRP, as they are not bound by the current 0.5m drawdown limit. Future assessments of waterholes located outside water supply scheme areas should therefore be undertaken.

Juvenile barramundi growth decreased under the development scenarios; however the magnitude of change was small. This suggests that the magnitude of flows under the development scenarios represents low risk to juvenile barramundi growth.

Table 33: Summary of ecological assets potential risk trajectory under the development cases. Upward arrow represents an increase in risk; downward arrow represents a decrease in risk; circles represent no change in risk profile.

Location		Low flow assets					Medium-High flow assets		High-flood flow assets						
		Glassfish	Purple spotted gudgeon	Rainbowfish	Waterholes	Riffles	Flow spawning fish	Riparian veg.	Wetlands	Barra (YCS)	Barra (growth)	Barr (recruits)	Banana prawns	Offshore reef fisheries	King salmon
Fitzroy	Barrage							o	↑	↑	o	↑	↑	↑	↑
	Wattlebank	↑	o	↑	o	↑	o	o	o						
Dawson	Beckers	↓	↓	↓	o	↑	o	o							
	Woodleigh	↓	↓	↓	o	↑	↑	↑	↑						
	Glebe Weir	↑	↑	↑		o	↑	↑	↑						
	Taroom	↑	↑	↑	o	o	↑		o						
	Utopia Downs	o	o	o		o	↑								
Mackenzie	Coolmaringa	↑	↑	↑	o	↑		o	↑						
	Bingegang Weir	↓	o	o		↑	o	↑							
	Carnangarra	↑	↑	↑	↓	↑	↑	↑	↑						
Comet	Comet Weir	o	o	o			↑	↑							
	Comet Lake	o	o	o			o	o							
Theresa	Gregory Highway	o	o	o			↑								
Nogoa	Fairbairn Dam	↓	↓	↓			↑	↑							
Overall		o	o	o	o	↑	↑	↑	↑	↑	o	↑	↑	↑	↑

5.2 Ecological assets at higher risk

All of the remaining assets were under higher risk; however the degree of potential risk varied both within and between asset groups.

The only low flow asset potentially at higher risk was riffles as habitat. Overall, potential risk for the measured indices (i.e. % time as habitat, % time dry, % time drowned, average duration of flows and average duration between spells) could be considered as moderate; however there were significant differences between sites. Sites upstream of the water supply scheme remained generally unchanged (e.g. Taroom and Baroodah). In the Nogo/Mackenzie and Dawson rivers potential risk increased with downstream distance, with Boolburra, Woodleigh and Bingegang the most affected. Risk also increased at sites affected by the proposed Nathan Dam. Most of the changes between scenarios resulted from an increase in the frequency and duration of dry periods, which is likely to be a result of changes in the flow regime through storage releases. However, the risk to the riffle community remains unknown, and the consequence of these changes require further investigation.

The two medium to high flow assets, flow spawning fish and riparian vegetation communities, were assessed at higher risk. The findings of the Fitzroy golden perch Bayesian modelling suggested that, under the current development scenario, the population is mostly affected in the middle sections of the catchment. Future developments represent a greater risk, particularly in the middle to lower Dawson River below the proposed Nathan Dam. Population status needs to be confirmed with additional monitoring and research, and management of connectivity of all parts of the basin's river network should be considered a high priority for long-term maintenance of the fish population.

Riparian vegetation communities, of which Coolabahs were the indicator species, were mostly at higher risk at sites directly downstream of major water infrastructure. In the current development scenarios, this included Bridge Flat Road and Bingegang, both of which are downstream of Fairbairn Dam. In the full entitlement scenario, most changes to the flooding opportunity also occurred at Woodleigh and Isla Delusion (downstream of the proposed Nathan Dam). Very large flood events (i.e. floods above the 75% inundation threshold) were the least affected, whereas those below 25% threshold were the most affected. Weirs were found to have very little influence on the flooding of riparian vegetation communities.

Alterations to the riparian vegetation community structure as a result of less flooding frequency are expected and future research should focus on potential consequences. The spell duration between floods will possibly have the greatest influence on the riparian community structure, with different species exhibiting different responses. Longer lived species, such as Coolabahs, are more likely to be able to persist with an extended flooding frequency; however recruitment would be affected. Shorter lived species may not be able to withstand extended spells between floods and population viability would be compromised.

Wetland flooding downstream of major water infrastructure was also assessed to occur less frequently under development scenarios. Under the current development scenario, this

included the Duckponds wetlands which is located downstream of Fairbairn Dam. The Duckponds (RHB) wetland had the highest potential risk, with the spell between flooding events almost doubling from filling every 1½ years to over 3 years. Under the full entitlement scenario the flooding frequency at sites downstream of the proposed Nathan Dam were also compromised; however with a less severity. Alterations to wetland communities are possible and future research should focus on potential consequences.

Notwithstanding these results, compensatory environmental flows may not be practical, if at all possible, for riparian vegetation communities and wetlands. Major flow events provide the only means of flooding as discharge capacities of the major infrastructure, including Fairbairn Dam, are not large enough to provide the necessary flooding flows. The provision of large flow events is an important consideration in the development of environmental flow management strategies for proposed water infrastructure (e.g. Nathan Dam and Connors River Dam).

Barramundi populations were assessed at higher risk. The work undertaken on Fitzroy estuary barramundi populations is the most extensive in Australia, with over 23 years of supporting data. Thus the results of this assessment are compelling. Both barramundi year class strength (i.e. years when barramundi were most spawned) and recruitment into nearby 12 Mile Creek were strongly linked to flow and risk was increased under both development flow scenarios.

Risk to the king threadfin salmon year class strength were also increased under the development flow scenarios; however natural risk was also assessed to be relatively high. Under pre-development conditions, about 17% of years resulted in low threadfin recruitment; this significantly increased under the development scenarios to approximately 30% of years.

The only fully marine asset assessed, offshore reef fisheries of the Capricorn Bunker Group (Great Barrier Reef), were assessed to be at potentially higher risk under both development scenarios. The chances of high catch years were assessed to be potentially reduced and spell length between high catch years increased.

For the development scenarios, reduction in wet season flow volumes during periods of naturally occurring low flow, and thus an extension of low flow periods, were the primary cause for the increased risk profile of barramundi, threadfin salmon and offshore reef fisheries, with each asset having between 2 to 4 high risk periods over the 107 modelled sequences (Figure 46 to Figure 49). In most instances, these high risk periods were not present in the pre-development scenario where the sequences were interrupted by years where flows provided the necessary recruitment conditions. During extended periods of low flow, low storage volumes and a high demand for waterharvesting is expected, which would reduce the volume of water reaching the estuarine/marine systems. Given that these flows are very important for securing existing water entitlements, it is not expected that compensatory environmental flows during these low flow periods would be possible.

This increased risk to barramundi, threadfin and reef fisheries populations must be considered in a wider context, as their persistence is influenced by a variety of activities. A recent assessment of the barramundi fishery in Queensland suggested that the fishery is dangerously overfished (Campbell *et al* 2008). Habitat quantity and quality along the coastal and floodplain regions have also been affected through extensive development of ponded pasture systems, barriers to floodplain and upstream movement and invasion of weed species (Cotterell & Jackson, 2000; Hyland, 2002). Potential climate change is also expected to decrease barramundi recruitment (Sawynok & Platten, 2008). Given these pressures, it is important that the allocation and management of streamflows in the WRP protects the volumes and frequency of medium to high flows discharged into the Fitzroy estuary and surrounding freshwater and marine environments.

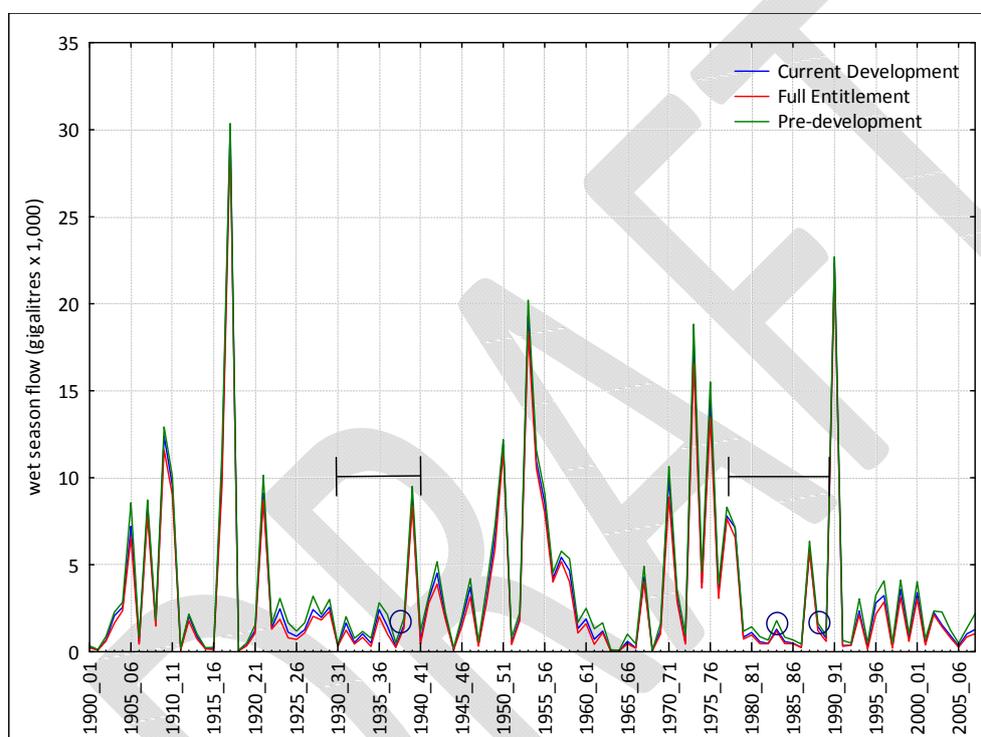


Figure 46: Modelled total wet season flows (November to March) for the Fitzroy Barrage, with the periods of high risk to 12 Mile Creek barramundi populations highlighted. Circles represent times during the high risk period where flows were recruitment flows were provided under the pre-development scenario.

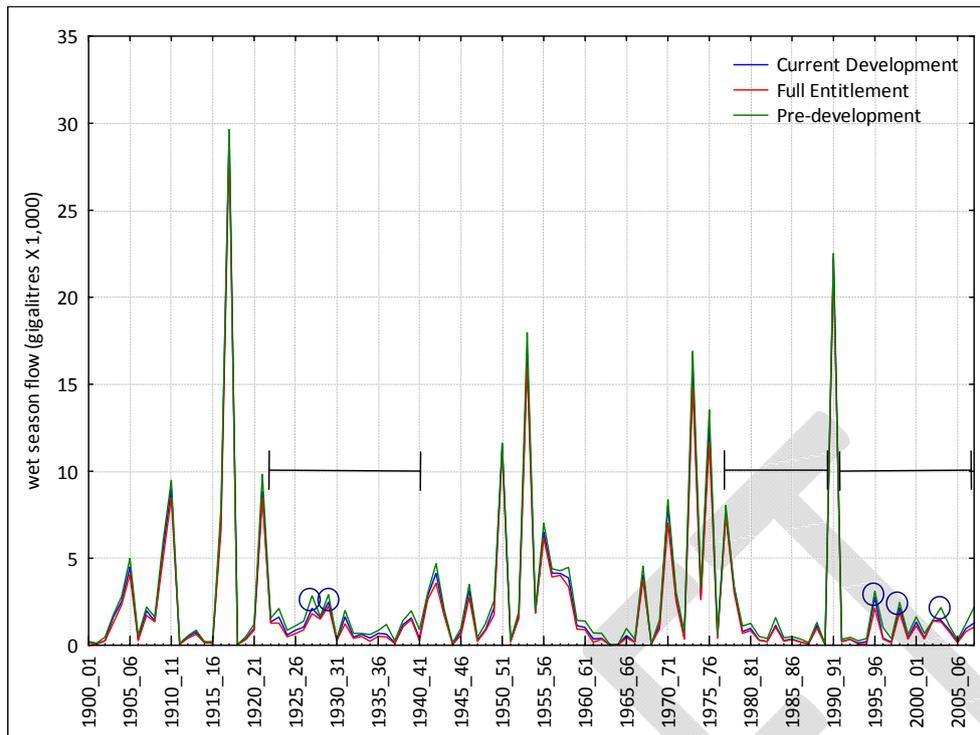


Figure 47: Modelled total wet season flows (December to February) for the Fitzroy Barrage, with the periods of high risk to barramundi year class strength highlighted. Circles represent times during the high risk period where flows where recruitment flows were provided under the pre-development scenario.

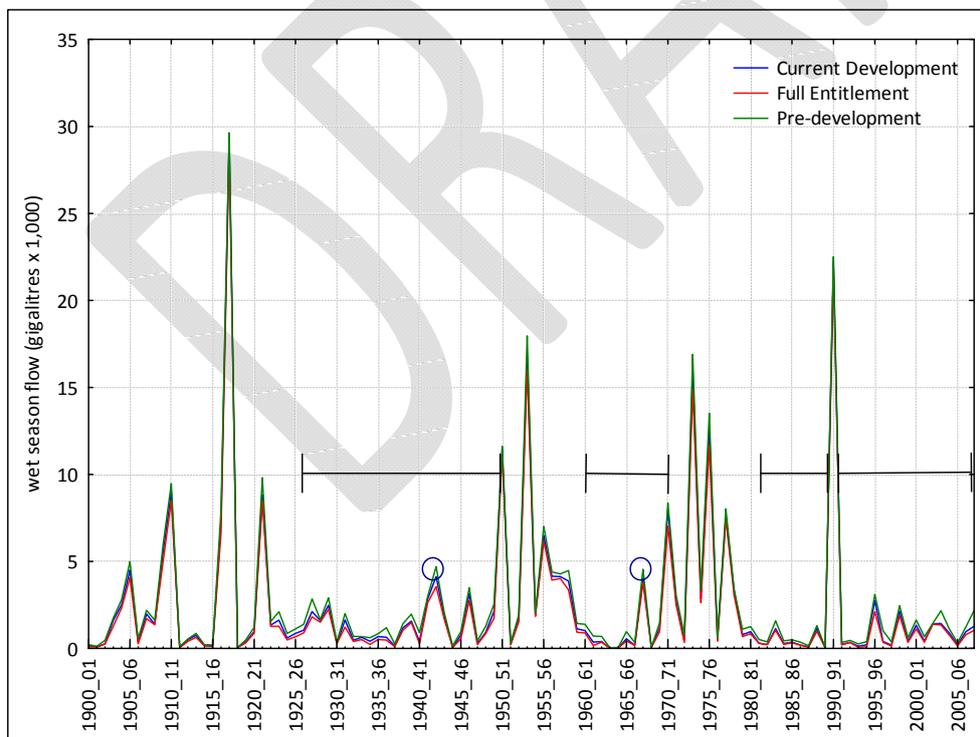


Figure 48: Modelled total wet season flows (November to March) for the Fitzroy Barrage, with the periods of high risk to Threadfin Salmon populations highlighted. Circles represent times during the high risk period where flows where recruitment flows were provided under the pre-development scenario.

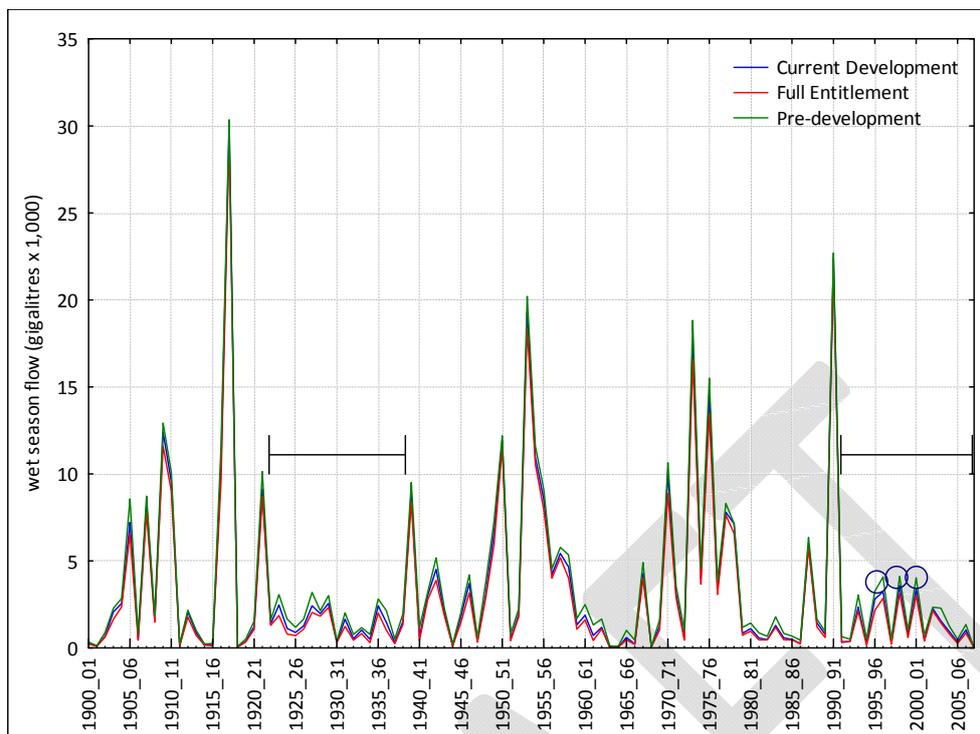


Figure 49: Modelled total wet season flows (November to March) for the Fitzroy Barrage, with the periods of high risk to offshore reef fisheries highlighted. Circles represent times during the high risk period where flows were provided under the pre-development scenario.

5.3 Future research priorities

Improving our understanding of Ecological Assets

The above assessments have highlighted that further research is required to improve our understanding of the ecological risk through water resource planning. A summary of these include:

- Low Flow Spawning Fish Species
 - assets identified at low risk; no further work is required
- Floodplain Riparian Vegetation Communities and wetlands
 - asset identified at higher risk
 - recommend that future studies be undertaken which assess the consequences of changes in flooding frequency on riparian communities and wetlands
- Barramundi, Offshore reef fisheries and Threadfin salmon
 - assets identified at higher risk
 - higher risk must be considered in a wider context, as their persistence is influenced by a variety of activities, including over fishing and habitat alterations

- the increased risk to recruitment needs to be assessed in terms of its potential consequences to the fisheries industry
- Banana Prawn
 - assets identified at higher risk
 - the increased risk to prawn growth needs to be assessed in terms of its potential consequences to the fisheries industry
- Riffles as habitat
 - asset identified at higher risk
 - risk to the riffle community remains unknown and the consequence of these changes require further investigation.
- Waterholes as refugia
 - asset identified at low risk
 - risk to unsupplemented waterholes not assessed in detail and requires further research
- Flow spawning fish species
 - asset identified at higher risk
 - population status needs confirmation and management of connectivity of all parts of the basin's river network may require a high priority for long-term population management

Ecological Risk Assessment methodology

In addition to further research on assets, the ecological risk assessment methodology could be improved to include:

- the effects of barriers to longitudinal connectivity as risk may be underestimated if recolonisation processes are impeded by barriers to dispersal.
- details about how local populations rebound from adversity (or even local extinction), particularly as many high risk assets had long periods (up to 16 years) without receiving their critical water requirements.
- asset thresholds of concern are currently binary (i.e. pass or fail) whereas current research suggests that these functions follow a more sigmoidal curve. Ongoing research is required to develop more rigorous population models to derive these functions.
- a more transparent process of linking the asset risk back to the values associated with the ecological outcome. Acceptable levels of risk can then be assigned.

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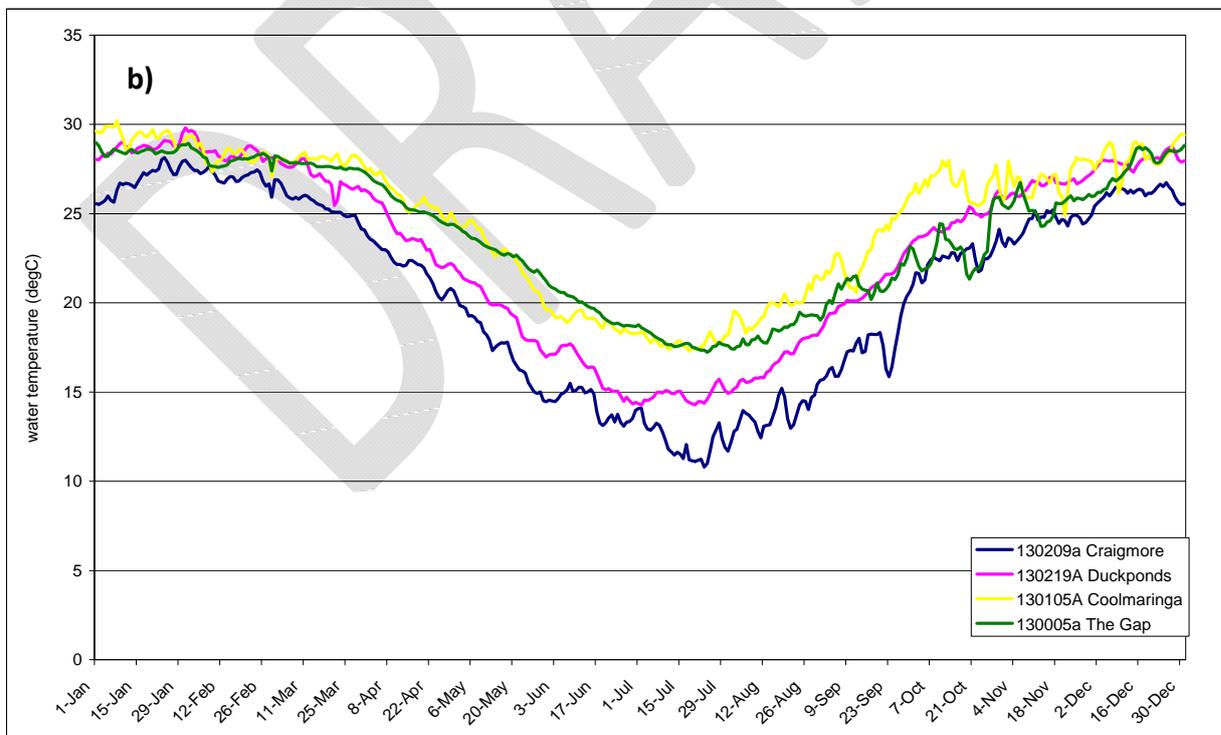
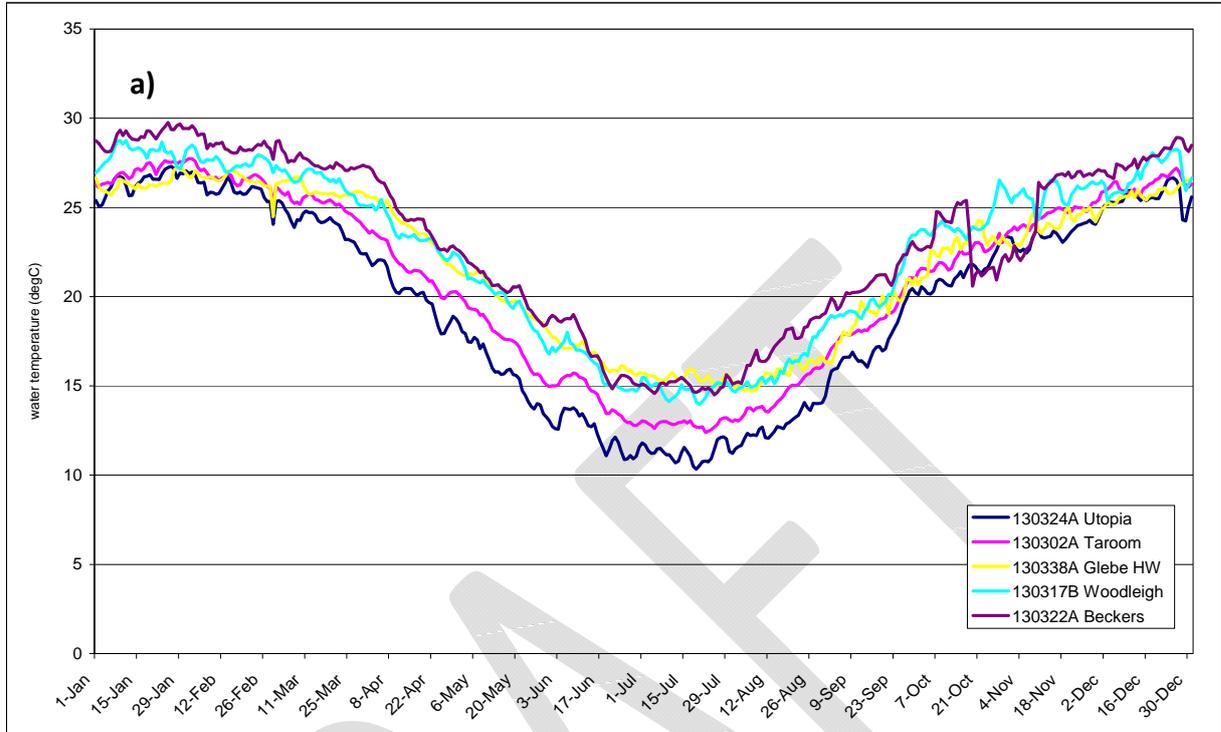
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7. Appendices

Appendix A: Period of records

WRP Node	GS number	Site	Period of record	Water Temperature	Rating Table Number_Release
Node 0		Lower Fitzroy	EOS		No rating tables available
Node 1	130005a	Fitzroy River @ The Gap	1964 - present	✓	21
Node 2	130322a	Dawson River @ Beckers	1964 - present	✓	94
Node 3	130306b	Don River @ Rannes recorder	1924 - present		29_1
Node 4	130317b	Dawson River @ Woodleigh	1957 - present	✓	20_1
Node 5	130338a	Dawson River @ Glebe Headwater	1983 - 2002	✓	72
Node 6	130302a	Dawson River @ Taroom	1911 - present	✓	78_1
Node 7	130324a	Dawson River @ Utopia Downs	1966 - present	✓	55
Node 8	130105a	Mackenzie River @ Coolmaringa	1971 - present	✓	93
Node 9	130401a	Isaac River @ Yatton	1962 - present	✓	26
Node 10	130110a	Mackenzie River @ Bingegang TW	1993 - 2002	✓	1_1
Node 11	130113a	Mackenzie River @ Rileys Crossing	2004 - present		6_1
Node 12	130504b	Comet River @ Comet Weir	1919 - present	✓	11
Node 13	130506a	Comet River @ The Lake	1972 - present	✓	11
Node 14	130206a	Theresa Creek @ Gregory Highway	1956 - present	✓	10_1
Node 15	130201b	Nogoa River dnst Fairbairn Dam	1919 - 1975		9
	130219a	Nogoa River @ Duckponds	1993 - present	✓	6
	130358a	Dawson River @ Isla Delusion	1993 - 2002		1
	130003b	Fitzroy River @ Riversleigh	1922 - present		15

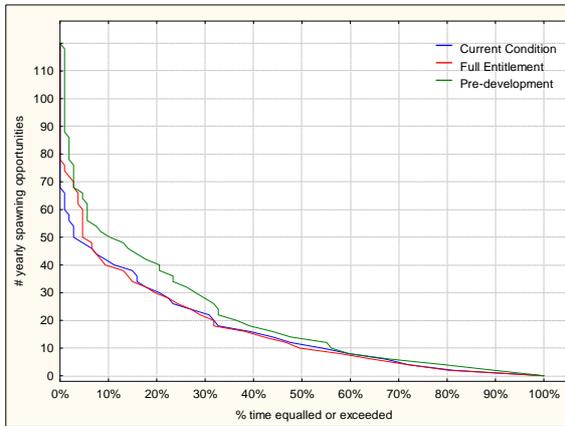
Appendix B: Annual daily water temperature calculated using mean daily water temperatures at sites along the Dawson River (a) and Nogo/Mackenzie River and Fitzroy River (b).



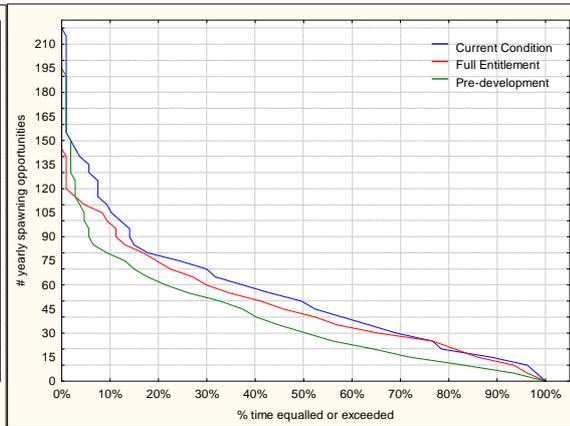
Appendix C : Low flow spawning fish population parameters applied to the estimation of the number of spawning opportunities required to maintain a population at equilibrium

	Ambassis agassizi	Mogurnda adspersa	Melanotaenia splendida splendida
Annual mortality rate	60%	60%	60%
eggs per event per ♀	40	90	120
egg to recruit success	7%	20%	5%
sex ratio ♀	50%	50%	50%
% ♀ fertile	7%	7%	3%
♀ spawning spell length	5	7	14
% capable ♀ breed per event	40%	10%	40%
Starting population 5000	5000	5000	5000
No recruits needed for equilibrium	3000	3000	3000
No fish spawn per event	70	17.5	30
Event recruits	196	315	180
No events needed for equilibrium	15	10	17
Starting population 1000	1000	1000	1000
No recruits needed for equilibrium	600	600	600
No fish spawn per event	14	3.5	6
Event recruits	39.2	63	36
No events needed for equilibrium	15	10	17
Starting population 500	500	500	500
No recruits needed for equilibrium	300	300	300
No fish spawn per event	7	1.75	3
Event recruits	19.6	31.5	18
No events needed for equilibrium	15	10	17

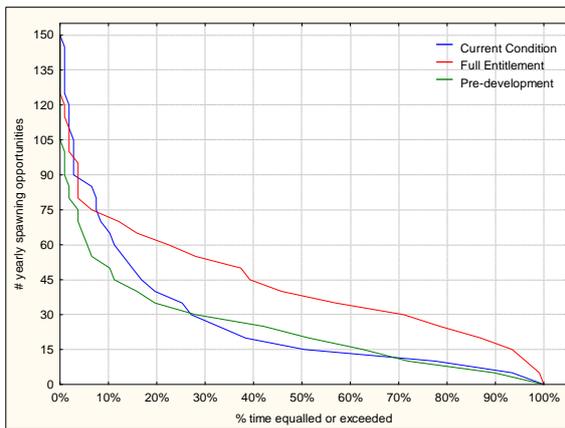
Appendix D: Cumulative frequency plots of the provision of recruitment opportunities for *Ambassis agassizii* at each reporting node.



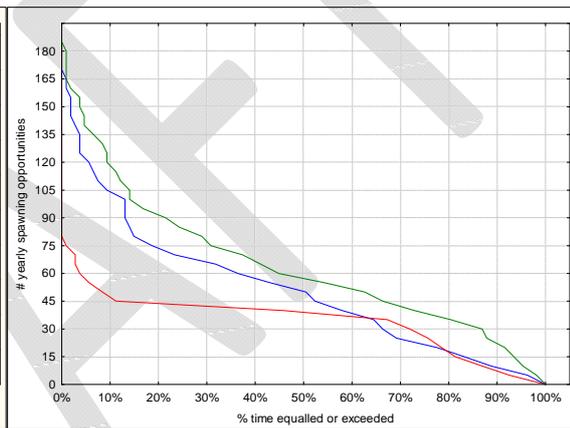
Fitzroy R @ Wattlebank (Node 1)



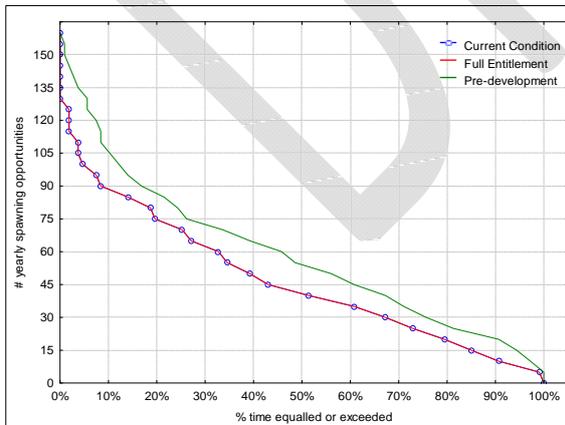
Dawson R @ Beckers (Node 2)



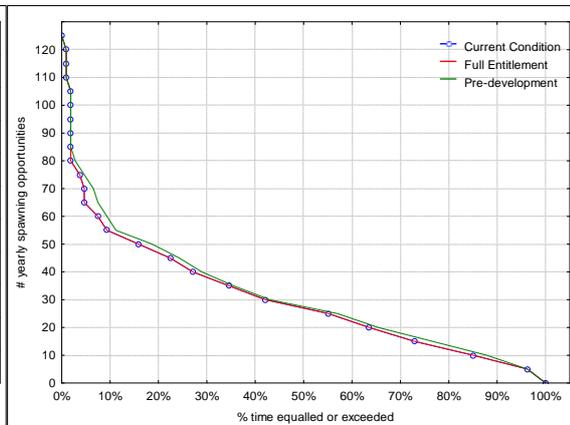
Dawson River @ Woodleigh (Node 4)



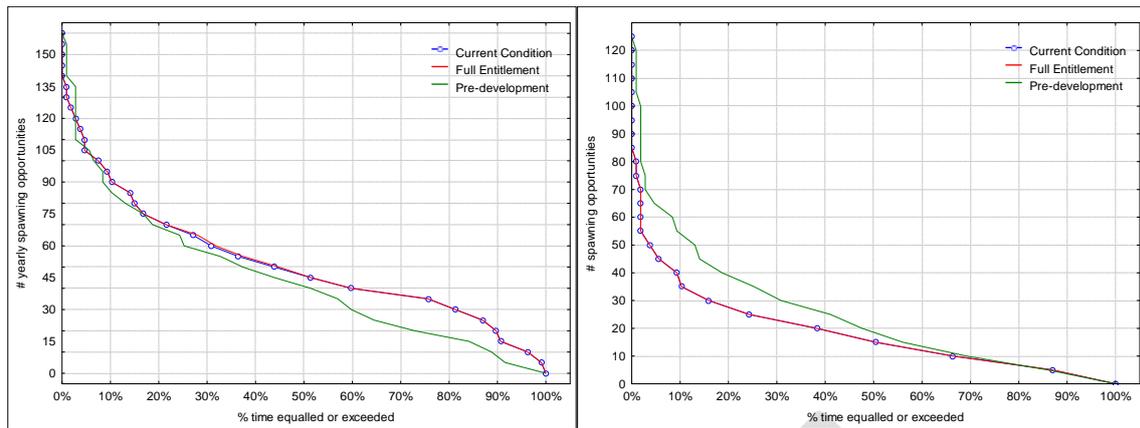
Dawson River @ Glebe (Node 5)



Dawson River @ Taroom (Node 6)

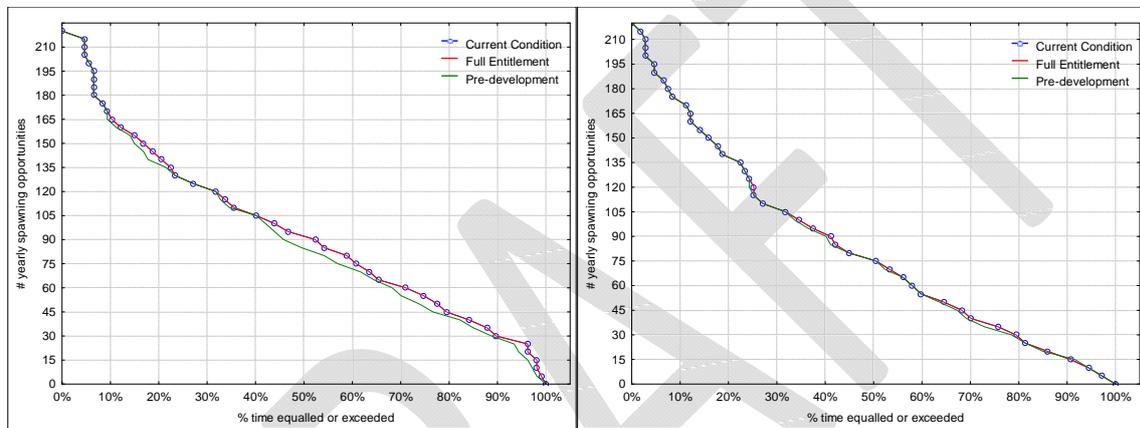


Dawson River @ Utopia Downs (Node 7)



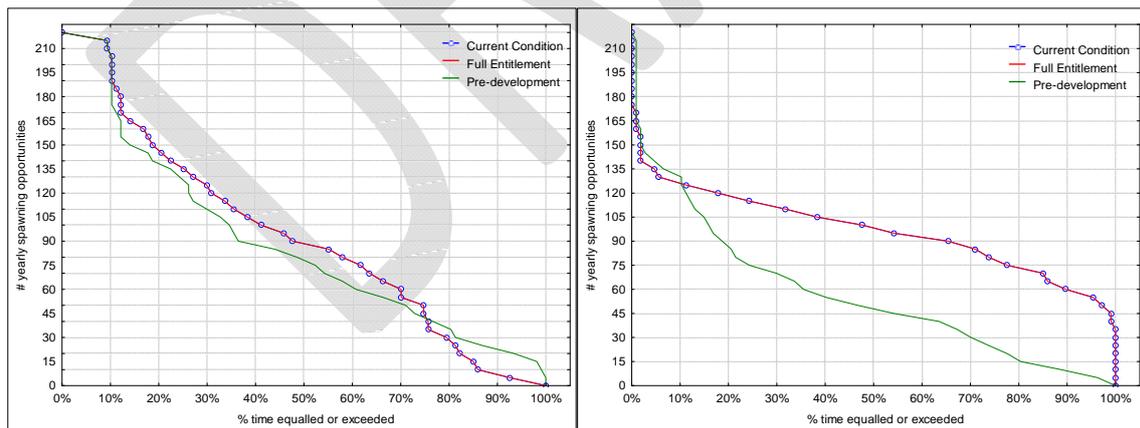
Mackenzie River @ Bingegang (Node 10)

Mackenzie River @ Carnangarra (Node 11)



Comet River @ Comet Weir (Node 12)

Comet River @ The Lake (Node 13)



Theresa Creek @ Gregory Highway (Node 14)
(Node 15)

Nogoia River downstream Fairbairn Dam

Appendix E: Cumulative frequency plots of the provision of recruitment opportunities for *Mogurnda adspersa* at each reporting node.

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Appendix F: Cumulative frequency plots of the provision of recruitment opportunities for *Melanotaenia splendida splendida* at each reporting node.

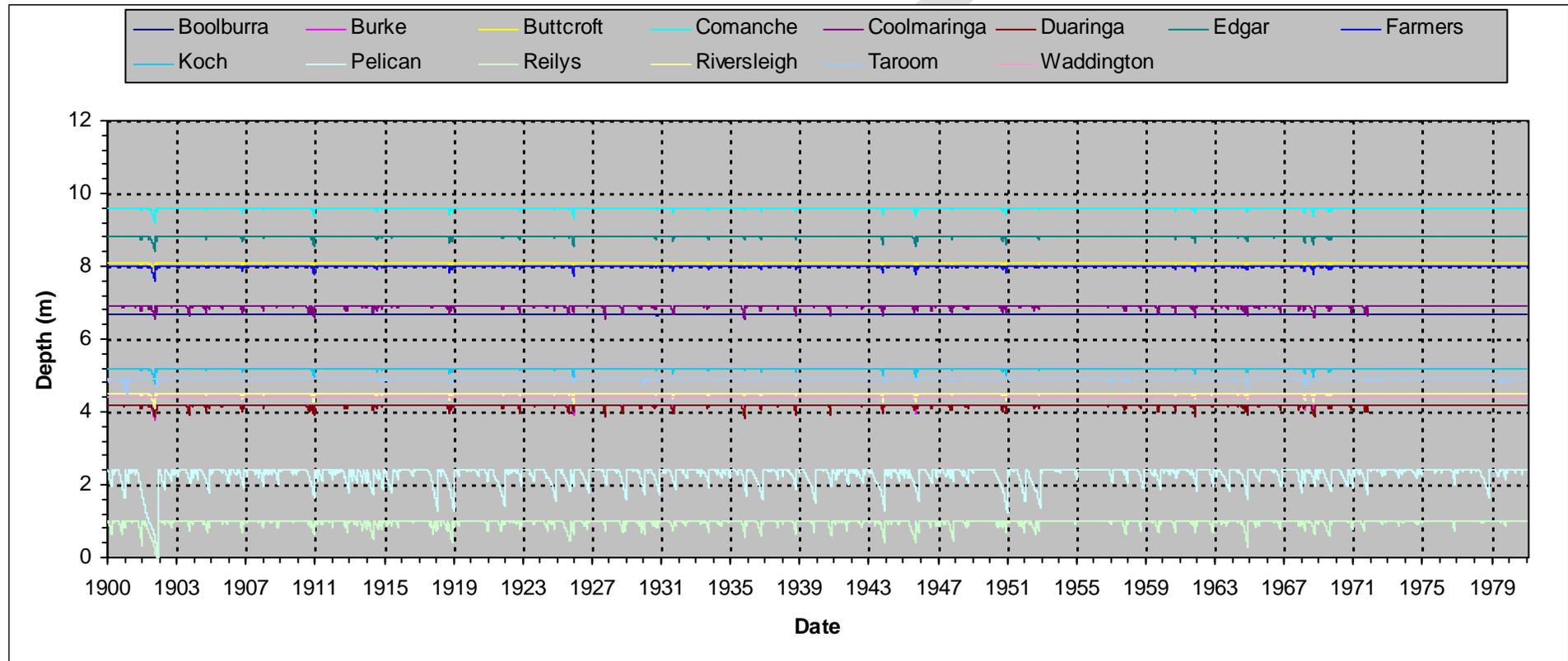
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**Appendix G: Modelled catch rates of offshore reef fisheries (Capricorn Bunker Group).
Green shading indicates strong catch years.**

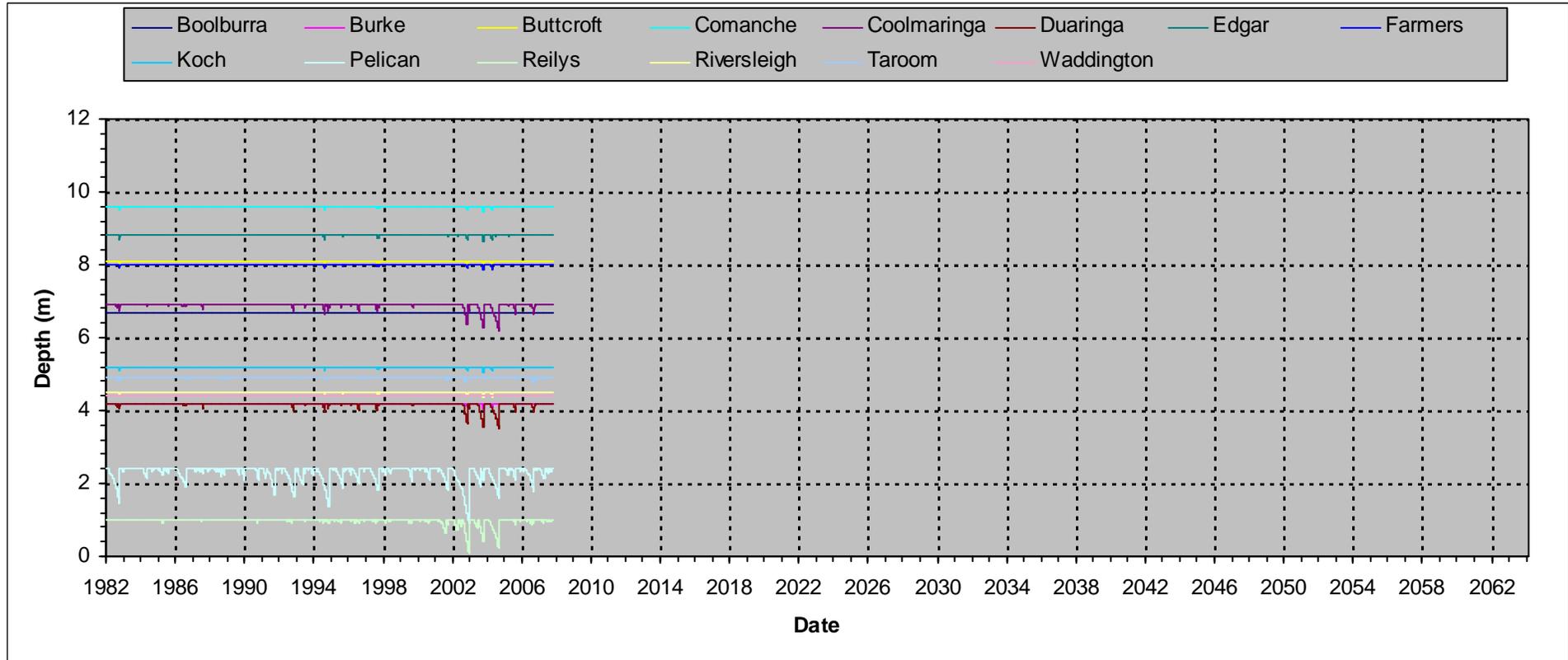
Wet Season	Current Development	Full Development	Pre-development	Wet Season	Current Development	Full Development	Pre-development
1900_01	16.59	16.59	16.60	1954_55	32.16	32.11	32.20
1901_02	16.58	16.58	16.58	1955_56	31.26	30.57	31.68
1902_03	16.62	16.62	16.64	1956_57	19.18	18.75	19.98
1903_04	16.90	16.77	16.98	1957_58	22.91	21.98	24.26
1904_05	17.11	17.01	17.30	1958_59	20.30	18.77	22.56
1905_06	29.11	27.17	31.30	1959_60	17.24	16.25	18.70
1906_07	22.94	21.68	24.35	1960_61	16.83	16.76	17.08
1907_08	31.03	30.32	31.42	1961_62	16.63	16.60	16.71
1908_09	24.19	23.72	24.44	1962_63	16.68	16.67	16.77
1909_10	32.23	32.20	32.24	1963_64	16.58	16.58	16.58
1910_11	31.88	31.63	32.03	1964_65	16.58	16.58	16.58
1911_12	24.74	24.57	24.83	1965_66	16.62	16.60	16.66
1912_13	16.89	16.80	16.93	1966_67	16.59	16.59	16.60
1913_14	16.64	16.63	16.66	1967_68	19.31	18.73	21.06
1914_15	16.59	16.59	16.59	1968_69	16.59	16.22	17.73
1915_16	16.58	16.58	16.59	1969_70	16.69	16.66	16.77
1916_17	32.08	31.87	32.20	1970_71	32.02	31.53	32.12
1917_18	32.25	32.25	32.25	1971_72	24.82	24.51	24.89
1918_19	24.97	24.97	24.97	1972_73	16.61	16.60	16.66
1919_20	16.60	16.60	16.61	1973_74	32.25	32.25	32.25
1920_21	16.69	16.67	16.75	1974_75	18.67	24.97	20.18
1921_22	31.69	31.41	32.04	1975_76	32.25	32.24	32.25
1922_23	24.61	24.43	24.84	1976_77	24.97	24.97	18.51
1923_24	17.07	16.83	17.48	1977_78	30.33	30.06	31.03
1924_25	16.67	16.63	16.77	1978_79	28.93	27.25	28.96
1925_26	16.64	16.62	16.68	1979_80	22.82	21.73	22.84
1926_27	16.70	16.67	16.78	1980_81	16.67	16.65	16.73
1927_28	17.04	16.88	17.60	1981_82	16.61	16.61	16.64
1928_29	16.86	16.82	16.92	1982_83	16.61	16.60	16.62
1929_30	17.12	17.00	17.43	1983_84	16.70	16.68	16.81
1930_31	16.60	16.59	16.60	1984_85	16.61	16.61	16.64
1931_32	16.77	16.69	16.88	1985_86	16.61	16.60	16.62
1932_33	16.61	16.60	16.63	1986_87	16.59	16.59	16.60
1933_34	16.66	16.64	16.68	1987_88	24.64	24.09	26.42
1934_35	16.61	16.59	16.63	1988_89	20.05	19.69	21.20
1935_36	17.04	16.88	17.28	1989_90	16.63	16.62	16.65
1936_37	16.73	16.66	16.92	1990_91	32.25	32.25	32.25
1937_38	16.59	16.59	16.61	1991_92	24.97	24.97	24.97
1938_39	16.74	16.71	16.86	1992_93	16.60	16.60	16.61
1939_40	31.49	31.12	31.86	1993_94	17.00	16.91	17.45
1940_41	24.48	24.24	24.72	1994_95	16.59	16.58	16.61
1941_42	17.44	17.25	17.61	1995_96	17.28	16.93	17.67
1942_43	19.88	18.52	21.94	1996_97	17.63	17.31	18.89
1943_44	16.97	16.08	18.30	1997_98	16.59	16.59	16.32
1944_45	16.58	16.58	16.59	1998_99	18.07	17.53	18.96
1945_46	16.80	16.73	16.88	1999_00	16.63	16.62	16.37
1946_47	18.24	17.56	19.15	2000_01	17.81	17.44	18.78
1947_48	16.60	16.60	16.50	2001_02	16.60	16.60	16.25
1948_49	17.47	17.30	18.27	2002_03	16.97	16.92	17.00
1949_50	27.44	24.81	29.26	2003_04	16.75	16.73	16.98
1950_51	32.22	32.20	32.22	2004_05	16.65	16.64	16.70
1951_52	24.95	24.94	24.96	2005_06	16.60	16.59	16.61
1952_53	16.86	16.81	16.97	2006_07	16.66	16.64	16.71
1953_54	32.25	32.25	32.25				

Appendix H : Individual waterhole depth over time for IQQM scenarios

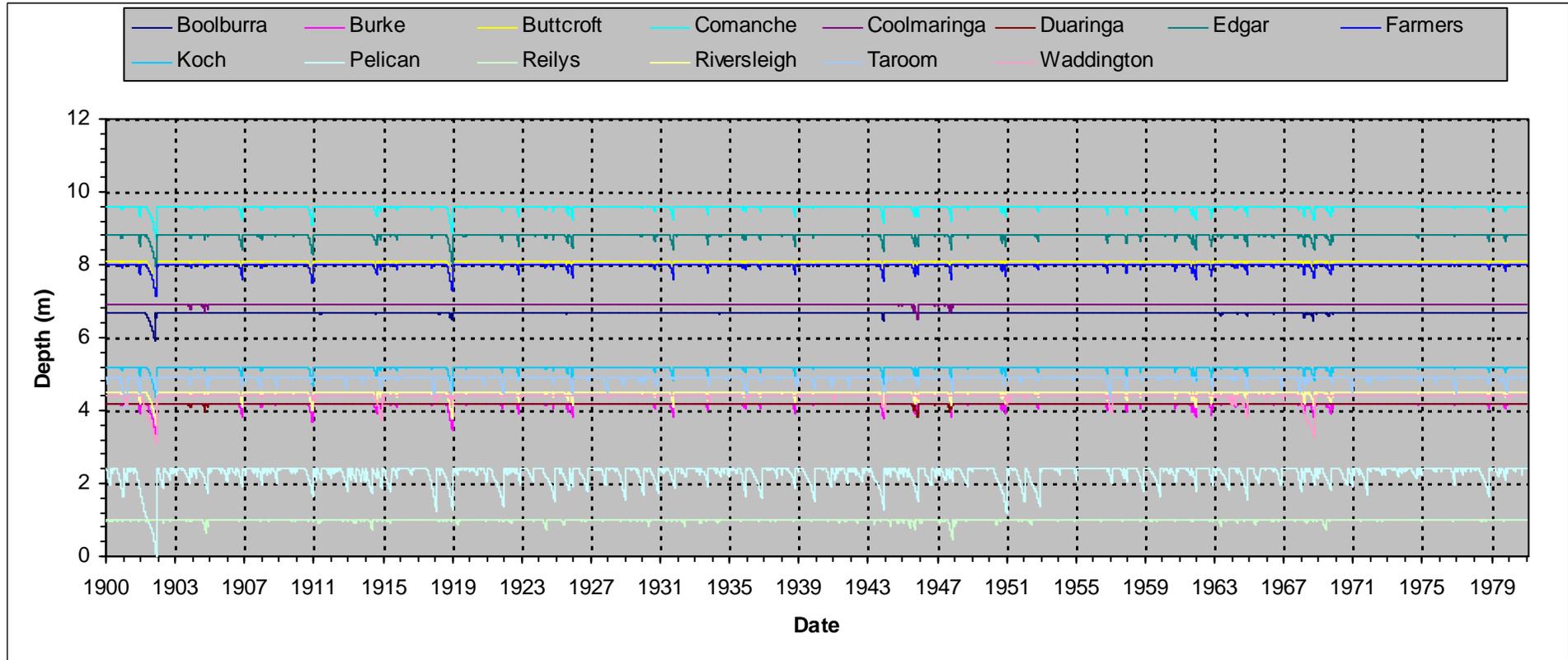
a) Pre-Development



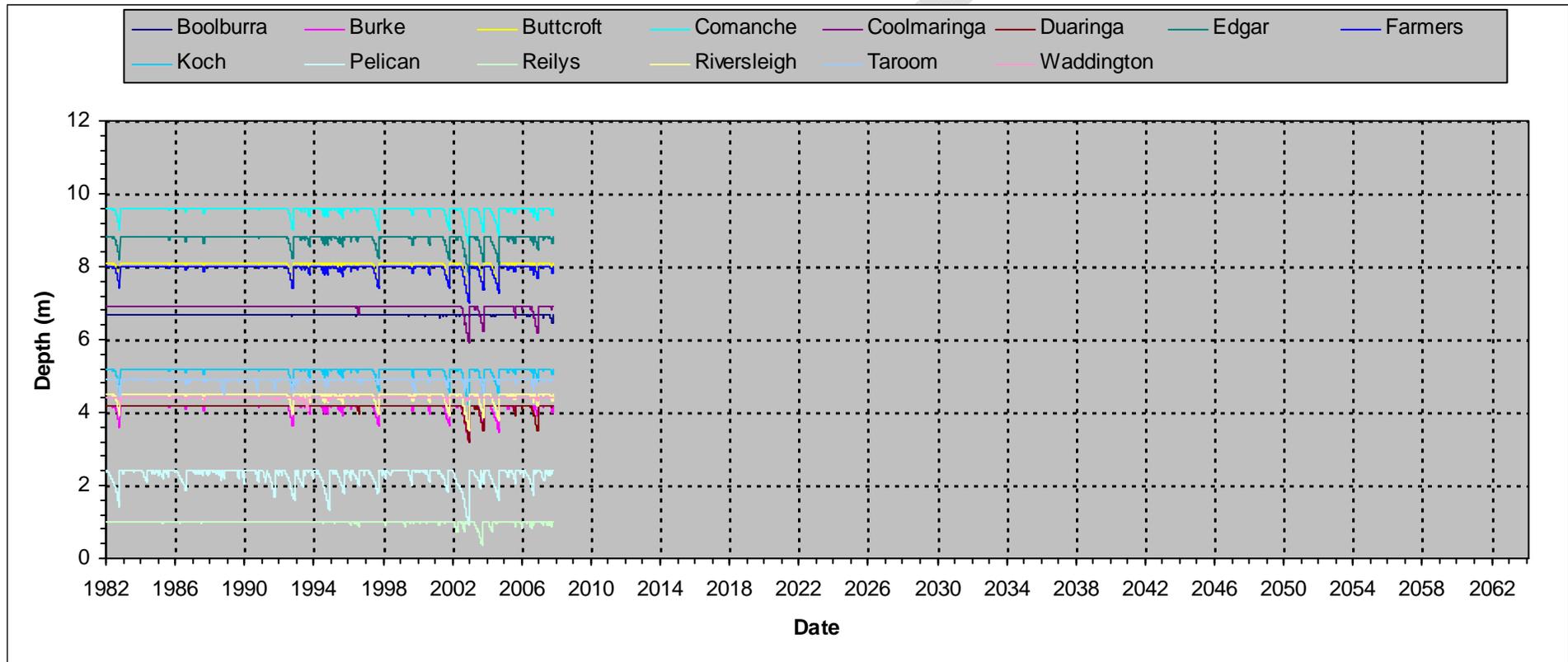
a) Pre-Development continued



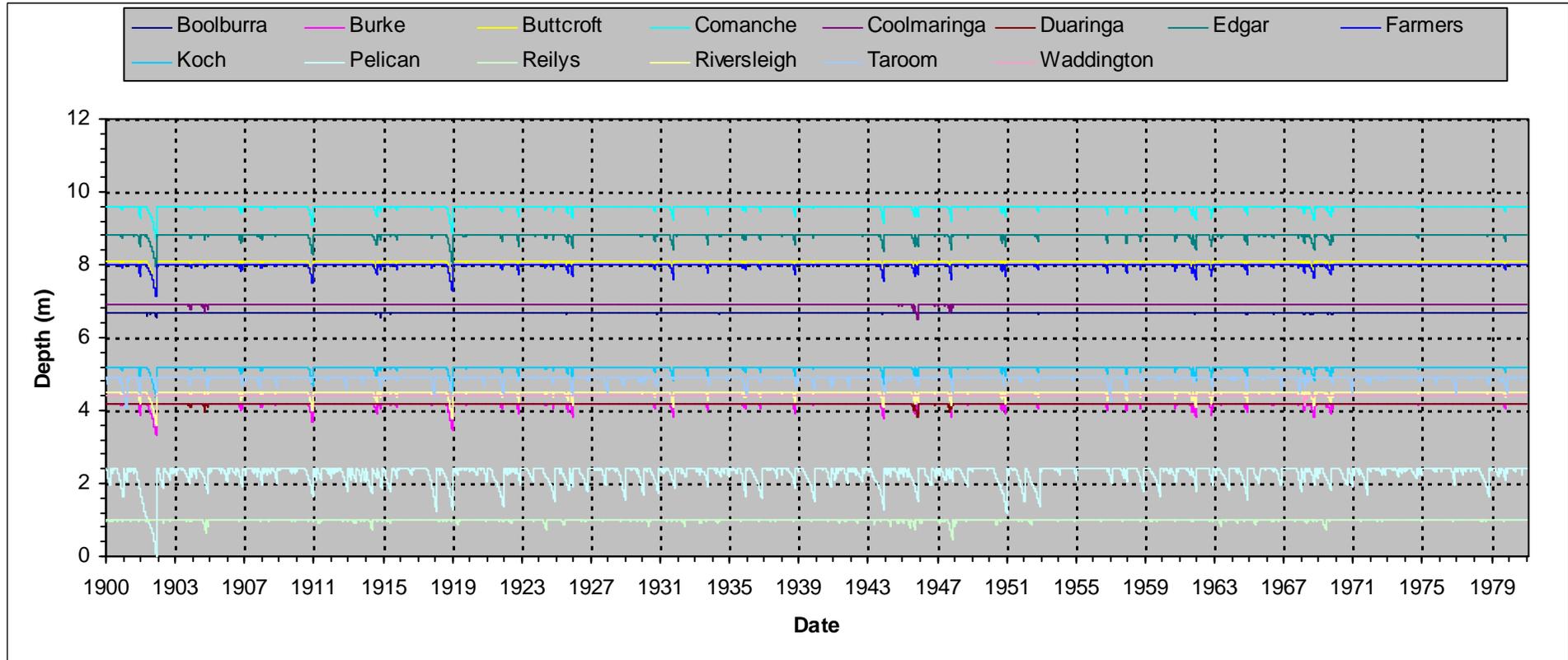
b) Current Development



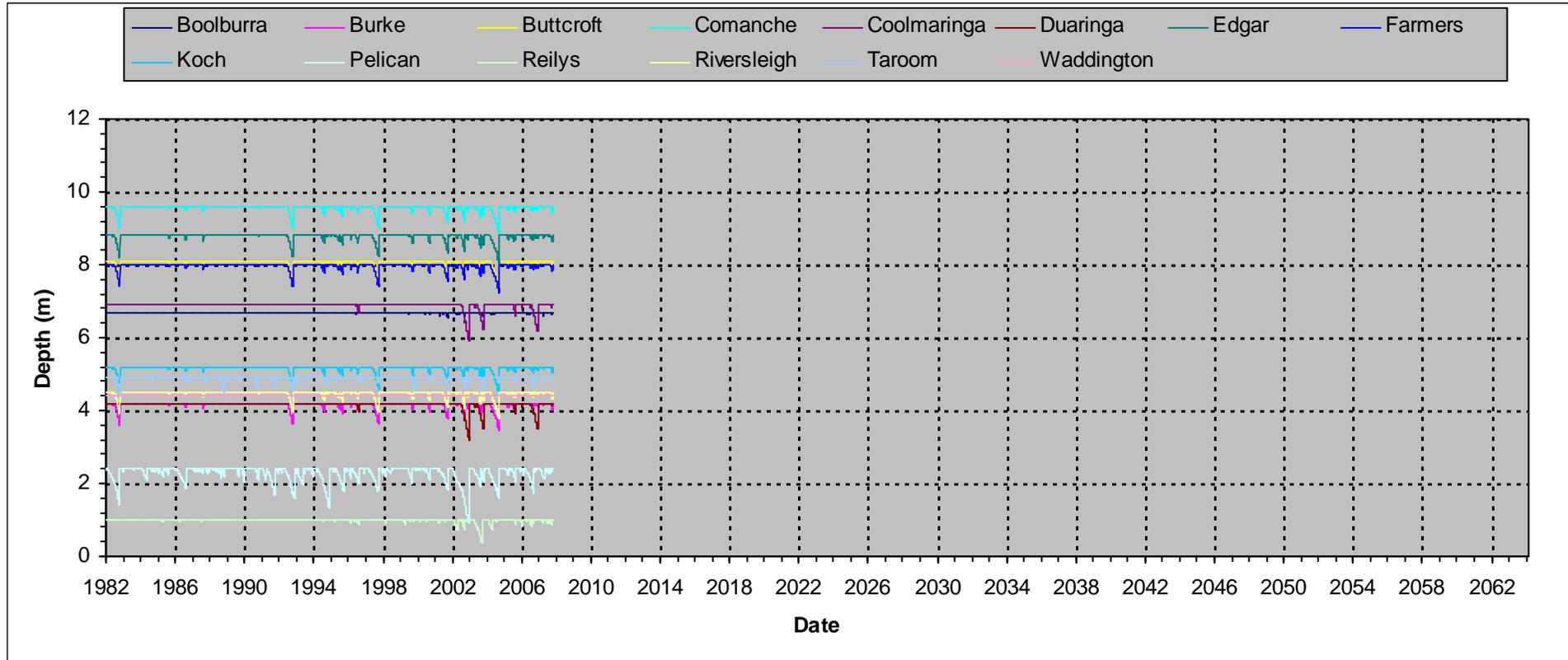
b) Current Development continued



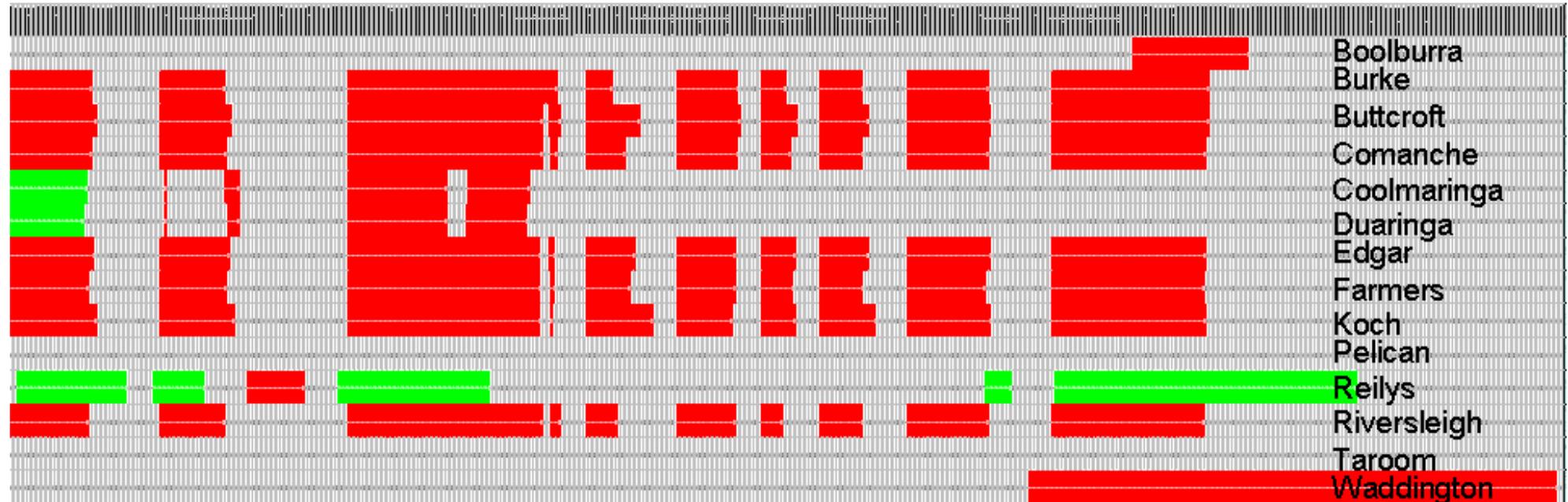
c) Full Development



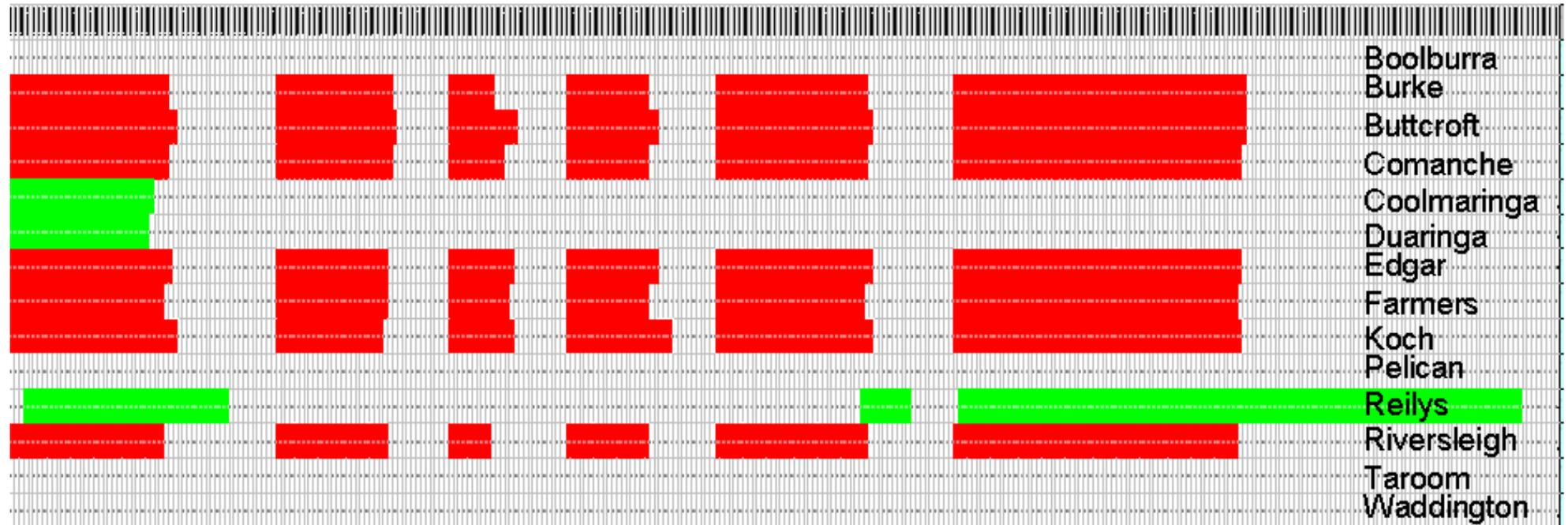
c) Full development continued



Current Development change – edited to time periods of change across multiple waterholes. Green shading represents increased periods in the development case of above the 0.5m CTF level compared to predevelopment, red shading represents increased periods in the development case of below 0.5m CTF level compared to the predevelopment case. White areas show there is no difference between scenarios.



Full Development change – edited to time periods of change across multiple waterholes. Green shading represents increased periods in the development case of above the 0.5m CTF level compared to predevelopment, red shading represents increased periods in the development case of below 0.5m CTF level compared to the predevelopment case. White areas show there is no difference between scenarios.



DRAFT

Fitzroy Basin Draft Water Resource Plan

Overview Report

December 2010

Prepared by:

Water Allocation and Planning

Department of Environment and Resource Management

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December 2010

#29526

Minister's foreword

The Fitzroy Basin Water Resource Plan released in 1999 was the first of its type for Queensland's developed coastal catchments. It broke new ground and opened a new chapter of awareness regarding the importance of integrated, sustainable resource management. As part of the renewal process a new water resource plan for the Fitzroy Basin must be developed to ensure we stay ahead of the game, learn from the lessons of the past ten years and look to innovative ways of addressing the challenges and opportunities that lie ahead.

The new draft water resource plan for the Fitzroy Basin has been released for public scrutiny to enable all stakeholders to have a say prior to finalisation. The process has been well-informed, with preparation of the new draft water resource plan supported by findings from hydrologic, environmental and socioeconomic technical assessments, along with input from the community. I would like to thank the groups and individuals who contributed to the process, in particular the Fitzroy Basin community reference panel members. I would also like to thank the previous Isaac Connors and Callide groundwater community reference panel members.

This overview report provides a plain English guide to the accompanying new draft water resource plan summarising key outcomes and provisions in the new draft plan, and the reasoning behind them.

The new draft water resource plan builds on the achievements of the existing plan and provides a balanced and sustainable approach to managing water resources in the Fitzroy Basin. The new draft plan includes strategies which provide for the management of groundwater for the first time, security for existing water users including the environment, establishment of additional tradeable water allocations, improved specification of entitlements and unallocated water reserves to support future development.

I encourage anyone with an interest in the water resources of the Fitzroy Basin to study this document and the accompanying new draft water resource plan and participate in the process by making a formal submission. All properly made submissions will be fully considered in finalising the water resource plan.

Stephen Robertson
Minister for Natural Resources,
Mines & Energy and Minister for Trade

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How to make a submission

Submissions are invited on the Draft Water Resource (Fitzroy Basin) Plan 2010 (new draft plan) which will replace the Water Resource (Fitzroy Basin) Plan 1999. Anyone can present a submission about the new draft plan.

Submission form

The form on the next page can be used to lodge a submission about the attached new draft plan. Complete the five steps on the first page of the form to finalise a submission. Internet submissions will also be accepted.

An electronic submission form can be found at <www.derm.qld.gov.au/wrp/fitzroy.html>.

Completed submission forms should be forwarded to the following address:

Postal address	Street address
Department of Environment and Resource Management	Department of Environment and Resource Management
Attention: Kel Roberts	Attention: Kel Roberts
Central West Region Water Services (Fitzroy Basin WRP)	Central West Region Water Services (Fitzroy Basin WRP)
P O Box 1762	Level 2 209 Bolsover Street
Rockhampton Qld 4700	Rockhampton Qld 4700

Submissions may also be made via:

Email: wrpfitzroy@derm.qld.gov.au.

Fax: (07) 4938 4011 Attention: Kel Roberts

For further information on submissions:

Telephone: 1800 822 100

Closing date for submissions

All submissions must be received by **5.00 pm on 28 February 2011**.

Submission form

Draft Water Resource (Fitzroy Basin) Plan 2010

Please use a ballpoint pen to complete this submission

Submissions are being sought from interested individuals and groups about the content of the Draft Water Resource (Fitzroy Basin) Plan 2010 (new draft plan).

The Minister for Natural Resources, Mines and Energy and Minister for Trade has released the new draft plan for public review, discussion and submissions. Submissions will be considered by the Minister in finalising the Fitzroy Basin Water Resource Plan.

Please complete the following five steps to make a proper submission:

- On the form, enter the name and address of each person making the submission.
- Ensure that each person making the submission has signed it.
- State the grounds of the submission, and the facts and circumstances relied on in support of these grounds.
- If you require more than the space provided in this submission form, please attach this completed submission form as a cover sheet to your detailed submission and tick the 'Detailed submission attached' box on this submission form.
- Ensure your submission is lodged by **5 pm on 28 February 2011**.

Submission Form

Office Use Only

Submission No:.....

Date Received:.....

Surname (Mr/Mrs/Ms/Dr).....

First Name

Address

..... Postcode Fax

Organisation..... Position.....

Phone No Mobile No.....

Email.....

Signature(s)..... Date.....

Which interest group(s) do you primarily represent? (You may tick more than one box.)

- | | | |
|---|---|---|
| <input type="checkbox"/> Riparian landholder | <input type="checkbox"/> Stock and domestic water user | <input type="checkbox"/> Grazier |
| <input type="checkbox"/> User of overland flow water | <input type="checkbox"/> Environmental interest | <input type="checkbox"/> Dryland farmer |
| <input type="checkbox"/> Mining/petroleum industry | <input type="checkbox"/> State/Commonwealth department | <input type="checkbox"/> Indigenous community |
| <input type="checkbox"/> Local government | <input type="checkbox"/> Tourism industry | <input type="checkbox"/> Urban water user |
| <input type="checkbox"/> Recreational fisher | <input type="checkbox"/> Commercial fisher | <input type="checkbox"/> Community group |
| <input type="checkbox"/> Irrigator (supplemented surface water) | <input type="checkbox"/> Irrigator (unsupplemented surface water) | <input type="checkbox"/> Irrigator (supplemented groundwater) |
| <input type="checkbox"/> Irrigator (unsupplemented groundwater) | <input type="checkbox"/> Natural Resource Management body | <input type="checkbox"/> Academic/researcher |
| <input type="checkbox"/> Other (please specify) | | |

Summary

Purpose of the overview report

This overview report, a requirement of the *Water Act 2000* (the Water Act), has been prepared to accompany the release of the Fitzroy Basin Draft Water Resource Plan (new draft plan). The finalised new plan will replace the expiring Water Resource (Fitzroy Basin) Plan 1999 (Fitzroy WRP 1999).

The overview report summarises the development and provisions of the new draft plan including differences from the Fitzroy WRP 1999. It also outlines the main issues raised by the community and the results of technical assessments prepared to provide information for the development of the new draft plan.

The overview report provides interested agencies, groups and individuals with supporting information that will promote understanding of the new draft plan. It will also assist those intending to prepare a formal submission. The minister will consider all properly made submissions prior to finalisation of the new plan.

Developing the new draft plan

Water resource plans, are subordinate legislation. The *Statutory Instruments Act 1992* provides for renewal of subordinate legislation after 10 years to ensure it is 'relevant to the economic, social and general wellbeing of the people of Queensland and ... of the highest standard'.

In line with the requirements of the Water Act, the provisions of the new draft plan were developed by evaluating and balancing the many factors—hydrologic, environmental and socioeconomic—that influence how water is allocated and sustainably managed to meet present and future needs.

Preparation of the new draft plan began formally in June 2008 through public notification and release of an information report that explained the renewal process and outlined key issues pertinent to the plan area.

Submissions on the proposed new draft plan were invited, and a community reference panel comprising representative Fitzroy Basin stakeholders was formed. Although the panel was not a decision-making body, it played a key role in advising the minister on water-related issues and community water needs and aspirations for the region.

In December 2008, the minister announced his intention to amalgamate the new water resource plan process with the Isaac–Connors and Callide groundwater amendments to the Fitzroy WRP 1999. The notices of intent for the groundwater amendments were released in December 2006 and they had progressed to the extent that technical studies were undertaken and planned community reference panel (CRP) meetings completed. Amalgamation enabled more efficient use of resources and provided an easier and more transparent public release process. Submissions on the amalgamated notice of intent were invited and one submission was received. That submission was considered together with submissions received on the initial notice of intent for the new draft plan and submissions received on the notices of intent for the Fitzroy WRP 1999 groundwater amendments.

In developing the new draft plan many factors were considered to provide a sound basis for the finalisation and implementation of a new plan. These factors include:

- effectiveness of the strategies contained in the Fitzroy WRP 1999 and implemented through the Fitzroy Basin Resource Operations Plan (Fitzroy ROP)
- existing water entitlements, works and their use
- hydrologic, environmental and socioeconomic factors raised in the technical assessments including changes in water demand and risks to natural ecosystems
- future water needs including cultural, economic and environmental water needs over the life of the new plan
- inclusion of subartesian water
- emerging issues such as climate change and water quality
- community views and aspirations as raised in public submissions and during community reference panel meetings.

By reviewing and assessing relevant information in this manner and utilising advances in scientific knowledge the new draft plan has been developed to provide a balance between the water needs of the environment and future community water requirements.

Key provisions of the Fitzroy WRP 1999

Generally the Fitzroy WRP 1999 provided for:

- regulation of water in a watercourse, lake or spring and overland flow water
- environmental flow objectives (seasonal base flow, first post-winter flow and medium to high flow) based on a hydrologic model with a simulation period from 1900 to 1995. All allocation and management decisions must be made in accordance with the objectives which ensure the maintenance of stream-flow variability and seasonality
- ecological and cultural values of waterholes and lakes by imposing a 0.5 metre draw down limit on new entitlements with an exemption for stock and domestic take.

For existing entitlements the Fitzroy WRP 1999 provided for:

- full use of existing entitlements and continued use of existing overland flow works
- establishment of supplemented water allocations in the Dawson, Nogoia Mackenzie, Lower Fitzroy and Fitzroy Barrage water supply schemes
- establishment of unsupplemented water allocations along the Nogoia, Mackenzie, Comet and Fitzroy rivers, although water allocations have yet to be established in the Fitzroy ROP for the Comet River
- water allocation security objectives based on a hydrologic model with a simulation period from 1900 to 1995
- amendment of some existing entitlements to include conditions, volumetric limits and maximum rates of take.

For future development, the Fitzroy WRP 1999 provided for:

- additional unallocated water to meet future water demands while maintaining water flows to support environmental processes and protecting existing entitlements
- unallocated water reserves in some water supply schemes
- an unallocated water reserve for the Nathan Dam project (up to 190 000 ML/a) on the Dawson River
- provision for dealing with unallocated water.

For overland flow water, the Fitzroy WRP 1999 provided for:

- continued use of existing works to capture overland flow water and authorisation of new overland flow works for stock and domestic purposes, to meet the requirements of an environmental authority, to contain potentially contaminated agricultural run-off, to divert water around a mine site and small scale storages up to 5 ML capacity
- authorisation of the take of overland flow water for other purposes e.g. irrigation, following the notification of such existing works within 12 months of the commencement of the Fitzroy WRP 1999
- a requirement for a water licence to take water (from release of unallocated water) and development permit for new overland flow works
- a requirement for new works, including authorised works, to be constructed in accordance with provisions of the *Sustainable Planning Act 2009* and associated codes. An exemption was provided for activities authorised under a mining tenement and the *Petroleum Act 1923* or *Petroleum and Gas (Production and Safety) Act 2004* until the Fitzroy ROP was amended to include overland flow
- continuing the effect of the moratorium on new works to take or store water taken from a watercourse that may increase the take of overland flow water, until an amendment is made to the Fitzroy ROP in relation to overland flow.

For monitoring and reviewing purposes, the Fitzroy WRP 1999 provided for:

- monitoring by the resource operations licence holder and the state, including stream flow, water quality, aquatic ecosystems and water use to establish how effectively the plan's outcomes are being achieved
- preparation of an annual report on the plan by the minister that summarises monitoring, new research findings, and assessments of the effectiveness of the plan's strategies in achieving its outcomes
- a mechanism for the minister to consider amending the plan if there is a major change in circumstances relating to water demands or environmental water need.

Key provisions in the new draft plan

The new draft plan will continue and build on the provisions mentioned above and the major provisions include the following:

For the environment:

- keeping the long-term total flows downstream of the Fitzroy Barrage to above 77 per cent of mean pre-development flows as per the existing Fitzroy WRP
- specification of environmental flow objectives that will ensure the continued application and improvement of seasonal base flow and first post-winter flow management strategies
- limitations and additional criteria for dealing with future applications to interfere with the flow of water by impoundment to minimise any impacts arising from in-stream barriers
- allocation and flow management strategies that will support good water quality outcomes.

New provisions for the management of groundwater:

- the regulation of subartesian water with specific management arrangements in five groundwater management areas
- strategies to address the over-allocation and overuse of groundwater in the Callide Valley alluviums, including a reduction in groundwater entitlement volumes from 37 375 ML to a sustainable level of about 19 000 ML
- improved management of groundwater in the Isaac–Connors and Don River subcatchments and continued use of existing groundwater works in the currently undeclared areas. This would be subject to a notification of works process and subsequent granting of water licences
- improved volumetric specification of existing groundwater entitlements, through the amendment of licences not being converted to water allocations. Amendments would occur as required, to include a purpose, an annual volumetric limit and conditions
- licences to take groundwater for stock purposes in the Callide groundwater management area will no longer be required
- additional take of groundwater will generally be subject to the future release of specified reserves of unallocated water.

Key provisions for more secure water entitlements and expanded opportunities for water trading:

- transitioning of existing water allocations to the new plan
- specification of water allocation security objectives to ensure appropriate long-term security for both established and new water allocations
- establishment of tradeable water allocations to take supplemented surface and groundwater in the Callide Valley Water Supply Scheme
- establishment of tradeable water allocations to take unsupplemented groundwater in the Callide Valley alluviums
- establishment of additional water allocations to take unsupplemented surface water in the Nogoia River, Dawson River, Comet River, Theresa Creek and Retreat Creek areas
- improved volumetric specification of existing surface water licences, through the amendment of licences not being converted to water allocations. Amendments would occur as required, to include a purpose, maximum rate, daily volumetric limit, annual volumetric limit and conditions. A monthly volumetric limit may also be required on some water licences.

Continued management of overland flow water, subject to the following changes:

- the size of overland flow storages that can be used for any purpose without the need for a water licence will be increased from the current 5 ML to 50 ML.
- mines will be required to notify existing overland flow works within 12 months from the commencement of the new plan.
- exemptions that existed for mining operations to take overland flow for consumptive purposes without the requirement for a water licence will be removed to ensure a consistent regulatory approach for all users.
- limiting the areas covered by the continued effect of the moratorium on new works to take or store water taken from a

watercourse that may increase the take of overland flow water, until an amendment is made to the Fitzroy ROP in relation to overland flow. This provision would now only apply to specific parts of Theresa Creek, Retreat Creek and the Comet River systems.

- authorising any incidental take of overland flow water associated with the storage and subsequent beneficial use of coal seam gas water.

Key provisions to support future development:

- reserves of unallocated surface water totalling 301 900 ML/a that provide for water infrastructure projects including the Connors River Dam (56 400 ML/a), Nathan Dam (90 000 ML/a) and Lower Fitzroy storages (76 000 ML/a), as well as providing for future demands for state, Indigenous and general purposes in other parts of the plan area
- provision for Nathan Dam on the Dawson River is changed from up to 190 000 ML/a for primarily irrigation purposes to 90 000 ML/a for high security supplies such as for mining, urban and power generation
- unallocated groundwater reserves totalling 16 200 ML/a for state and general purposes in those parts of the plan area that can sustain additional levels of groundwater use
- unallocated groundwater reserve of 20 000 ML/a from naturally saline water in the coastal parts of the Fitzroy groundwater management area for possible expansion of the salt production industry
- interim arrangements to provide access to unallocated water for state purposes prior to the future amendment to the Fitzroy ROP.

For monitoring and review of the plan—updated monitoring requirements including groundwater monitoring requirements have been included.

1 Introduction

1.1 Role of the overview report

Preparation of an overview report is required under the *Water Act 2000* (Water Act) to support the development of a water resource plan. This report is a companion document and guide to the Fitzroy Basin Draft Water Resource Plan (new draft plan), with which it is released. The overview report explains:

- how and why the new draft plan was prepared
- the factors considered in preparing the new draft plan
- the key provisions of the new draft plan and reasoning behind them including differences from the Water Resource (Fitzroy Basin) Plan 1999 (Fitzroy WRP 1999)
- the role of community consultation and technical assessments in the development of the new draft plan
- the process for finalising and implementing the new plan.

The report aims to:

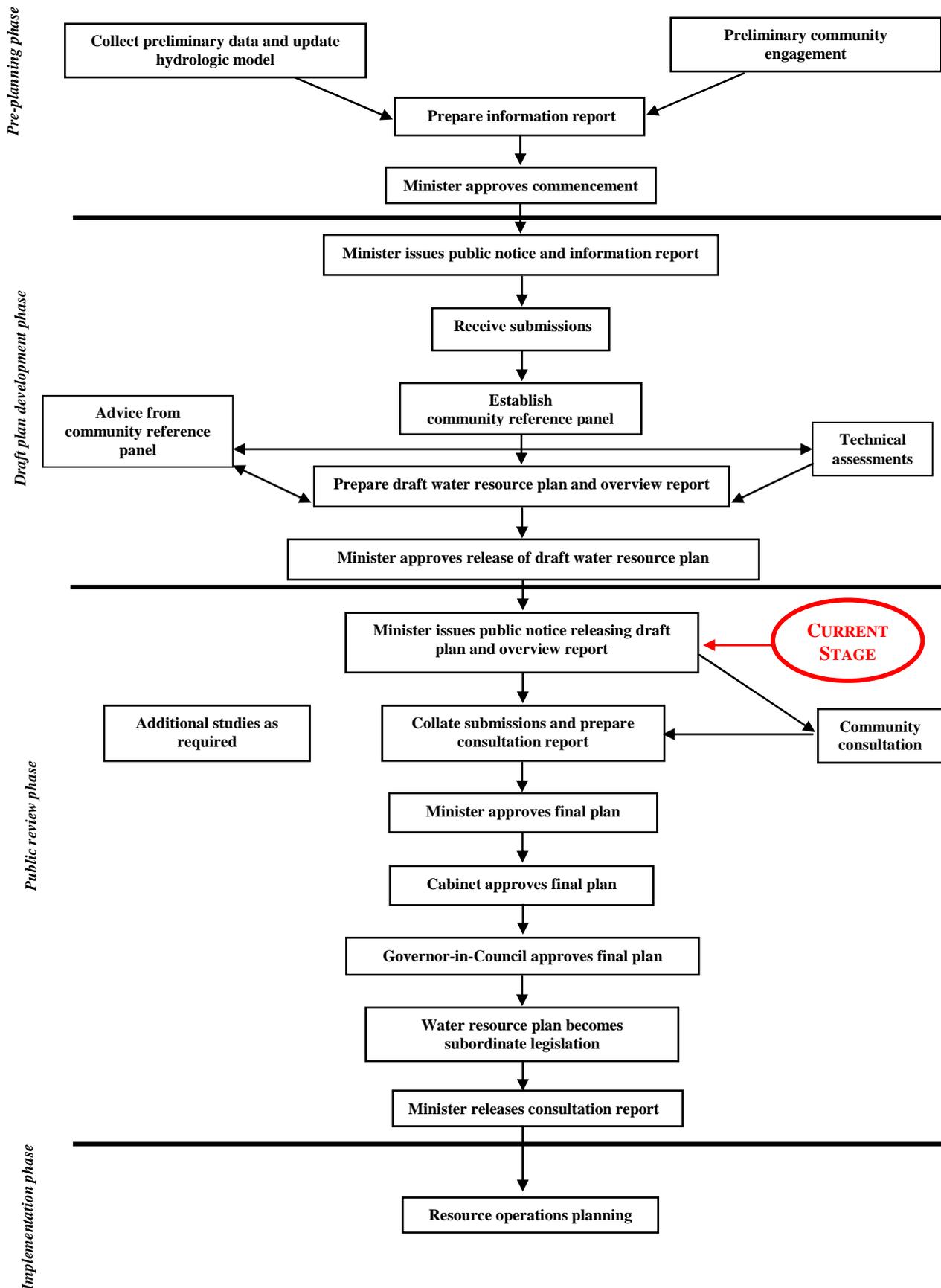
- promote informed debate and understanding about the water planning process.
- provide interested agencies, groups or individuals with the information they need to prepare a formal submission on the new draft plan for the minister to consider prior to finalisation.

The report comprises seven chapters which address the following matters:

- Chapter 1 provides an introduction to the process and profiles the plan area
- Chapter 2 summarises the new draft plan purposes and outcomes
- Chapter 3 explains the strategies for achieving general and specific surface water and groundwater outcomes
- Chapter 4 explains the strategies for achieving ecological outcomes including specific ecological outcomes
- Chapter 5 outlines monitoring and reporting requirements
- Chapter 6 sets out arrangements for implementing and amending the plan
- Chapter 7 summarises how the new draft plan was developed.

The water resource planning process and the current status of its preparation are shown in Figure 1.

Figure 1: The water resource planning process



1.2 Background to the water resource planning process

In the initial stages of Australia's water resource development, the small population generated relatively negligible development pressures and the negative effects of unstructured and incremental water resource allocation policies were correspondingly low. In the latter part of the last century, as economic growth increased in Australia and the limitations on water availability became apparent, it was clear that a more coordinated approach to water allocation and management was needed to sustain future needs.

In addition to this, drought caused further stresses to some catchments which had previously not seen the effects of water supply limitations. These factors combined to drive the need for a new approach to water management, the focus of which was to strike a balance between environmental needs and socioeconomic needs of a catchment. This is an especially important consideration in a dry land, renowned for its extreme climatic variability.

1.2.1 Water reforms and the National Water Initiative

In 1994, the Council of Australian Governments agreed on a set of principles for restructuring water allocation and management approaches. The states and territories agreed to implement changes that would ensure water resource availability was properly assessed and supplies sustainably allocated to support economic, social and environmental needs.

As the water reform progressed the principles were refined under the 2004 National Water Initiative.

The new draft plan is consistent with Queensland's commitments to national water reform through:

- transparent, statute-based water planning
- better definition of terms and conditions for water entitlements
- providing for the conversion of water entitlements to water allocations and increasing opportunities for trading
- stating general and ecological outcomes
- allowing for potential future water demands to be met where sustainable
- ensuring that appropriate monitoring and reporting requirements are introduced to foster water user confidence and ensure that ecological outcomes are being met
- encouraging water use efficiency within the urban and rural sectors as a way of meeting increased water demands
- addressing currently over-allocated and/or overused systems
- recognition of the linkages between overland flow water and stream flows as complementary parts of a single surface water resource, including their management and allocation as a single resource
- recognition of the linkages between groundwater and stream flows as complementary parts of a single resource.

1.2.2 *The Water Act 2000*—the Queensland approach

Queensland's commitments to national water reform are principally met through the Water Act, under which the minister plans for the allocation and sustainable management of water through the preparation of a water resource plan for any part of the state. The requirements include provision for protecting natural ecosystems and security of supply for water users. A water resource plan can apply to water in streams, lakes and springs and, where necessary, to overland flow and groundwater.

1.2.3 The Fitzroy WRP 1999

Over the past decade, surface water in the Fitzroy Basin has been managed by the Fitzroy WRP 1999. This plan originally began as a water allocation and management plan but was transitioned under the Water Act to become a water resource plan. The Fitzroy WRP 1999 was amended in 2005 to include overland flow water.

The Fitzroy Basin Resource Operations Plan (Fitzroy ROP), which commenced in January 2004, implements strategies in the Fitzroy WRP 1999 by setting out the day-to-day arrangements to put these strategies into effect. The Fitzroy ROP has been amended, the most recent amendment occurring in July 2009. Overland flow water is yet to be included in the Fitzroy ROP.

While water resource plans can be amended or renewed at any time if the minister believes goals are not being met, are at risk, or if new economically viable uses emerge. A formal process for timely review and renewal is provided at 10-year intervals under the *Statutory Instruments Act 1992*. The Fitzroy WRP 1999 is now due for replacement by a new water resource plan.

1.3 A new water resource plan for the Fitzroy Basin

Through review and renewal, the new plan will be able to build on the achievements of the Fitzroy WRP 1999 whilst also responding to opportunities and challenges. Renewal enables a new plan to address water resource and use changes that have occurred during the past 10 years, including providing for the management of additional water resources not included in the first plan, as well as assessing the requirements for future growth and climate change.

Through the technical assessments that support development of the new draft plan, renewal provides the means for any new or improving knowledge that may be available to be appropriately incorporated into the new draft plan. Community consultation is also important so that community views and aspirations can be taken into account in the development of the new draft plan.

Preparation of the new draft plan began formally in June 2008, through public notification and release of an information report that explained the planning process and outlined key water resource management issues pertinent to the plan area. A supplementary public notice and information report were released in December 2008 to announce the amalgamation of the new plan process with the Callide and Isaac–Connors groundwater amendments to the Fitzroy WRP 1999 that commenced in December 2006.

The public notice announcing the release of the new draft plan is shown in Appendix A of this report.

1.3.1 The plan area and the water to which it applies

The Fitzroy Basin (plan area) is the largest coastal river basin in Queensland (Figure 2) and includes several extensive subcatchments that drain into the Great Barrier Reef World Heritage Area.

The new draft plan will continue to apply to:

- water in watercourses or lakes, including water in dams and weirs built across them
- water in springs not connected to artesian water¹, and not connected to subartesian water² connected to artesian water
- overland flow water³.

The new draft plan will also apply to subartesian water (groundwater) for the first time.

¹ The Water Act defines artesian water as 'water that occurs naturally in, or is introduced artificially into, an aquifer, which if tapped by a bore, would flow naturally to the surface'.

² The Water Act defines subartesian water as 'water that occurs naturally in, or is introduced artificially into, an aquifer, which if tapped by a bore, would not flow naturally to the surface.'

³ The Water Act defines overland flow water as 'water, including floodwater, flowing over land, otherwise than in a watercourse or lake after having fallen as rain or in any other way or after rising to the surface naturally from underground.'

Figure 2: Map of the new draft plan area



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1.3.2 Life of the new plan and new plan review

Once finalised and approved, the new plan, as subordinate legislation to the Water Act, will expire after 10 years consistent with the *Statutory Instruments Act 1992*. Before its expiry, the minister must prepare another new water resource plan.

Should the need arise for minor changes the Water Act provides a process for amendments. The Act also provides a process for review and amendment should the need for more substantial changes arise.

An amendment to, or review of, the new plan could be triggered:

- if water entitlements in the plan area are unable to meet existing or emerging needs, having regard to potential gains from unallocated water available under the new plan, unused entitlements, water use efficiency improvements, or alternative water sources such as recycling
- if economically viable and ecologically sustainable uses for additional water are identified
- if the outcomes including ecological outcomes are not being achieved.

The new plan will primarily be implemented following an amendment to the Fitzroy ROP, as explained in Chapter 6 of this report.

1.4 Background to the Fitzroy Basin plan area

The Fitzroy Basin covers approximately 142 600 square kilometres and is the largest coastal river basin in Queensland. A number of important river systems lie within the Fitzroy Basin, including the Dawson, Comet–Nogoa–Mackenzie, Isaac–Connors and Don–Callide river systems. The Fitzroy River has a mean annual discharge of approximately 5 941 000 megalitres, which flows into Keppel Bay south-east of Rockhampton. There are also important aquifers providing for groundwater extractions in the Fitzroy Basin, those of particular note being the alluvial aquifers in the Callide and Isaac – Connors subcatchments.

Major regional centres in the Fitzroy Basin are Rockhampton, Emerald, Moranbah and Biloela, while Mackay lies just to the north of the plan area and Gladstone to the south.

Due to its size and location, the Fitzroy Basin is diverse, encompassing a range of topographic and climatic regimes, from semiarid to subtropical. Rainfall, runoff and temperature are highly variable and irregular, and evaporation rates are high. Economic activities range from mining, manufacturing and agricultural production, to commercial fishing and tourism.

1.4.1 People in the plan area

A number of regional councils lie within the boundaries of the Fitzroy Basin. The majority of the plan area is within the following councils:

- Rockhampton Regional Council
- Central Highlands Regional Council
- Banana Shire Council
- Woorabinda Aboriginal Shire Council
- Isaac Regional Council.

The plan area also incorporates small proportions of the following councils:

- Gladstone Regional Council
- Mackay Regional Council
- North Burnett Regional Council
- Roma Regional Council
- Dalby Regional Council
- Blackall Tambo Regional Council.

Australian Bureau of Statistics data indicate the estimated resident population of the plan area in June 2007 was 155 660 people. Rockhampton city accounts for approximately 42 per cent of the plan area population. The Australian Bureau of Statistics also estimates 5 per cent of the population identify themselves as being of Aboriginal and/or Torres Strait Islander origin. Indigenous people retain close social and cultural spiritual ties to the water and land of the region.

Department of Local Government, Planning, Sport and Recreation population forecast data prepared in 2008 indicate the resident population of the Fitzroy region⁴ is expected to increase from an estimated 163 698 people in 2006 to almost 222 514 by the year 2026. Most growth is projected to occur in areas where there is mining.

According to the Australian Bureau of Statistic Census data in 2006, mining was by far the highest employing sector in the region, accounting for about 13 per cent of all employed persons. The agriculture, forestry and fishing sector is the fourth highest sector, accounting for 8 per cent of employment in the region. Employment in the mining and construction industries expanded dramatically between 2001 and 2006, highlighting the strong influence of the resources boom on the regional economy.

1.4.2 Industry in the plan area

The socioeconomic assessment (reports 1 and 2) conducted to support the planning process highlights the regional diversity of the plan area, and the importance of various water uses to the economy (see Chapter 7 for more information).

Water use supports a number of industries including mining and agriculture, as well as the urban sector. The main land use is grazing and main water use is irrigated cotton. Tourism and fishing (recreational and commercial) are also important to the plan area's economy. Adequate freshwater stream flows are important to the commercial and recreational fishing industries, as reduced stream flows can have an adverse impact on fish populations.

1.4.3 Ecological significance of the plan area

The Fitzroy Basin is home to significant fauna and flora that include migratory birds and numerous species of conservation significance listed under the Queensland *Nature Conservation Act 1992*. There are a number of species which may be affected by water management activities including the Fitzroy River turtle (*Rheodytes leukops*) currently listed as vulnerable⁵.

The Fitzroy Basin also contains a number of nationally important wetland areas listed in the Environment Australia Directory of Important Wetlands. Also, water from the Fitzroy Basin flows into the National and World Heritage listed Great Barrier Reef.

1.4.4 Water resource development and use

The plan area has five supplemented water supply schemes:

- Callide Valley Water Supply Scheme owned and operated by SunWater under an interim resource operations licence:
 - Major infrastructure: Callide Dam, Callide Weir and Kroombit Dam.
 - Total allocations: High priority (surface water) 4 311 ML, medium priority (groundwater) 19 527 ML and risk priority (surface water) 443 ML.
- Nogoia Mackenzie Water Supply Scheme owned and operated by SunWater under a resource operations licence:
 - Major infrastructure: Fairbairn Dam, Selma Weir, Bedford Weir, Bingeang Weir and Tartus Weir.
 - Total allocations: High priority 44 398 ML and medium priority 190 925 ML.
- Dawson Valley Water Supply Scheme owned and operated by SunWater under a resource operations licence:
 - Major infrastructure: Glebe Weir, Gylanda Weir, Orange Creek Weir, Theodore Weir, Moura Offstream Storage, Moura Weir and Neville Hewitt Weir.
 - Total allocations: High priority 5 579 ML, medium A priority 19 456 ML, medium priority 36 797 ML and an interim medium priority water allocation of 105 ML.
- Lower Fitzroy Water Supply Scheme owned and operated by SunWater under a resource operations licence:
 - Major infrastructure: Eden Bann Weir.
 - Total allocations: High priority 25 520 ML and medium priority 3 101 ML.
- Fitzroy Barrage Water Supply Scheme owned and operated by Fitzroy River Water (a business unit of the Rockhampton Regional Council) under a resource operations licence:
 - Major Infrastructure: Fitzroy Barrage.

⁴ Includes Rockhampton (C), Emerald (S), Duaringa (S), Fitzroy (S), Livingstone (S), Peak Downs (S), Mount Morgan (S), Bauhinia (S), Banana (S), Taroom (S) and Belyando (S).

⁵ Status under the *Nature Conservation Act 1992*

- Total allocations: High priority 50 483 ML and medium priority 11 610 ML.

Irrigation is the dominant supplemented water use (by volume) with the exception of the Lower Fitzroy and Fitzroy Barrage schemes where the principal use is industrial and urban.

In the Callide subcatchment mining, power generation and meat processing are significant water uses dependant on the Callide Valley Water Supply Scheme. Callide power station also imports water from Awoonga Dam in the adjacent Boyne River Basin.

The Fitzroy Basin also has three water management areas managed under the Fitzroy ROP:

- in the Nogoia Mackenzie and Fitzroy water management areas there are unsupplemented water allocations. See Section 3.2.2.1
- the Fitzroy WRP 1999 did not provide for conversion of unsupplemented authorisations in the Dawson Valley Water Management Area since operational details of the proposed Nathan Dam on the Dawson River were not then available.

Unsupplemented water authorisations outside these established water management areas continue to be managed under the Water Act and are subject to current terms and conditions specified on the authorisation. However, the Fitzroy ROP provided for amendment of some licences for consistency with the water resource plan and authorisations may also have been amended as a consequence of actions under the Act.

Unsupplemented subartesian water is used extensively throughout the Fitzroy Basin for urban, industrial, irrigation, stock and domestic purposes. The plan area is substantially covered by subartesian areas declared by regulation under the Water Act. These declared areas are listed in Schedule 11 of the Water Regulation 2002, together with the requirements for authorisation of entitlements and for assessment of works under the *Sustainable Planning Act 2009*. More specific management arrangements are contained in departmental policy and work practice documents.

There is currently a small percentage of the plan area where there are no requirements for managing or licensing of groundwater take. The amount of development in these areas is monitored by analysis of bore logs that are submitted as a mandatory requirement of licensed groundwater well drillers.

The Great Artesian Basin is located in the south-western part of the Fitzroy Basin and the Water Resource (Great Artesian Basin) Plan 2006 manages artesian water in this area.

1.5 Links with other planning initiatives

In recent years, the plan area has experienced a significant increase in natural resource management and planning activity as described below. To varying degrees, these initiatives have influenced the development of the new draft plan.

1.5.1 Central Queensland Regional Water Supply Strategy

The Central Queensland Regional Water Supply Strategy (CQRWSS), released in December 2006, is a non-statutory planning document developed by the Department of Environment and Resource Management (the department) in collaboration with other agencies, industry and community groups to inform long-term understanding of water supply and demand in the Central region. This included the identification of options for meeting projected future increases in demand through infrastructure and non-infrastructure options including water use efficiency and expansion of water trading. The new draft plan is consistent with the CQRWSS. In particular, proposed infrastructure mentioned in the CQRWSS is provided for under the new draft plan.

1.5.2 Central Queensland Regional Growth Management Framework

The Central Queensland Regional Growth Management Framework (released in 2002) was prepared by the Central Queensland Regional Planning Advisory Committee, in consultation with the communities of Central Queensland. It is the long-term regional planning strategy for Central Queensland. The framework is built around six guiding principles, one of which is in the area of resource use. That principle states: 'The allocation, use and management of the natural resources of Central Queensland shall be in accordance with the principles of ecologically sustainable development and shall be undertaken through the processes of integrated catchment management'. The new draft plan has been developed in alignment with the principles of sustainable development as required under the Water Act.

1.5.3 Reef Water Quality Protection Plan and the State Coastal Management Plan

The Reef Water Quality Protection Plan (Reef Plan), initially released in 2003 and updated in September 2009, is a joint initiative of the Australian and Queensland governments.

The Reef Plan identifies actions to halt and reverse the decline in the quality of water entering the reef, within a 10-year timeframe. The two primary objectives of the Reef Plan are:

- to reduce the pollutant load from non-point sources in the water entering the reef

- to rehabilitate and conserve areas of the reef catchment that have a role in removing water-borne pollutants.

The State Coastal Management Plan (coastal management plan), released in February 2002, is a statutory plan under the *Coastal Protection and Management Act 1995*. The coastal management plan provides the framework under which the coastal zone and its resources are managed. The coastal management plan includes objectives relating to water quality, Indigenous culture and the maintenance of coastal ecosystems.

The new draft plan is consistent with the principles of both of these plans. The strategies contained within the new draft plan maintain flows for the environment and will help to protect water quality. It also contains a number of strategies designed both to maintain processes that support coastal ecosystems and to support water-related cultural values of the traditional owners of the plan area.

1.5.4 Environmental Protection Policy (Water) 2009

The Environmental Protection (Water) Policy 2009 (EPP Water) is subordinate legislation to the *Environmental Protection Act 1994* and aims to protect Queensland's waters while allowing for development that is ecologically sustainable.

The purpose of the EPP Water is achieved within a framework that includes:

- identifying environmental values (EVs) for Queensland waters (including for aquatic ecosystems, water for drinking, water supply, water for agriculture, water for industrial and recreational use)
- deciding and stating water quality guidelines and water quality objectives (WQOs) to enhance or protect environmental values (EVs).

Draft environmental values and water quality objectives have been developed in collaboration with the Fitzroy Basin Association and key stakeholders and are being released for public consultation at the same time as the new draft water resource plan. The waters identified in the draft EVs report for high ecological value (HEV) level of protection are almost entirely within the protected estate and all these areas currently have near-natural flow regimes. In all catchments the aquatic ecosystem protection environmental value was recognised as important by the community. The defined environmental flow provisions of the new draft plan will continue to support aquatic ecosystem health and hence support draft aquatic ecosystem environmental values. Human-use EVs have also been identified across the catchment. The flow provisions of the new draft plan will continue to support the water quality required for EVs such as drinking water and irrigation.

It is important to note that while water resource plans can support good water quality outcomes, there are many other pressures on water quality that are external to water resource planning provisions. Such pressures include point source pollution, poor land use and management, and degradation of riparian vegetation and wetlands.

1.5.5 Review of the Fitzroy River water quality issues

In early 2008 the Premier of Queensland commissioned Professor Barry Hart to review water quality issues in the Fitzroy River after the discharge of over 138 000 ML of mine-affected floodwater from the Ensham Resources Pty Ltd coal mine located near Emerald in Central Queensland. Professor Hart released the report *Review of the Fitzroy River Water Quality Issues* in November 2008. The report contained one recommendation with a direct link to the Fitzroy Basin Water Resource Plan.

Recommendation 11: 'that DNRW consider a more equitable balancing of water between consumptive users and the environment, and the provision of State-owned contingency allocation, during the 10-yearly review of the Fitzroy Water Resource Plan'.

The Queensland Government released its response to Professor Hart's report and supported, or supported in principle, the report's 13 recommendations. In relation to recommendation 11, the government's response was: 'DERM will consider the balance between consumptive use and the environment, and the provision of a State-owned contingency allocation, in the current review of the Fitzroy Basin Water Resource Plan'.

Essentially Professor Hart recommended that the reservation of a large volume of water be held in storages (e.g. Fairbairn Dam) to respond to incidents that may affect water quality. Whilst the new draft plan does ensure an appropriate balance between consumptive use and the environment it does not provide for State-owned contingency allocations from major storages such as Fairbairn Dam. This is because:

- a State-owned contingency allocation would provide little or no benefit in mitigating water quality issues well downstream of any storage and would not assist with problems that may occur with water quality in unsupplemented streams
- it would be very expensive to acquire a significant allocation from an existing water supply scheme
- there would be impacts on the local economy since significant quantities of water would no longer be available for consumptive use.

Water quality outcomes are proposed to be achieved through other more effective means including by maintaining a flow regime and management strategies that mimic natural conditions and by including more responsive infrastructure operating rules in the Fitzroy ROP. Water markets will also provide a viable option for entities to acquire either permanent or temporary access to water supplies to support mitigation activity in response to any emerging or existing environmental or other situation.

1.5.6 Environmental Protection and Biodiversity Conservation (EPBC) Act 1999

The *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* is the legislation which gives the Australian Government a framework for identifying and managing environmental assets of national significance. The environmental assessment prepared to provide information for the development of the new draft plan included consideration of the conservation status assigned to various environmental assets in the Fitzroy Basin. This also provided a basis for the Environmental Flow Assessment Program undertaken by the Department of Environment and Resource Management.

1.5.7 Central Queensland Strategy for Sustainability—2004 and Beyond

The new draft plan builds on the work of the community-based natural resource management regional body in the plan area—the Fitzroy Basin Association (FBA). The regional body is responsible for preparing and implementing a natural resource management plan (NRM plan). The Central Queensland Strategy for Sustainability—2004 and Beyond (CQSS2) is the regional plan for the management of the natural resources and environments of the river catchments of the Central Queensland region. The plan guides investment strategies and seeks to protect the region's assets through addressing key pressures.

The NRM plan also assessed the condition of environmental assets in the Fitzroy Basin. There is some consideration in the document of economic and community viability with regards to these assets. As such, it formed a source of data for the environmental assessment for the new draft plan.

The new draft plan supports and builds on the objectives, outcomes and targets of the NRM plan by:

- protecting water ecosystem values and environmental conditions
- maintaining the current morphology and biodiversity of aquatic habitats
- promoting and allowing for sustainable water use to provide economic and social benefits to the community
- providing a more robust system of water allocation, reinforced by stronger licensing and monitoring of water use, leading to greater protection of water resources.

The new draft plan is consistent with the NRM plan and provides clear direction, supports environmental values, and promotes community and economic security and growth.

When finalised, the new plan will provide a statutory framework that supports the goals of the regional body and encourages efficient and sustainable water use.

2 New draft plan purposes and outcomes

The new draft plan following this overview report has been prepared and made available for public comment as required under the Water Act.

In addition to establishing a framework for sustainably managing and allocating water, the purpose of the new draft plan is to:

- define the availability of water in the plan area
- identify ways of and priorities for meeting future water needs
- provide for the creation of water allocations
- look to minimise, where practicable, degradation to natural ecosystems
- regulate the taking of overland flow
- regulate the taking of subartesian water (groundwater).

2.2 Plan outcomes

The Water Act requires that a draft water resource plan include its proposed outcomes. The outcomes are stated in Chapter 3 of the new draft plan and fall into four categories:

- general outcomes
- specific surface water and groundwater outcomes
- general ecological outcomes
- specific ecological outcomes.

Rather than being viewed as four separate categories, the outcomes should be seen as complementary and balanced set of responses for the sustainable management of the Fitzroy Basin's water resources.

The new draft plan outcomes, which reflect the diversity of issues raised through the community consultation process and technical assessments, guided development of strategies provided in Chapter 5 of the new draft plan.

2.2.1 General outcomes

The new draft plan's provisions will cater for the area's consumptive and non-consumptive water needs for the 10 year life of the new plan. The general outcomes for the new draft plan are:

- to provide for the use of water entitlements and other authorisations in the plan area
- to provide for the continued use of existing overland flow works
- to provide for the continued use of existing groundwater works
- to protect the probability of being able to take water under a water allocation
- to support water-related cultural values including the values of the traditional owners in the plan area
- to provide mechanisms that support water being made available for the following:
 - population growth in towns and communities dependent on water resources in the plan area
 - growth in industries dependent on water resources in the plan area
 - stock or domestic purposes in the plan area
 - Indigenous communities dependent on water resources in the plan area to achieve their economic and social aspirations
- to support flexible and diverse water supply arrangements for consumptive water users
- to maintain flows that support water-related aesthetic, economic and recreational values in the plan area, including, for example, tourism
- to encourage continual improvement in the efficient use of water
- to provide a flow regime that supports the quality of water for human and ecological use.

The new draft plan's provisions will keep long-term total flows in the Fitzroy River downstream of the barrage above 77 per cent of mean pre-development flows as per the Fitzroy WRP 1999.

2.2.2 Specific surface water and groundwater outcomes

Specific outcomes have been included in the new draft plan for both surface water and groundwater. The specific surface water outcomes in the plan area make water available to support:

- mining and growth in the population of towns and communities, industry and agriculture in the Isaac-Connors, Upper Dawson and Lower Dawson subcatchments
- urban, industrial and other uses in the Fitzroy subcatchment.

The specific groundwater outcomes in the plan area relate to groundwater in the Callide Valley alluviums and provide for:

- the use of groundwater that can be sustained in the long term
- increased security for town water supplies and rural water supply boards that rely on groundwater
- security of supply for existing enterprises that rely on groundwater.

2.2.3 General ecological outcomes

The new draft plan's general ecological outcomes focus on making sure that water continues to move freely between habitats. These outcomes are summarised as follows:

- to minimise changes to the natural variability of flows that support aquatic ecosystems
- to provide continued connectivity between different parts of the river system
- to provide a flow regime that maintains delivery of fresh water to the estuaries of watercourses and the Great Barrier Reef Lagoon and supports productivity in the receiving waters of the Great Barrier Reef and inshore reefs
- to improve understanding of the matters affecting the flow-related health of ecosystems in the plan area
- to minimise the impact of the taking of water on aquatic ecosystems, including ecological assets
- to protect and maintain refugia associated with waterholes, lakes and wetlands
- to support surface water and groundwater interactions
- to support ecosystems dependent on groundwater including, for example, riparian vegetation and wetlands.

2.2.4 Specific ecological outcomes

The following specific ecological outcomes are included for areas of special note:

- to protect flows and water quality for flow spawning fish and endemic species e.g. the Fitzroy golden perch (*Macquaria ambigua orientalis*)
- to provide for flows necessary for estuarine ecosystem functions, including flows for:
 - barramundi (*Lates calcarifer*) and king threadfin salmon (*Polydactylus macrochir*) recruitment
 - banana prawn (*Penaeus merguensis*) growth
- to provide for groundwater levels to support relevant groundwater-dependent ecosystems and wetlands that rely on groundwater in the Callide Valley alluviums
- to maintain groundwater discharge to watercourses in the Isaac-Connors groundwater management area.

The strategies proposed in the new draft plan show how these outcomes are to be achieved. The strategies have been formulated to address issues raised during community consultation and in the technical assessments undertaken to provide a sound knowledge base from which to plan.

3 Strategies for achieving general and specific surface water and groundwater outcomes

Surface water is currently regulated under the Fitzroy WRP 1999. The new draft plan proposes to continue the regulation of surface water and for the first time provide for the regulation of subartesian water (groundwater). The strategies contained in the new draft plan build on those contained in the Fitzroy WRP 1999 and address issues raised by the community, technical assessments and consideration of other emerging matters.

3.1 Continued use of existing entitlements

3.1.1 Surface water licences and overland flow works

The new draft plan provides for the use of existing surface water entitlements. Riparian stock and domestic water use is authorised under the provisions of the Water Act without a requirement for a water licence. Additionally, the taking of water in an emergency situation, for example to fight a fire, is authorised under the Water Act. Existing overland flow works authorised under the Fitzroy WRP 1999 or built before the overland flow water moratorium in 2001 (subject to notification) will continue to be authorised under the new draft plan. See Section 3.5 for more information.

The new draft plan provides for better specification of existing surface water entitlements and conversion of additional existing water entitlements to unsupplemented water allocations in some areas. Existing licences not being converted to water allocations may be amended to include a purpose, maximum rate, daily volumetric limit, annual volumetric limit and conditions such as a passing flow requirement. Provision will be made for the inclusion of a monthly volumetric limit to support water sharing arrangements where necessary. See Sections 3.2 and 3.4 for further information.

Supplemented interim water allocations in the Callide Valley Water Supply Scheme (both groundwater and surface water) will be converted to surface water and groundwater supplemented water allocations. See Section 3.2.1.2 for more information.

Water resource plans provide an opportunity to bring historic and less than optimal management arrangements into line with the more contemporary arrangements provided for by the Water Act. Sections 82 and 83 of the new draft plan provides a process for granting licences to replace permits granted under the Water Act 1926 and a process to grant a licence to a mining lessee with a long historic take dating back to 1989.

3.1.2 Groundwater licences and groundwater works

The new draft plan will provide for the use of existing unsupplemented groundwater entitlements. In the Callide Valley alluvium, which is over-allocated, supplemented and unsupplemented groundwater entitlements will be converted to groundwater allocations based on the history of use of the existing entitlement. See Sections 3.2 and 3.6 for more information.

The new draft plan will also provide for the continued use of existing groundwater works in the currently non-declared areas of the Isaac–Connors and Don River subcatchments. A notification process for existing works will ensure that these works are authorised, licensed and accounted for in future water planning activities. See Section 3.6 for more details.

The new draft plan provides for greater specification of existing groundwater entitlements. All existing groundwater licences, except for those which are being converted to water allocations or have a purpose of mine de-watering, are to be amended as required to have a purpose, annual volumetric limit and conditions. Existing groundwater licences for stock purposes are no longer required.

3.2 Tradeable water allocations

The National Water Initiative shows a clear preference for entitlements, wherever possible, to be held as tradeable water allocations. Tradeable water allocations promote efficiency and provide for movement of water to higher-value use by allowing the supply and demand forces that promote efficiency elsewhere in the economy to drive the water market.

Establishing tradeable water allocations separate from land provides security of tenure over the water entitlement. The specification of water allocation security objectives ensures appropriate security for water allocations and also provides a guide to their long-term performance.

Water allocation security objectives (WASOs) are defined for groups of water allocations in water resource plans in terms of one or more performance indicators which for supplemented water allocations in the new draft plan are expressed in terms of annual and/or monthly water sharing indices. For unsupplemented water allocations, the performance indicator is the annual volume probability which equates to the long-term probability of taking the total nominal volume for the water allocation group for a water year.

Performance indicators and WASOs for the new draft plan were developed using the new Integrated Quantity and Quality Model (hydrology model) for the Fitzroy Basin with a 108 year simulation period from 1900 to 2007. It is important to note

that these have been based on the simulated historic performance of the system and a range of assumptions, and do not provide a guarantee of future performance which will depend on climatic conditions and future rainfall.

3.2.1 Supplemented water allocations

3.2.1.1 Existing water allocations

Existing supplemented water allocations will be transitioned without amendment to water allocations under the new plan. Furthermore they will continue to be managed under their respective resource operations licences and subject to the water sharing rules, water allocation change rules (trading rules), and seasonal assignment arrangements in the Fitzroy ROP.

3.2.1.2 Callide Valley Water Supply Scheme

Supplemented water allocations in the Callide Valley Water Supply Scheme will be established through the conversion of all existing interim water allocations (IWAs) for that scheme. The Callide Valley Water Supply Scheme consists of Callide Dam (136 300 ML) and Callide Weir (500 ML) on Callide Creek, and Kroombit Dam (14 600 ML) on Kroombit Creek.

This scheme is used to supply high priority water (4311 ML) directly from Callide Dam for urban and power generation purposes. The scheme also supplements groundwater supplies in a benefitted part of the Callide Valley alluviums through recharge releases from Callide and Kroombit Dams under raised dam levels. This currently supports medium priority allocations (19 527 ML) that access this groundwater resource for town, industrial and irrigation purposes. The scheme also supplies a small volume of risk priority water (443 ML) directly from recharge releases.

System performance has been under pressure over a long period both from over-allocation and overuse of the groundwater resource and more recently being subject to drought conditions. The issues and provisions relating to over-allocation of the groundwater resource are discussed further in Section 3.6.

The new draft plan proposes to establish tradeable water allocations for this scheme. Most elements for the water allocations (location, purpose and conditions) will be determined based on details that already exist on the entitlement.

However the over-allocation of the groundwater resource will be addressed by reducing the total volume for the allocations established from the existing medium priority IWAs from 19 527 ML to around 12 700 ML. This will be based on the history of use for each IWA over a specific ten-year period (1997–2007). Furthermore it is proposed to convert two medium priority IWAs that supply Banana Shire and Coreen Water Board to the high B priority group. This will enable these allocations to preferentially access available groundwater resources and so support town water supplies in the area.

The nominal volume and priority group will be based on the following:

- The nominal volume specified on a surface water allocation will be determined based on the volume stated on the surface water IWA.
- The nominal volume specified on the groundwater allocation will be determined based on the history of use of the groundwater IWA. See Section 3.6.6.2 for more information.
- There will be four priority groups for water allocations:
 - surface water IWAs which currently specify high priority will convert to high A priority group
 - surface water IWAs which currently specify risk priority will convert to risk priority group.
 - groundwater IWAs which currently specify medium priority will convert to medium priority group with the exception of two entitlements that supply water for Banana Shire and Coreen Water Board, which will convert to high B priority group.

The reduction in allocation from the supplemented groundwater resources and other arrangements will lead to improved performance of these allocations. Schedule 7 of the new draft plan sets out water allocation security objectives for the Callide Valley Water Supply Scheme. The minimum annual and monthly supplemented water sharing indices are shown in Table 1 (below).

Water sharing rules and water allocation change rules (trading rules) for the water allocations will be established in a future amendment to the Fitzroy ROP. It is expected that the water allocation change rules will include provision for the conversion of medium priority water allocations to high B priority allocations. This would allow for existing groundwater users to change to a more secure groundwater supply within the scheme. The particulars of such rules will need to consider local water availability and the recharge characteristics throughout the benefitted area. Preliminary assessments indicate that a conversion ratio of 3:1 may be appropriate for an allocation moving from the medium priority group to the high B priority group.

3.2.1.3 Nogo Mackenzie Water Supply Scheme

More than 540 supplemented water allocations totalling 235 323 ML have been established for this scheme under the Fitzroy WRP 1999 and Fitzroy ROP. A recent amendment of the Fitzroy ROP also provided for more flexible water trading

rules by allowing for the conversion of medium priority allocations to additional high priority allocations. The new draft plan is consistent with the continuation of these and other arrangements in the existing Fitzroy ROP.

It is highlighted that the hydrologic assessments associated with the development of the new draft plan have resulted in an increased understanding of the historical streamflows and improved modelling and representation of all systems. Schedule 7 of the new draft plan sets out the water allocation security objectives for this scheme and the minimum annual and monthly supplemented water sharing indices are shown in Table 1.

The long-term performance for this scheme in particular has changed from earlier assessments underpinning the Fitzroy WRP 1999. Previous assessments showed a long-term monthly supplemented water sharing index of over 88 per cent for medium priority allocations. Updated assessments now show an index of 81 per cent for these allocations. Particular influences on this performance assessment include improved derivation of historical streamflows particularly during critical periods, modelling additional years prior to the start of the simulation period so as to have more realistic starting storage levels, and the extension of the simulation period up to 2007 which includes a recent significant dry period. The simulation period now goes from 1900 to 2007.

3.2.1.4 Dawson Valley Water Supply Scheme

More than 220 supplemented water allocations totalling 61 937 ML have been established for this scheme under the Fitzroy WRP 1999 and Fitzroy ROP. The new draft plan is consistent with the continuation of water sharing and other arrangements in the existing Fitzroy ROP. However the new draft plan also provides for the conversion of an existing medium priority IWA (105 ML) relating to the Back Creek Water Board to a tradeable water allocation. This can occur once the future arrangements of that water board are clarified.

Schedule 7 of the new draft plan sets out the water allocation security objectives for this scheme and the minimum annual and monthly supplemented water sharing indices are shown in Table 1.

In the advent of potential future projects in this area such as a raised Glebe Weir or Nathan Dam, the Fitzroy ROP would need to be amended to incorporate any changed operating, water sharing and allocation change rules. In the case where the Nathan Dam project proceeded, it would also likely lead to changes to the proposed unsupplemented water allocations in the Dawson River downstream of the dam. The nature of such changes would depend on the specific proposal by the proponent and the impacts on the performance of any established allocations.

3.2.1.5 Lower Fitzroy and Fitzroy Barrage Water Supply Schemes

More than 300 supplemented water allocations totalling 90 714 ML have been established for these schemes under the Fitzroy WRP 1999 and Fitzroy ROP. The new draft plan is consistent with the continuation of water sharing and other arrangements in the existing Fitzroy ROP.

Schedule 7 of the new draft plan sets out the water allocation security objectives for this scheme and the minimum annual and monthly supplemented water sharing indices are shown in Table 1.

The area is currently subject to investigations regarding the Lower Fitzroy Water Infrastructure Project. This project is about new water infrastructure developments on the Fitzroy River, such as a raised Eden Bann Weir or a new weir at Rookwood, to provide for greater security and additional water supplies to meet future regional water demands. The project is a joint partnership between SunWater and Gladstone Area Water Board with technical assistance from consultants GHD Pty Ltd. Rockhampton City Council is an important stakeholder in any proposal. The Lower Fitzroy River Infrastructure Project is part of the State Government's statewide Water Policy.

In the advent of future augmentation of either of these schemes, the Fitzroy ROP would need to be amended to incorporate any changed operating, water sharing and allocation change rules. In all cases the existing water allocations would be protected under these amendments.

Water supply security is a particular issue in this area with water supplies for both Rockhampton and the Stanwell power station dependent on these schemes. There has also been some consideration of a future change to the type of water sharing rules for these schemes, such as a move to capacity sharing. An amendment to the Fitzroy ROP would be required if this was to occur and full consultation with the water allocation holders and other stakeholders would be required. The new draft plan provides for the protection of the long-term performance of these water allocations and any such change would need to be consistent with both the plan's outcomes and water allocation security objectives.

Table 1: WASOs for supplemented water allocations

Water supply scheme	Priority group	Annual supplemented WSI minimum probability	Monthly supplemented WSI minimum probability
Callide Valley	High A (surface water)	95%	98%
	High B (groundwater)	95%	NA
	Risk (surface water)	60%	
	Medium (groundwater)	65%	
Nogoa-Mackenzie	High	95%	98%
	Medium	NA	81%
Dawson Valley	High	95%	98%
	Medium and medium A	NA	82%
Lower Fitzroy and Fitzroy Barrage	High	95%	98%
	Medium	NA	82%

3.2.2 Unsupplemented water allocations

3.2.2.1 Existing water allocations

Under the Fitzroy WRP 1999 and Fitzroy ROP, 175 unsupplemented water entitlements (mostly to take water under conditions commonly known as water harvesting) were converted to unsupplemented water allocations along the Nogoa, Mackenzie and Fitzroy Rivers.

These existing unsupplemented water allocations will be transitioned as water allocations under the new plan. Furthermore they will continue to be subject to the water sharing rules, water allocation change rules (trading rules), and seasonal assignment arrangements in the Fitzroy ROP.

The new draft plan also proposes to amend the existing unsupplemented water allocations so that all unsupplemented water allocations have the same elements. It is proposed that all existing unsupplemented allocations would state a daily volumetric limit (ML) that would be consistent with the maximum rate, expressed in litres per second, currently stated on each allocation. The maximum rate would also be amended to increase by a factor of 1.3 to reflect the larger instantaneous capacity of most pump installations. The ongoing management of these allocations, including access and sharing would essentially remain unchanged as the current rate specified on the allocation reflected the operational duty points of the original works.

3.2.2.2 Additional water allocations to take unsupplemented surface water

The new draft plan proposes to establish additional unsupplemented water allocations to take surface water through the conversion of existing licences to take unsupplemented water in the following watercourses:

- Nogoa River from the upstream limit of Fairbairn Dam at AMTD 737.5 km to its junction with Theresa Creek
- Theresa Creek from its junction with Retreat Creek at AMTD 15.0 km to its junction with the Nogoa River
- Retreat Creek, including anabranches, from its junction with Kettle Creek at AMTD 23.6 km to its junction with Theresa Creek
- Comet River, including anabranches, from Lake Brown gauging station AMTD 199.2 km to its junction with the Nogoa River
- Dawson River from Utopia Downs Gauging Station at AMTD 453.5 km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible.

3.2.2.3 Elements of new water allocations

Chapter 5 Part 2 Division 7 (Section 87–99) of the new draft plan proposes how unsupplemented surface water allocations would be specified and determined. Water allocations would have elements of purpose, maximum rate, daily volumetric limit and annual volumetric limit.

The *daily volumetric limit*, expressed in megalitres (Section 95 of the new draft plan) would generally be based on the rate that may be stated on the existing licence, or for authorisations which do not have a stated rate, a volume linked to any associated pump size. Table 2 shows the daily volumetric limit (ML) for allocations based on an associated pump size. The values in the table reflect the capacity of a pump to take water over the course of a day under normal operating conditions.

The *maximum rate*, expressed in litres per second (Section 94 of the new draft plan) would generally be based on the capacity of any pump associated with the authorisation. Table 2 shows the maximum rate (litres/sec) for authorisations linked to any associated pump size. The values in the table reflect the maximum capability of pumps to take water.

Table 2: Maximum rates and daily volumetric limits for various pump sizes

Pump size (mm)	Maximum rate (litres/sec)	Daily volumetric limit (ML/day)
32	11	0.6
40	15	1
50	35	1.5
65	60	2.6
80	80	3.9
100	110	5.6
125	140	7.8
150	165	9.9
200	215	16
250	275	21.6
300	340	25.9
350	415	30.2
400	500	37.2
500	780	56.2
600 to 660	1400	95
750	2375	160
800	2900	201

The annual volumetric limit, expressed in megalitres (Section 96 of the new draft plan) would generally be determined by multiplying the daily volumetric limit by a prescribed number of days. The number of days would depend on the location and flow condition of the existing licence. Table 3 shows the number of days to be used depending on the location and flow conditions of the existing licence.

However the annual volumetric limit for allocations converted from licences that state an annual volume, would be the stated volume. For those allocations converted from licences that state an area that may be irrigated, the annual volumetric limit would be the area in hectares multiplied by six.

Future management of unsupplemented water allocations would be based on the daily volumetric limit and annual volumetric limit while the maximum rate would be used to assess any applications for a development permit.

Unsupplemented water allocations would also include the elements of nominal volume and water allocation group. The nominal volume would reflect a water allocation's share of the resource and become a form of currency in any potential trading of the water allocation. The nominal volume for each water allocation will be established through an amendment to the Fitzroy ROP and would reflect the long-term average take for the water allocation. Each unsupplemented water allocation would also belong to a water allocation group for which the plan specifies water allocation security objectives. Table 3 also shows the water allocation groups for the new unsupplemented water allocations to take surface water.

Table 3: Water allocation groups to take unsupplemented surface water

Place	Access condition	Water allocation group	Number of days
Nogoa River from the upstream limit of Fairbairn Dam at AMTD 737.5km to its junction with Theresa Creek	2592 ML/day	Class 0A	NA
Theresa Creek from its junction with Retreat Creek at AMTD 15.0 km to its junction with the Nogoa River	more than 0 ML/day	Class 8A	24 days
Retreat Creek, including anabranches ¹ , from its junction with Kettle Creek at AMTD 23.6km to its junction with Theresa Creek			
Comet River, including anabranches ² , from Lake Brown gauging station AMTD 199.2km to its junction with the Nogoa River	less than 864 ML/day	Class 9A	24 days
	equal to or more than 864 ML/day	Class 9B	20 days
Dawson River from its junction with Mimosa Creek at AMTD 133km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible ³	1296 ML/day	Class 10A	20 days
	2592 ML/day	Class 10B	19 days
Dawson River from the end of the supplemented section at AMTD 18.37km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible ³	0 to 25 ML/day	Class 10C	NA
Dawson River from Orange Creek Weir at AMTD 270.7km to its junction with Mimosa Creek at AMTD 133km, including sections of tributaries where Dawson River flows are accessible ³	1296 ML/day	Class 11A	20 days
	2592 ML/day	Class 11B	19 days
Dawson River from the upstream limit of Glebe Weir at AMTD 356.5km to Orange Creek Weir at AMTD 270.7km, including sections of tributaries where Dawson River flows are accessible ³	1296 ML/day	Class 12A	20 days

Dawson River from Utopia Downs Gauging Station at AMTD 453.5km to the upstream limit of Glebe Weir at AMTD 356.5km, including sections of tributaries where Dawson River flows are accessible ³	up to 1296 ML/day	Class 13A	20 days
	up to 25 ML/day	Class 13C	NA

Notes:

1 An access condition on a water licence in an anabranch will be translated to an equivalent access condition for Retreat Creek.

2 An access condition on a water licence in an anabranch will be translated to an equivalent access condition for Comet Creek.

3 An access condition on a water licence in an anabranch will be translated to an equivalent access condition for Dawson River.

3.2.2.4 Defining water allocation security

Unsupplemented water allocations feature a higher level of specification than water licences. These allocations have the added requirement that all decisions associated with changing them, for example through trading, must be consistent with their associated water allocation security objectives. Many decisions, including the volumes, location and flow conditions of new and existing water entitlements, can influence the long-term performance of unsupplemented water allocations.

The performance indicator for existing and new unsupplemented surface water and groundwater allocations in the new draft plan is the annual volume probability which equates to the long-term probability of taking the total nominal volume for the water allocation group for a water year. The minimum annual volume probabilities for both existing and new unsupplemented surface water allocations are shown in Table 4.

This indicator is a change from those in the Fitzroy WRP 1999 which relate to the 30 per cent, 50 per cent and 75 per cent performance profile for each water allocation group. It is considered that this indicator will provide for a more consistent and practical approach to future water trading rules. The profile of performance will still be a major consideration in the development of any future water sharing and allocation change rules (Sections 28 and 29 of the new draft plan).

Table 4: Minimum annual volume probabilities for unsupplemented surface water allocations

Place	Flow condition	Water allocation group	Annual volume probability
Nogoa River from the upstream limit of Fairbairn Dam at AMTD 737.5 km to its junction with Theresa Creek	2592 ML/day	Class 0A	17%
Mackenzie River from the Isaac Mackenzie water harvesting upstream limit to the Dawson River junction	2592 ML/day	Class 1A	73%
	4320 ML/day	Class 1B	71%
Nogoa and Mackenzie rivers from the Comet Mackenzie waterharvesting upstream limit to the Isaac Mackenzie waterharvesting upstream limit	2592 ML/day	Class 2A	47%
	4320 ML/day	Class 2B	47%
Nogoa River from the Theresa Creek junction to the Mackenzie waterharvesting upstream limit	2592 ML/day	Class 3A	38%
Mackenzie River from the Springton Creek junction to the Dawson River junction	No flow condition and 9 ML/day	Class 4C	95%
Fitzroy River from the Dawson River junction to the Fitzroy Barrage	2592 ML/day	Class 5A	61%
	4320 ML/day	Class 5B	73%

Fitzroy River from the Dawson River junction to upstream limit of Eden Bann Weir	No flow and 9 ML/day	Class 6C	95%
	260 ML/day	Class 7D	93%
Theresa Creek from its junction with Retreat Creek at AMTD 15.0km to its junction with the Nogoia River; and Retreat Creek, including anabranches ¹ , from its junction with Kettle Creek at AMTD 23.6km to its junction with Theresa Creek	More than 0 ML/day	Class 8A	48%
Comet River, including anabranches ² , from Lake Brown gauging station AMTD 199.2km to its junction with the Nogoia River	Less than 864 ML/day	Class 9A	55%
	Equal or more than 864 ML/day	Class 9B	47%
Dawson River from its junction with Mimosa Creek at AMTD 133 km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible ³	1296 ML/day	Class 10A	68%
	2592 ML/day	Class 10B	68%
Dawson River from the end of the supplemented section at AMTD 18.37 km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible ³	0 to 25 ML/day	Class 10C	66%
Dawson River from Orange Creek Weir at AMTD 270.7 km to its junction with Mimosa Creek at AMTD 133 km, including sections of tributaries where Dawson River flows are accessible ³	1296 ML/day	Class 11A	63%
	2592 ML/day	Class 11B	60%
Dawson River from the upstream limit of Glebe Weir at AMTD 356.5 km to Orange Creek Weir at AMTD 270.7 km, including sections of tributaries where Dawson River flows are accessible ³	1296 ML/day	Class 12A	63%
Dawson River from Utopia Downs Gauging Station at AMTD 453.5 km to the upstream limit of Glebe Weir at AMTD 356.5 km, including sections of tributaries where Dawson River flows are accessible ³	up to 1296 ML/day	Class 13A	60%
	up to 25 ML/day	Class 13C	67%

Notes:

- 1 An access condition on a water licence in an anabranch will be translated to an equivalent access condition for Retreat Creek.
- 2 An access condition on a water licence in an anabranch will be translated to an equivalent access condition for Comet Creek.
- 3 An access condition on a water licence in an anabranch will be translated to an equivalent access condition for Dawson River.

3.3 Meeting future water needs

Existing and future water needs will be met through the use of existing entitlements, including the opportunity to acquire access from both supplemented and unsupplemented water allocations as established. Water markets are now established in many parts of the Fitzroy Basin and the new draft plan will provide for additional water allocations as discussed in previous sections.

The new draft plan also provides for additional reserves of unallocated water for both surface water and groundwater in specific parts of the plan area. The Fitzroy WRP 1999 accommodated additional unallocated surface water including a specific reserve for Nathan Dam on the Dawson River.

A moratorium (Appendix B) released in December 2010 prevents pre-emptive development proposals that would be contrary to the new draft plan provisions and replaces two existing groundwater moratoriums. The moratorium applies to:

- the construction of new works for taking groundwater from those parts of the Don River subcatchment and Isaac–Connors Rivers subcatchment in which groundwater has not been previously managed
- applications for water licences to take groundwater in the existing Callide, Fitzroy, Highlands and Great Artesian Basin subartesian declared areas in the Fitzroy Basin
- applications for water licences to take surface water from the Downstream of the Fitzroy Barrage subcatchment area
- applications for water licences to interfere with the flow of water by impoundments (such as dams and weirs) on watercourses throughout the Fitzroy Basin.

The moratorium will be in existence until finalisation of the new plan. Section 3.3.2 provides information on how particular applications—received prior to the commencement of the new plan—to take groundwater, surface water from a watercourse in the subcatchment Downstream of the Fitzroy Barrage and to interfere with the flow of water by impoundment would be dealt with.

3.3.1 Additional unallocated water

The Fitzroy WRP 1999 identified small reserves of supplemented water that had not been allocated at the time as well as unallocated water reserves providing for additional development including water reserved for the proposed Nathan Dam project (up to 190 000 ML/a). This project has been delayed and the reserve has not yet been allocated.

The Fitzroy ROP also provided a process for the release of unallocated water and specifies total volumes similar to those indicated in the overview report to the Fitzroy WRP 1999. Those volumes of unallocated water include:

- up to 300 000 ML/a of mean annual diversion in the Isaac–Connors, Lower Mackenzie and Fitzroy River catchments
- up to 40 000 ML/a of mean annual diversion in the Comet, Nogoia and Upper Mackenzie system upstream of Bingegang Weir
- up to 11 500 ML/a of mean annual diversion from the Dawson River upstream of Taroom.

It is highlighted that the Fitzroy ROP indicates that the 40 000 ML/a reserve upstream of Bingegang Weir is no longer available because of significant development of overland flow works prior to the commencement of the WRP amendment process in late 2001.

The Fitzroy ROP provides for a number of releases of unallocated water from this reserve, but as yet no releases have occurred.

The development of a new draft plan provides an opportunity to review and respecify these reserves and take into account existing water users, environmental flow objectives and requirements, future water demands including new water infrastructure and climate change. Reserves of unallocated water to provide for town water supplies, industry, Indigenous purposes and general purposes are to be specified in the new draft plan. The new draft plan includes reserves for both surface water and groundwater in particular parts of the plan area. The reserves proposed are similar to the existing Fitzroy WRP 1999 but have been reconfigured to provide specifically for:

- new water infrastructure projects identified in the Central Queensland Regional Water Supply Strategy and government program of works (Connors River Dam, Nathan Dam and Lower Fitzroy weirs)
- reserves throughout the basin for state purposes (projects of state and regional significance, town water supply and community use)
- reserves for Indigenous purposes
- reserves for general purposes.

The new draft plan provides for unallocated water reserves totalling 301 900 ML (surface water) and 16 200 ML (groundwater), and will support future growth and water supply security across the plan area.

The provisions relating to unallocated water are contained in Chapter 5, Part 1, Division 3 and Schedule 8 of the new draft plan.

As part of the reserves for surface water, the new draft plan specifies an unallocated water reserve in the area downstream of the Fitzroy Barrage. Future development in this area will be limited to a strategic reserve of 1000 ML for state purposes.

Furthermore there will also be an unallocated groundwater reserve of 20 000 ML from naturally very saline water in the coastal parts of the Fitzroy GMA. This is to provide for possible expansion of the salt production industry.

Importantly, the new draft plan provides reserves of unallocated water for specific water infrastructure projects in the plan area. These include Connors River Dam, Nathan Dam on the Dawson River and Lower Fitzroy storages. These are discussed further in Section 3.3.1.1.

Surface water reserves are specified by subcatchment areas which are shown in a map in Schedule 2 of the new draft plan. Groundwater reserves are specified by groundwater management areas or groundwater sub-areas which are shown in maps in schedules 3 and 4 of the new draft plan.

The reserves will be available for a range of purposes and in forms such as water allocations and water licences. They are specified in terms of nominal volume, annual volumetric limit or mean annual diversion with the exact form of any entitlement to be subject to the release process to be specified in an amended Fitzroy ROP.

The following sections outline the range of reserves provided for in the new draft plan.

3.3.1.1 Strategic reserves for water infrastructure

The government has demonstrated its support for the Central Queensland Regional Water Supply Strategy that includes provision for new water infrastructure proposals in the Fitzroy Basin when future water supplies are needed and viable business cases are presented. The Fitzroy WRP 1999 provided explicitly for Nathan Dam (up to 190 000 ML/a) on the Dawson River and also accommodated additional volumes of unallocated water at other locations in the plan area. The new draft plan proposes strategic reserves specifically for three water infrastructure projects in the Fitzroy Basin.

Connors River Dam

A business case for the Connors River Dam Project (373 000 ML capacity) near Nebo is currently being developed by SunWater primarily to meet the water supply needs of new mining developments in the Bowen and Galilee Basins. The project has been declared a significant project under the *State Development and Public Works Organisation Act 1971* and a draft environmental impact statement (EIS) was released in February 2010 for public comment. A supplementary report to the draft EIS has now been received by the Coordinator General for further consideration. It is anticipated that the EIS will be finalised early next year with construction of the dam beginning later next year.

- The new draft plan provides a strategic reserve of up to 56 400 ML nominal volume which is consistent with the draft EIS.

Nathan Dam on Dawson River

A business case for Nathan Dam (880 000 ML to 1 100 000 ML capacity) on the Dawson River near Taroom is currently being developed by SunWater to meet the water supply needs of new mining developments. The case for Nathan Dam has changed from a focus primarily on irrigated agriculture (10 years ago) to a current focus on providing high-security water supplies for new mines and regional towns. The EIS for the Nathan Dam project is expected towards the end of 2010. This project has been declared a significant project under the *State Development and Public Works Organisation Act 1971*.

- The new draft plan provides a strategic reserve of up to 90 000 ML nominal volume which would provide for the Nathan Dam option under consideration by SunWater.

If a project other than Nathan Dam was considered in the Dawson River e.g. raised Glebe Weir, this reserve could also be used to support such water infrastructure.

Lower Fitzroy storages

Investigations for new or raised weirs on the Fitzroy River upstream of Rockhampton are currently being undertaken jointly by SunWater and the Gladstone Area Water Board. Rockhampton Regional Council, while not involved in the joint venture, is also an integral stakeholder in any proposal. The case for new or raised weirs depends on additional water demands near Gladstone and/or increased water supply security for Rockhampton. The Lower Fitzroy River Infrastructure Project is part of the State Government's statewide water policy.

- The new draft plan provides a strategic reserve of up to 76 000 ML nominal volume which is consistent with the

Central Queensland Regional Water Supply Strategy.

Any water granted from the strategic water infrastructure reserves for water infrastructure projects are expected to be granted as water allocations.

3.3.1.2 Other unallocated surface water reserves

Figure 3 shows the unallocated surface water reserves including those for future water infrastructure.

The strategic reserves, 1000 ML for Downstream of the Fitzroy Barrage subcatchment area and 15 000 ML elsewhere in the plan area, will be available for a state purpose which includes water for projects of state significance, projects of regional significance, town water supply and community use. Water granted from the strategic reserve for state significant and regional significant projects will be issued as a water licence for the life of the project and returned to the strategic reserve on conclusion of the project.

The strategic reserve of 5000 ML will be available for projects that help Indigenous communities achieve their economic and social aspirations. Water granted for Indigenous purposes will be issued as a water licence for the life of the project and returned to the strategic reserve on conclusion of the project

The general reserves totalling 58 500 ML will be available in particular subcatchments and for any purposes.

3.3.1.3 Unallocated groundwater reserves

Figure 4 shows the unallocated groundwater reserves.

The strategic reserves, totalling 4950 ML, will be available for a state purpose which includes water for projects of state significance, projects of regional significance, town water supply and community use.

The general reserves, totalling 31 250 ML, will be available in particular groundwater management areas, groundwater sub-areas or groundwater units for any purposes. It is highlighted that part of the general reserve is a 20 000 ML volume from Fitzroy Groundwater Unit 1 which contains naturally very saline water in the coastal parts of the Fitzroy groundwater management area.

3.3.1.4 Process for releasing unallocated water

Water use efficiency is now a national priority as Australians increasingly come to grips with the reality of living on the driest inhabited continent. While the new draft plan provisions are intended to promote progressive efficiency for existing uses, those uses associated with the release of any unallocated water will also need to satisfy efficiency and other criteria to ensure consistency with overall planning goals.

The new draft plan contains a provision to replace the unallocated water process stated in Chapter 6 of the current Fitzroy ROP. A new process for releasing unallocated water will be included in the Fitzroy ROP when it is amended to implement the new plan. Releases are likely to occur in stages as industries and water demands materialise.

Sustainability goals and best practice will guide the release of unallocated water to promote efficiency, economic viability and to protect the ecological outcomes in the new draft plan.

These goals will be supported by measures that include:

- Alternative water sources: In deciding whether to make additional water available, the department will consider whether the proposed requirements can be met from alternative sources (for example, from existing unused entitlements or through gains made by improving water use efficiency). This will ensure that the community derives the maximum benefit from its water resources.
- Generally water will be made available under a market-based competitive model such as tender or auction. Prices are likely to be influenced by demand, especially where there is competing interest for high-value uses. A reserve price will generally be set for the unallocated water.

3.3.1.5 Interim arrangements for applications about unallocated water

Section 36 of the new draft plan provides interim arrangements that allow for particular applications to take water (under Section 206 of the Water Act) for State purposes and stock and domestic purposes to be dealt with prior to the finalisation of the new plan and the amendment of the Fitzroy ROP.

Figure 3: Unallocated surface water reserves

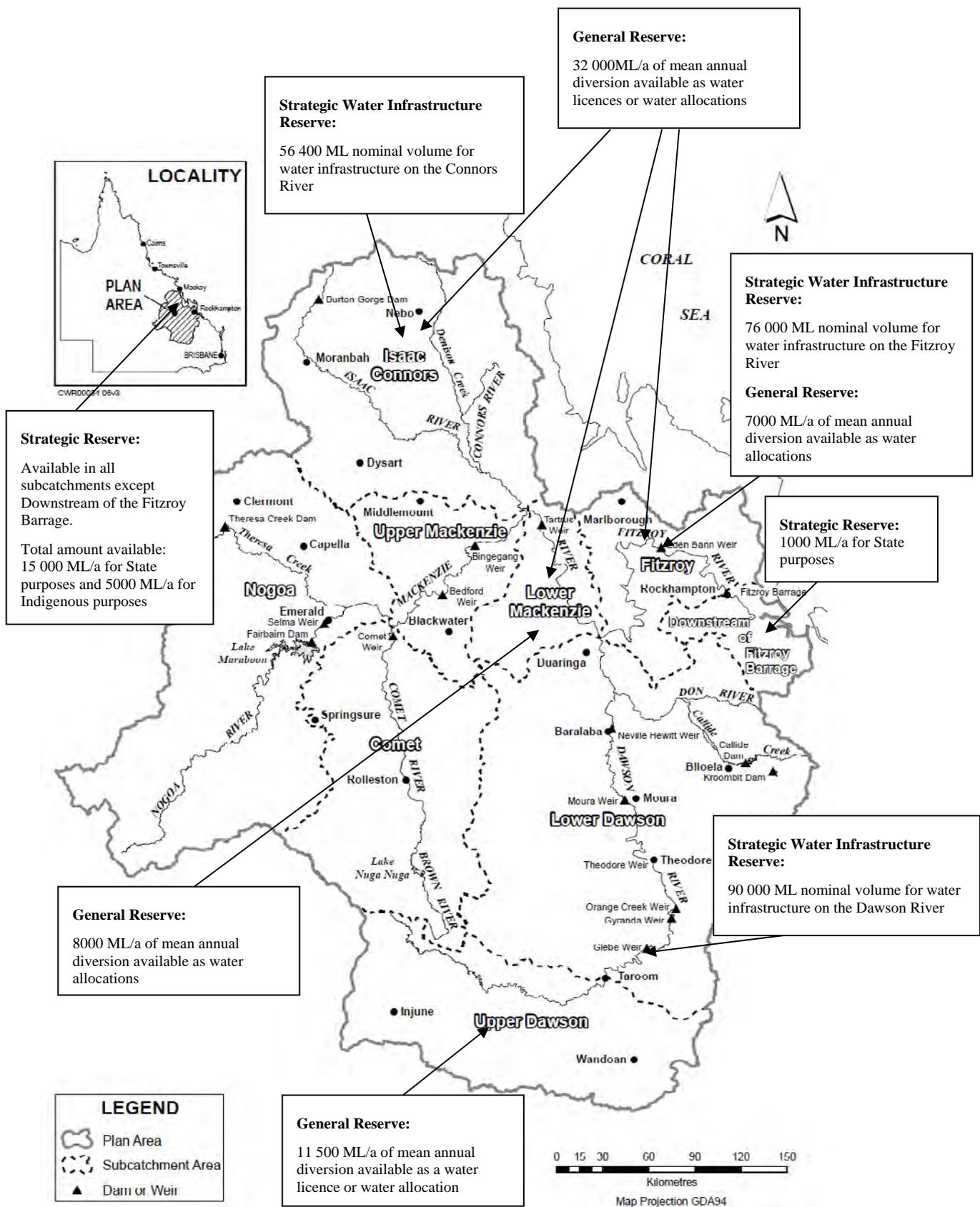
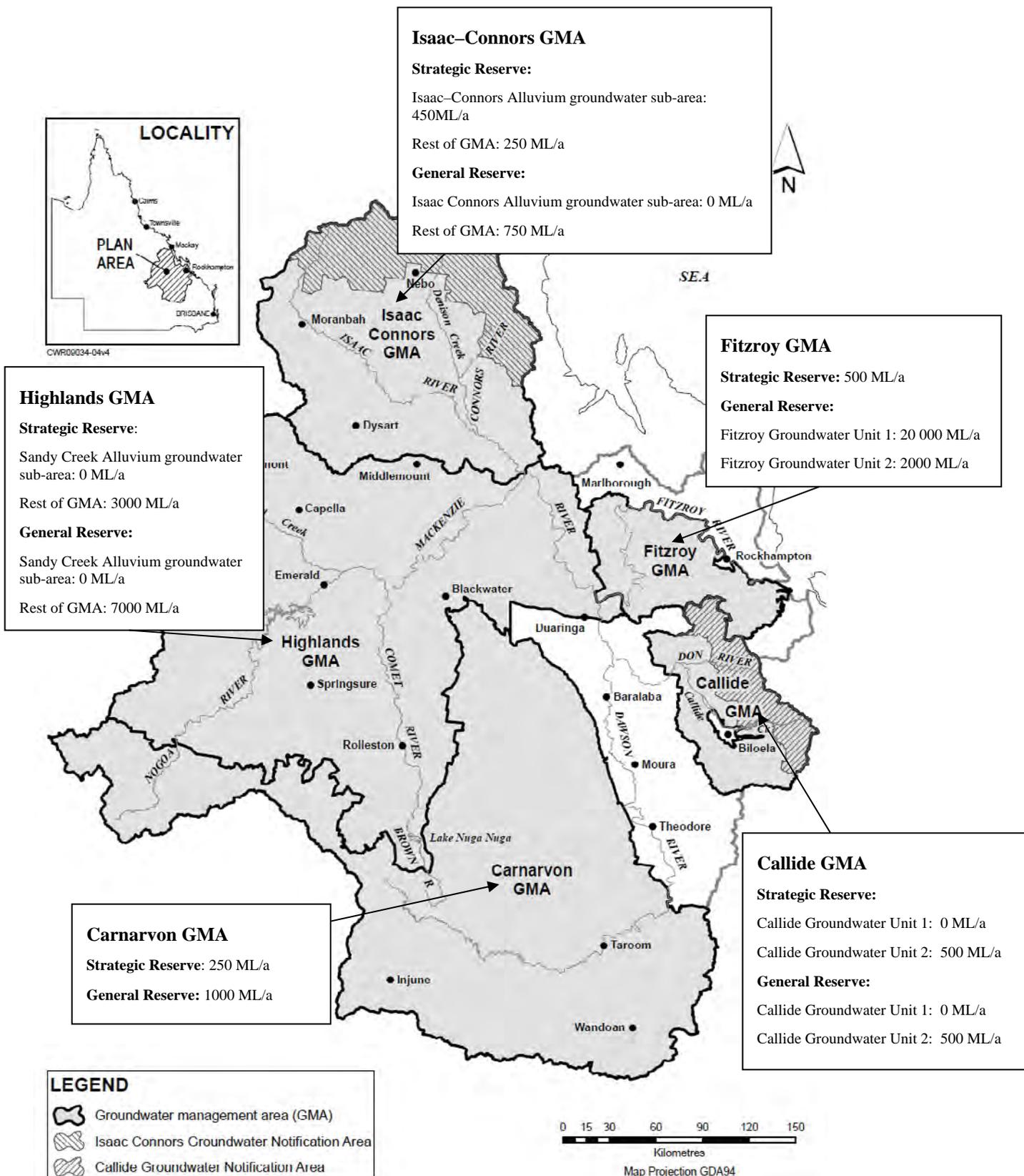


Figure 4: Unallocated groundwater reserves



3.3.2 Particular applications made before the Fitzroy ROP is amended

Chapter 5 Part 1 Division 2 of the new draft plan directs that particular applications received prior to the plan's commencement would be refused. This includes applications to take groundwater, surface water from a watercourse in the subcatchment Downstream of the Fitzroy Barrage and to interfere with the flow of water by impoundment. Exemptions include applications for town water supplies and those for projects of state and regional significance.

Furthermore, applications that would increase the amount of water that may be taken will be refused prior to an amendment to the Fitzroy ROP to state a new process for dealing with unallocated water (Section 35 of the new draft plan). Exemptions include applications for a State purpose and an Indigenous purpose.

Stakeholders will have the opportunity to obtain unallocated water through the process for the release of unallocated water that will be provided in the amended Fitzroy ROP.

3.3.3 Granting and amending interim resource operations licences

The new draft plan contains provisions for granting and amending interim resource operations licences (iROL) to provide for the necessary authorisation to interfere with the flow of water before construction or augmentation of any water infrastructure. These provisions would allow for the construction of new water infrastructure located outside an existing water supply scheme (such as Connors River Dam) in the event that the new water infrastructure commenced prior to the finalisation of an amendment to the Fitzroy ROP.

The construction of new water infrastructure located within an existing water supply scheme (such as the proposed raising of Glebe Weir), can occur through an amendment to an existing resource operations licence under the Act (Section 113(1)(c) or 111A) either with ROL holder consent or under a process in the resource operations plan. The latter would require an amendment of the Fitzroy ROP to include a process for amending a ROL. Prior to the new infrastructure reaching the operational stage the Fitzroy ROP would be amended to include the operational rules for the infrastructure.

3.3.4 Interference with the flow of water

Chapter 5 Part 2 Division 4 of the new draft plan proposes additional criteria when dealing with any licence applications to interfere with the flow of water by impoundment, where the purpose of interference is:

- to store water for stock or domestic purposes
- to pool water behind the structure to enable an authorised pump to function properly
- to store water for town water supply purposes
- to satisfy the requirements of an environmental authority issued under the *Environmental Protection Act 1997*
- related to a proposed water entitlement to take water granted from unallocated water under a release process.

Additional criteria against which applications would be assessed are stated. These criteria relate to the potential impacts of the proposed interference on the environment and on cultural values. Limits for the size of particular impoundments also apply.

For example, if the structure is designed to pool water to allow a pump to function properly to divert water under an existing entitlement, the proposed storage capacity cannot exceed five megalitres. Additionally existing water supplies on the property and availability of water at the proposed site would be considerations with regard to applications to store water for stock or domestic purposes.

3.4 Better defined entitlements

Clearly defined entitlements are important for sustainably allocating and managing water resources, and provide water users with greater confidence in planning than they might previously have enjoyed.

Many unsupplemented water entitlements to take either water from a watercourse or groundwater do not include a volumetric limit. Licences for the purpose of irrigation are often specified in terms of an area that can be irrigated and the absence of a volumetric limit can lead to increasing and sometimes inequitable take of water.

3.4.1 Watercourse licences

Chapter 5 Part 2 Division 8 of the new draft plan proposes that existing and new unsupplemented surface water licences are to include the following licence terms:

- the purpose for which the water is to be used
- the maximum rate for taking water, expressed in litres per second
- the daily volumetric limit that may be taken

- the nominal entitlement or maximum volume that may be taken in a year
- conditions, including any flow conditions, or conditions for storing the water
- the monthly volumetric limit, if applicable.

The purpose stated on an unsupplemented surface water licence will be either agriculture or any. Agriculture includes normal uses associated with primary production e.g. stock-watering, irrigation, agriculture and aquaculture. Any also includes urban, mining and industrial uses i.e. water can be used for any purpose including rural purposes such as feedlots and piggeries.

The maximum rate, daily volumetric limit and nominal entitlement would be determined in a similar manner to that described for unsupplemented water allocations in Section 3.2.2.3 of this report. For licences that state an area that may be irrigated, a monthly volumetric limit equating to two ML for each hectare will also be added to the licence.

It is proposed that water entitlements would be amended to include these elements over a period of time in response to other more general licence amendments.

3.4.2 Overland flow water licences

Section 112 of the new draft plan requires that all new overland flow water licences will state:

- the purpose for which the water is to be used i.e. either agriculture or any
- at least one of the following:
 - the maximum rate at which water can be taken
 - the daily volumetric limit that may be taken
 - the nominal entitlement
 - the maximum volume of water that may be stored under the licence
 - conditions, if any.

3.4.3 Groundwater licences

Chapter 5 Part 3 Division 2 of the new draft plan requires that all existing and new groundwater licences are to state particular licence terms, including:

- the purpose for which the water is to be used will be either agriculture or any
- nominal entitlement—if this is already specified on the existing licence, then that volume, otherwise a volume determined by the chief executive
- conditions, if any.

3.5 Regulation of overland flow water

The Fitzroy WRP 1999 was amended in 2005 to provide for regulation of overland flow water. The amendment followed hydrological investigations which concluded that the Fitzroy WRP 1999 outcomes would be at risk if uncontrolled overland flow development were allowed to continue. The new draft plan proposes to build on the strategies in the Fitzroy WRP 1999.

3.5.1 Authorisation of existing and new take of overland flow water

Under the new draft plan existing and new overland flow take will continue to be authorised for stock and domestic use, to meet the requirements of an environmental authority or a development permit for an environmentally relevant activity, and to capture contaminated run-off.

The Fitzroy WRP 1999 allows for the take of overland flow water by small scale storages with a capacity of up to 5 ML. Under the new draft plan it is proposed to increase the authorised capacity to 50 ML. Storages up to 50 ML for purposes other than ponded pasture and water spreading will be able to be constructed without the need to purchase unallocated water. The exemption for ponded pasture and water spreading is necessary to prevent take of large volumes of water by incremental construction of multiple low cost small scale storages. Examples of projects that small-scale storages may provide for include agriculture, small community purposes, works for managing urban stormwater and groundwater recharge works. This change will provide for less regulatory impact on the rural sector without compromising plan outcomes.

It is also proposed to authorise any incidental take of overland flow water associated with the storage of coal seam gas water that is to be used for a beneficial use (see Section 3.5.6 for further information).

New overland flow works which are authorised under the new plan will be either self assessable or assessable development under the *Sustainable Planning Act 2009*. Those that are classified as assessable include works for capturing contaminated run-off and works for storing coal seam gas water that also incidentally take overland flow water. Those works that are classified as self assessable include works for stock and domestic purposes, works up to 50 ML capacity and works for the purposes of complying with an environmental authority or a development permit for an environmentally relevant activity. For information about the assessable and self assessable development codes that apply to new overland flow development go to <http://www.derm.qld.gov.au/water/management/overland_flow/index.html>

Any proposal for new overland flow works not otherwise authorised under the new draft plan is assessable development and will require both:

- a licence to take water, subject to the availability and release of unallocated water (see Section 3.3.1.4)
- a development permit issued under the *Sustainable Planning Act 2009*.

3.5.2 Notification process for existing OLF storages

Take of overland flow water by existing works (built before September 2001) will continue to be authorised under the new draft plan and any works that have not been notified under the Fitzroy WRP 1999 will still require notification.

Notification is now required for existing overland flow works associated with mines (built before the commencement of the new plan) if the works are not otherwise authorised under the new plan. Mines must notify the chief executive of the existing works within 12 months of the commencement of the new plan.

Notification of existing overland flow storages will provide essential data to enable the department to more effectively monitor and evaluate the level of overland flow development in the basin.

3.5.5 New take of overland flow water for mining purposes

Under the Fitzroy WRP 1999, new take of overland flow water for the purpose of mining is authorised until the Fitzroy ROP is amended to include overland flow water. The new draft plan proposes to replace this provision with a requirement to purchase unallocated water for new works not authorised under the new plan. The new draft plan provides for interim arrangements that will allow for the purchase of unallocated water between the final plan and the final amended Fitzroy ROP, but only for those mining projects considered to be of state or regional significance.

Furthermore the existing provision to authorise any take of overland flow water of not more than the amount necessary to divert water around a mine site is proposed to be removed. Any new take of overland flow water for this purpose will now generally require the acquisition of a water entitlement.

The existing approach in the Fitzroy is considered inequitable in how it deals with different water using sectors and these changes will lead to a more consistent approach.

3.5.6 Incidental take of overland flow water associated with coal seam gas water

The take of coal seam gas water is dealt with under the *Petroleum Act 1923* and the regulation of its disposal is dealt with under the *Environmental Protection Act 1997*. The new draft plan proposes to authorise the incidental take of overland flow water associated with the storage of coal seam gas water in circumstances where the water cannot be stored for beneficial reuse, other than in an overland flow storage. The works for taking the water will be assessable development under the *Sustainable Planning Act 2009* and will require a development permit. The take of overland flow water will only be authorised while it is associated with the storage of coal seam gas water. This new proposed provision seeks to support the beneficial use of coal seam gas water.

3.5.7 Continuation of the effect's of the overland flow moratorium in part

The Fitzroy WRP 1999 continues the effects of the overland flow moratorium. This effectively prevents landholders, with existing storages that store both water taken from a watercourse and overland flow water, from reconfiguring existing storages or building new storages to store water taken from a watercourse (water harvesting). This provision aims to limit any increased take of overland flow water. The new plan proposes that the continued effect of the moratorium will only apply to sections of the Comet River and Theresa Creek areas where plan outcomes are considered to be at most risk from any increased take of overland flow water. This provision will remain in effect until the Fitzroy ROP is amended to include the management of overland flow water and it is expected that un-supplemented water allocations to take water from watercourses would also be established at that time.

3.6 Regulation of groundwater

The new draft plan provides a framework for adaptive management of all subartesian groundwater in the plan area. It allows for management of subartesian water resources at an appropriate scale in response to an assessment of risk that includes consideration of the level of allocation compared with recharge and vulnerability to threats and concerns such as salinity, rising water tables, threats to groundwater dependent ecosystems and surface water–groundwater connectivity, local pumping effects, development pressures and community conflicts.

The new draft plan provides a consistent approach to the taking of groundwater for stock or domestic purposes across the plan area in that no licence will be required. Bore logs will still need to be submitted as a mandatory requirement of groundwater well drillers.

The new draft plan provides for future development through the specification of unallocated water reserves for each of the five groundwater management areas (GMAs). This effectively provides a cap on total groundwater extractions throughout the plan area. See Section 3.3. However, extractions for de-watering while still requiring licensing and applications will be decided under the provisions of the *Water Act 2000*.

The new draft plan provides for the amendment of all existing licences to take groundwater to include a purpose, nominal entitlement and conditions, if required.

It has been determined that the level of development and use of subartesian water in some parts of the plan area where licences have not been required in the past poses little risk to the water resource. The areas are the central and lower Dawson, lower Fitzroy north of the river and south-east extremity of the Fitzroy below the Fitzroy Barrage. Those areas are unshaded on the map provided in Schedule 3 of the new draft plan. Management in those areas will continue to involve some monitoring of water levels and assessment of activity by evaluation of bore logs submitted as a mandatory requirement of groundwater well drillers.

The Callide Valley Water Supply Scheme area (centred on Biloela) is not part of the Callide groundwater management area and also remains unshaded on the map provided in Schedule 3 of the new draft plan. Water allocations to take supplemented groundwater will be established through the conversion of existing medium priority interim water allocations in that area and will be managed under a resource operations licence for the Callide Valley Water Supply Scheme. See Section 3.2.1.2.

In the remainder of the plan area, specific management provisions are provided in the new draft plan to allow appropriate management of subartesian groundwater in five Groundwater Management Areas (GMAs). Schedule 3 of the new draft plan outlines these GMAs which are named as follows:

- Callide GMA
- Isaac–Connors GMA
- Highlands GMA
- Carnarvon GMA
- Fitzroy GMA.

Future management arrangements will be specified in the units and sub-areas of the groundwater management areas.

These five groundwater management areas will effectively replace the existing Fitzroy and Callide subartesian areas, and those parts of the existing Highlands and Great Artesian Basin subartesian areas that are located in the Fitzroy Basin that are currently declared and managed under the *Water Regulation 2002*.

GMAs are divided into sub-areas and groundwater resources can be assigned as units to provide for effective management at the scale required. Schedule 4 of the new draft plan provides maps of sub-areas. The new draft plan will provide for management arrangements in each of the GMAs as summarised below.

3.6.1 Callide GMA

Four sub-areas have been established within the Callide GMA as depicted in Schedule 4 Maps A, B, C and D.

- Map A—Upper Callide groundwater sub-area
- Map B—Lower Callide groundwater sub-area
- Map C—Prospect Creek groundwater sub-area
- Map D—Don and Dee groundwater sub-area.

The new draft plan also provides for improved management of subartesian groundwater in the area in the eastern section of the Callide GMA crosshatched on the map in Schedule 3 and referred to as the Callide Groundwater Notification Area. This area was not previously declared under the *Water Regulation 2002* and no licences were required.

The new draft plan provides for notification of groundwater works existing on the date of the moratorium (December 2010) and the subsequent licensing to authorise the take of groundwater in this area. Licences will also be required for any new take of groundwater in the Callide Groundwater Notification Area other than for stock or domestic purposes. It will be necessary to obtain a volume of water and a licence through the release of unallocated water under a process to be defined in the Fitzroy ROP.

The Callide GMA contains two groundwater units. Callide Groundwater Unit 1 contains the alluvial aquifers (quaternary alluvium) and Callide Groundwater Unit 2 contains the remaining aquifers not contained in Callide Groundwater Unit 1. The new draft plan provides for up to 500 ML from each of the strategic and general reserves of unallocated water from Callide Groundwater Unit 2. There are no reserves of unallocated water from Callide Groundwater Unit 1.

The new draft plan will provide for water sharing rules in the Don and Dee groundwater sub-area and these will be specified in an amended Fitzroy ROP.

The more specific issue of groundwater management for the Callide Valley alluviums which are contained within the Upper Callide, Lower Callide and Prospect Creek groundwater management sub-areas and the Callide Valley Water Supply Scheme is discussed in Section 3.6.6.

3.6.2 Isaac–Connors GMA

One sub-area is to be established within the Isaac–Connors GMA as depicted in Schedule 4 Map E–Isaac–Connors alluvium groundwater sub-area. The new draft plan provides for a strategic reserve of 450 ML from this groundwater sub-area. The new draft plan also provides for a strategic reserve of 250 ML and a general reserve of 750 ML for the areas of the Isaac–Connors GMA that are not part of the Isaac–Connors alluvium groundwater sub-area.

For management purposes the Isaac–Connors GMA has been divided into two units:

- Isaac–Connors Groundwater Unit 1 contains aquifers of the quaternary alluvium
- Isaac–Connors Groundwater Unit 2 contains all subartesian aquifers within the Isaac–Connors GMA not included in Isaac–Connors Unit 1.

The Isaac–Connors GMA is predominantly the Highlands subartesian area declared under the Water Regulation 2000. It has been extended to provide for improved management of subartesian groundwater in a relatively small area in the north of the Isaac–Connors GMA, crosshatched on the map in Schedule 3 and referred to as the Isaac–Connors Groundwater Notification Area. This area was not previously declared under the Water Regulation 2002 and no licences are currently required.

The new draft plan provides for notification of groundwater works existing as of specified dates within the extended area of the Isaac–Connors GMA and the subsequent licensing for the take of groundwater in this area. The specified dates for determination of existing works are:

- for Isaac–Connors Groundwater Unit 1 in the Isaac–Connors Groundwater Notification Area—groundwater works in existence as of 15 December 2006
- for Isaac–Connors Groundwater Unit 2 in the Isaac–Connors Groundwater Notification Area—groundwater works in existence on the date of the moratorium (December 2010).

Licences will also be required for any new take of groundwater for purposes other than stock or domestic in the Isaac–Connors Groundwater Notification Area. It will be necessary to obtain a volume of water and a licence through the release of unallocated water under a process to be defined in the Fitzroy ROP.

The new draft plan will provide for the development of water sharing rules where necessary. Water sharing rules such as announced allocations will provide for management of over extraction from the Isaac–Connors alluvium, including the Braeside borefield south of Nebo.

3.6.3 Highlands GMA

The Highlands GMA contains the bulk of the Highlands declared subartesian area that is currently managed under the Water Regulation 2000. The new draft plan describes two groundwater units within the Highlands GMA:

- Highlands Groundwater Unit 1 contains the aquifers of the quaternary alluvium
- Highlands Groundwater Unit 2 contains all subartesian aquifers within the Highlands GMA other than those contained in Highlands Groundwater Unit 1.

The new draft plan also provides a particular part of Highlands Groundwater Unit 1 as a groundwater sub-area depicted in Schedule 4 Map F—Sandy Creek Alluvium groundwater sub-area.

The new draft plan provides for unallocated water reserves as a strategic reserve of 3 000 ML and a general reserve of 7 000 ML from the Highlands GMA other than the Sandy Creek Alluvium groundwater sub-area. There is to be no additional take of groundwater from the Sandy Creek Alluvium groundwater sub-area.

For additional take of groundwater, it will be necessary to obtain a volume of water and a licence through the release of unallocated water under a process to be defined in the Fitzroy ROP.

3.6.4 Carnarvon GMA

The new draft plan deals with the Carnarvon GMA in its entirety and there are no separate groundwater units or sub-areas for management purposes. The new draft plan provides for a strategic reserve of 250 ML and a general reserve of 1000 ML in the Carnarvon GMA.

For additional take of groundwater, it will be necessary to obtain a volume of water and a licence through the release of unallocated water under a process to be defined in the Fitzroy ROP.

All new works for taking groundwater, including those for stock and domestic purposes, in the Carnarvon GMA will continue to be assessable development of the *Sustainable Planning Act 2009* (see Section 116 of the new draft plan). This is to ensure that any new works do not drill into the underlying Great Artesian Basin aquifers.

3.6.5 Fitzroy GMA

The Fitzroy GMA contains the declared Fitzroy Subartesian Area that is currently managed under the Water Regulation 2000. The new draft plan provides for two groundwater units for management purposes:

- Fitzroy Groundwater Unit 1 containing the aquifer described as modern coastal deposits which contains naturally very saline water that has been used for salt production
- Fitzroy Groundwater Unit 2 containing all subartesian aquifers within the Fitzroy GMA other than those contained in Fitzroy Groundwater Unit 1.

The new draft plan provides for a strategic reserve of 500 ML from the Fitzroy GMA, a general reserve of 20 000 ML from Fitzroy Groundwater Unit 1 (modern coastal deposits), and a general reserve of 2 000 ML from Fitzroy Groundwater Unit 2.

For additional take of groundwater, it will be necessary to obtain a volume of water and a licence through the release of unallocated water under a process to be defined in the Fitzroy ROP.

3.6.6 Callide Valley alluvium groundwater

The need to address groundwater management and in particular the over-allocation of groundwater in the Callide Valley alluvium was highlighted in the December 2006 public information report which accompanied the public notice announcing the intent to include groundwater in the Callide catchment as an amendment to the Fitzroy WRP 1999.

Part of the Callide Valley alluvium lies within the supplemented area (benefitted area) of the Callide Valley Water Supply Scheme operated by SunWater Ltd. In this scheme releases are made to streams from Callide Dam and Kroombit Dam for aquifer recharge. Supplemented groundwater is supplied to holders of interim water allocations with a total allocation for 19 527 ML/a.

In the unsupplemented areas of the alluvium, located upstream and downstream of the water supply scheme supplemented area, groundwater is taken by water licence holders with a total allocation for 17 848 ML/a.

The Callide Valley alluvium has been under considerable stress over a long period both from over-allocation and previous high levels of water use and more recently being subject to drought conditions and generally poor groundwater recharge.

While the total allocation from the alluvium amounts to 37 375 ML/a, the average annual water use over the 10-year period from 1997 to 2007 was 13 500 ML (36 per cent of the total allocation), and the maximum annual use was 16 000 ML (43 per cent of allocation). For the same period, the average supplemented water usage was 9500 ML/a (49 per cent of allocation) with a maximum of 11 700 ML, and the average unsupplemented water usage was 4000 ML/a (22 per cent of allocation) with a maximum of 6000 ML. For the 2008–09 water year, supplemented use was 7700 ML and unsupplemented use was 1200 ML.

It is widely acknowledged that this groundwater system is over allocated and a reduction of the volume allocated to existing authorisations is required to better align the allocation with the available supplies. The allocation levels in the Callide Valley alluvium have been assessed as needing to be reduced by around 50 per cent in order to more effectively manage this resource sustainably.

3.6.6.1 Dealing with the over-allocation of groundwater

A range of options were considered for reducing the level of allocation. The new draft plan proposes that the allocation volumes will be reduced on the basis of the history of use of each entitlement over the 10-year period from 1997–2007, as

opposed to a uniform reduction. This approach will ensure an increased portion of the available resource for active users where there is access to water. Provision is also made for an additional 5 ML over and above the history of use which ensures those who do not have a record of use will receive 5 ML.

The history of use approach would reduce the total allocation from 37 375 ML/a to around 19 000 ML/a, comprising 12 700 ML/a for supplemented water and 6300 ML/a for unsupplemented water.

The allocation reductions would be put into effect by the conversion of about 273 existing interim water allocations and water licences for groundwater to tradeable water allocations through an amendment to the Fitzroy ROP following finalisation of the new plan.

Reduction of the level of allocation in this way will assist in maintaining water supply to those users who have demonstrated dependency on water to support existing business investments and should lead to a more stable base from which industry in the valley can adjust and grow. Water allocations will allow producers to work with greater security and more flexibility than before.

Importantly this proposed method of allocation reduction has no dependency on the hydrologic groundwater model for the Callide alluvium. This model has been developed to compare aquifer responses over the long-term historical period under the proposed and existing allocation scenarios and to provide a basis for measures for water allocation security and environmental objectives required for the water resource plan.

It is possible that both rainfall and stream flow recharge capabilities may have diminished considerably over more recent times caused by agricultural land use reducing infiltration on the floodplain overlying the alluvium, and though siltation of the in-stream recharge areas. There has been no extended wet sequence of years since the 1970s, which are needed for significant widespread aquifer replenishment, to enable evaluation of potential changes in recharge characteristics and groundwater flow.

For these reasons there are remaining uncertainties associated with current natural recharge characteristics as well future rainfall patterns given highly variable long-term historical rainfall distributions. It follows that there should be some caution regarding the recovery of groundwater levels and improvement in supply for water users in the short to medium term, particularly in those parts of the alluvium with slow recharge responses that are currently under the most stress.

3.6.6.2 Volumes for new water allocations

Chapter 5 Part 3 Division 4 of the new draft plan proposes how the volumes for the new water allocations will be determined through the conversion of existing entitlements to water allocations. These volumes will be the nominal volume for a supplemented water allocation and the annual volumetric limit for an unsupplemented water allocation.

The volume for a new water allocation being converted from an existing authorisation will be the average of the five highest annual water use volumes for the authorisation over the 10-year history of use period from 1997–98 to 2006–07, plus an additional five ML allowance. The total volume will not be more than the nominal entitlement volume for the authorisation being converted.

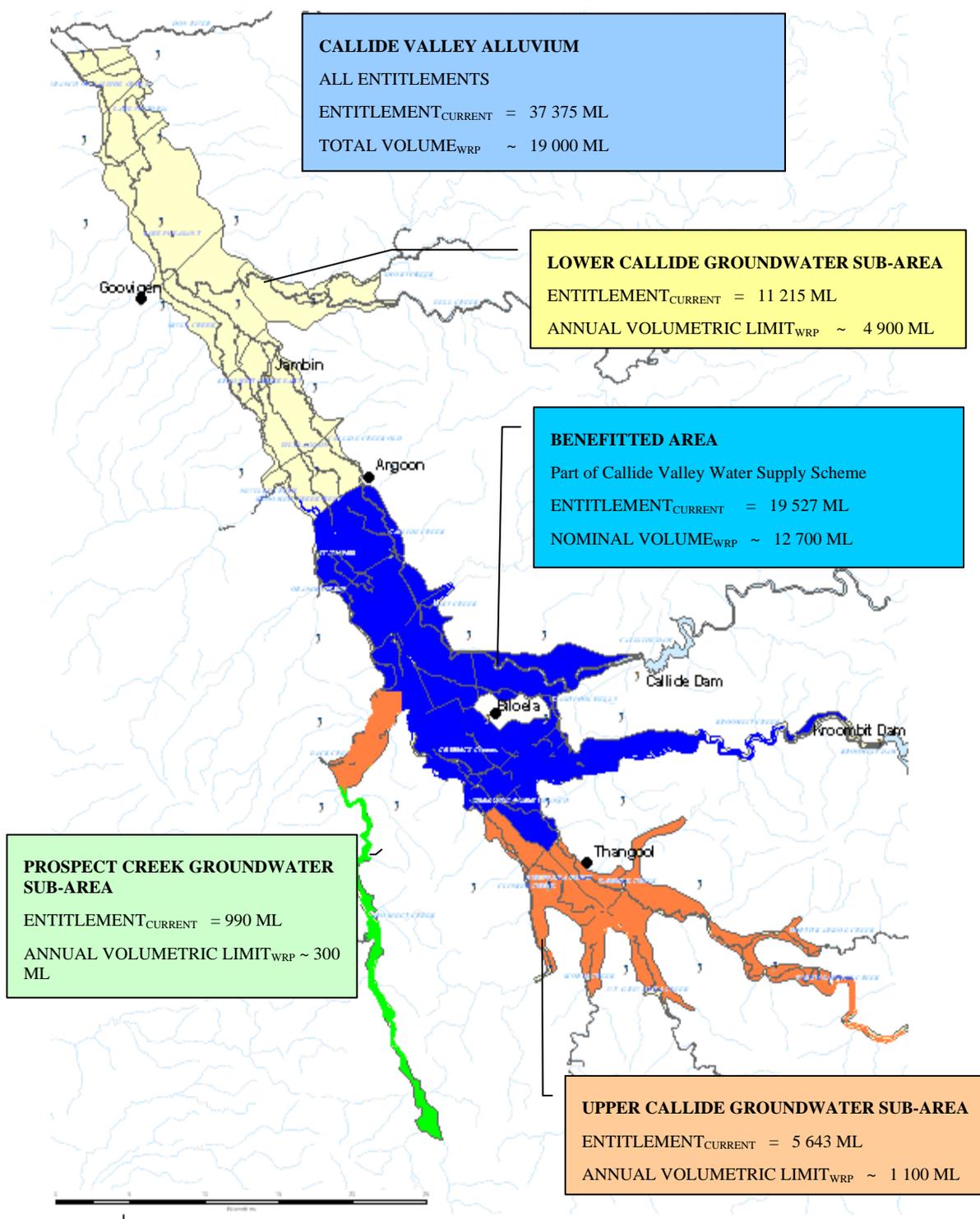
The five ML allowance will only be applied as a benefit for authorisations that existed on the date of release of the new draft plan. The volume determined for an entitlement at the end of the history of use period may also need to be adjusted to account for the effects of any subsequent subdivision or amalgamation of authorisations. These adjustments will be on the same basis that the nominal entitlements associated with the subdivision or amalgamation were determined.

For working out the annual water use for an authorisation during the history of use period:

- Water use in excess of the annual entitlement in a water year that was taken under carry over arrangements will be attributed to the previous year's usage, and water taken under a forward draw arrangement will be attributed to the next year's usage.
- Water use under a seasonal water assignment or temporary transfer arrangement will be attributed to the authorisation from which the water was assigned or transferred.
- Volumes considered as being taken under a stock and domestic accounting arrangement are not included.
- Water use will be adjusted to account for any amalgamation or subdivision of authorisations.

Figure 5 shows an estimate of the total volumes for groundwater allocations to be established based on the history of use approach.

Figure 5: Callide Valley Alluvium - existing entitlements and approximate future water allocation volumes



3.6.6.3 Unsupplemented groundwater water allocations

Chapter 5 Part 3 Division 3 of the new draft plan proposes how unsupplemented water allocations would be specified. Supplemented water allocations are covered in Section 3.2.1 of this report.

The previous section discusses how the annual volumetric limits will be determined for new unsupplemented water allocations under the new draft plan.

Specifications for unsupplemented water allocations will also include the additional elements of nominal volume and water allocation group. The nominal volume reflects a water allocation's share of the resource and becomes a form of currency for water trading purposes. Each water allocation will belong to a water allocation group for which the plan specifies water allocation security objectives.

The nominal volumes for unsupplemented water allocations will be determined primarily from estimates of the long-term simulated mean annual diversions of groundwater obtained from the Callide groundwater hydrologic model.

It is proposed that water allocations for the Banana Shire Council for Goovigen and Thangool and for the Grevillea and Kooingal rural water supply boards will belong to water allocation groups that are different to the groups for other water allocations in the same locality. This will enable those particular allocations to have preferential access to the available supplies to support improved security of supply under water sharing arrangements (announced allocations) which will be directly related to the prevailing groundwater levels. The water sharing arrangements and water allocation change rules (for trading of water allocations) will be established in a future amendment of the Fitzroy ROP.

It is proposed that the water allocation groups would also reflect the groundwater sub-areas in which the allocations are located. There are three groundwater sub-areas in the Callide GMA where unsupplemented water allocations are to be established, being the Upper Callide, Lower Callide and Prospect Creek groundwater sub-areas. When combined with those allocations which are proposed to have preferential access to the resource, there will be six water allocation groups in total.

Schedule 7 of the new draft plan sets out the water allocation objectives for the unsupplemented groundwater water allocations. The performance indicator is the annual volume probability which equates to the long-term probability of taking the total nominal volume for the water allocation group for a water year. The annual volume probability for the water allocation groups for water allocations in each of the groundwater sub-areas are shown in Table 5.

Table 5: Minimum annual volume probability for water allocation groups

Description	Water allocation group	Annual volume probability
Upper Callide groundwater sub-area (existing management sections 4B, 10A, 11A, 11B)	GW1A (Banana Shire Council and Grevillea Water Board)	95%
	GW1B	75%
Lower Callide groundwater sub-area (existing management sections 1, 2A,2B)	GW2A (Banana Shire Council)	95%
	GW2B	75%
Prospect Creek groundwater sub-area (existing management sections 4A)	GW3A (Kooingal Water Board)	95%
	GW3B	85%

These indicators have been established using the Callide groundwater hydrologic model to give an indication of the simulated long-term historical probabilities of water supply for a group of entitlements as a whole. These indicators should not be viewed as an assurance of future performance given the uncertainty of future rainfall, aquifer replenishment and groundwater recovery as previously discussed. In addition the access to groundwater supply is highly spatially variable within the alluvium, more so when storage levels are low.

3.7 Providing for Indigenous values

For traditional owners the water resources of the Fitzroy Basin, and the landscape they shape and are formed by, are inseparable from Indigenous spiritual and cultural values. The land and water resources also support the plants and animals that are the source of food for Indigenous communities.

Under the *Aboriginal Cultural Heritage Act 2003*, anyone engaging in any activity has a duty of care to protect areas and objects of significance to Aboriginal people, in accordance with their tradition and history.

In parallel to the *Aboriginal Cultural Heritage Act*, the provisions in the new draft plan support social and cultural interests by protecting dry season habitats such as waterholes, lakes, and other permanent sources of water that may be important to the traditional owners of the area. Additionally, floodwaters will continue to flow to estuarine and marine environments where they will maintain productive traditional fishing interests.

4 Strategies for achieving ecological outcomes

Water resource plans provide a framework for the sustainable allocation and management of the water resources of a basin. To that end Sections 14 and 15 of the new draft plan provide for general and specific ecological outcomes that are dependent on the way in which the water resources of the basin are allocated and managed. The new draft plan proposes to achieve these outcomes through a number of strategies.

The new draft plan will build on the strengths of the Fitzroy WRP 1999 and contain a range of strategies that protect the low flow regime and important aspects of in-stream flows, maintain linkages between the floodplain and watercourse and between surface water and groundwater, maintain connectivity along watercourses and protect groundwater levels.

- **Flow Management Strategies:** New draft plan provisions will support the continuation of both the seasonal baseflow and first post-winter flow management strategies as currently managed under the Fitzroy ROP (explained further in 4.1).
- **Interference:** To minimise the impacts of in-stream barriers, future applications to interfere with the flow of water by impoundment will only be considered for enhanced town water supply security, stock and domestic purposes, pumping pools, to satisfy the requirements of an environmental authority or in association with any new release of unallocated water. Applications will be assessed against criteria in the *Water Act 2000* and additional criteria in the new plan. See Section 3.3.4.
- **Flow Regime:** With additional streamflow data and modelling improvements, the hydrologic assessments for the Fitzroy Basin now extend over the historical period from 1900 to 2007 (108 years). The new draft plan's provisions will keep long-term total flows in the Fitzroy River downstream of the barrage above 77 per cent of the mean pre-development flows which was provided for under the Fitzroy WRP 1999.
- **Groundwater:** Groundwater dependent ecosystems across the plan area will be protected by improved management of groundwater and surface water extractions.
 - A total of five groundwater management areas will be established to replace existing declared subartesian areas and provide for additional areas in the Isaac–Connors and Don River subcatchments. See Section 3.6.
 - Limited future additional take from each groundwater management area will be specified, so that total groundwater extractions will be capped.
 - There will be sustainable management of the Callide Valley alluvium arising from an approximate 50 per cent reduction in total volumetric entitlements and water sharing directly related to prevailing groundwater levels. This will promote recovery of ecological values associated with the currently over allocated aquifer system.
- **Environmental Flow Objectives:** The new draft plan will contain environmental flow objectives in the plan area for low flows, medium to high flows, the first post-winter flow and groundwater levels in the Callide Valley alluvium. All future allocation and management decisions will need to be in accordance with these objectives (explained further in 4.2).
- **Maintaining ecological and cultural values of waterholes and lakes by restricting take below natural full supply level** (explained further in 4.3).
- **Effectively limiting the overall volumes of water that can be taken by:**
 - limiting the volumes of water that can be taken using existing entitlements by including volumetric limits
 - specifying additional unallocated water for each subcatchment or groundwater management area and conditioning any future entitlements granted.
- **Climate change and water quality:** The new draft plan has been developed with strategies that should mitigate potential climate change impacts (Section 4.4 of this report) and support good water quality outcomes (Section 4.5 of this report)

4.1 Flow management strategies

The environmental water needs at the local scale will be met through the continuation of the seasonal baseflow and first post-winter flow strategies, environmental management rules and the process for dealing with unallocated water. These strategies have been a focus of the resource operations plan and will also guide the water access conditions placed on new licences and existing licences where needed, to ensure that there is water to maintain local natural values.

The seasonal baseflow strategy, which provides for the passing of natural low flow events through water supply schemes and for limiting access by unsupplemented allocations to above certain flow thresholds, will continue under the new draft plan. This strategy supports ecological assets by topping up waterholes, improving water quality and providing connectivity. The strategy will continue to be implemented and amended where necessary to avoid undesirable consequences, such as creating periods of above natural wetness by passing low flow events at the same time as making consumptive releases.

The new draft plan will also continue the first post-winter flow strategy which provides for the passing and maintenance of the first significant flow event after the dry winter period. This characteristic flow of the Fitzroy Basin provides, among other things, opportunities for fish spawning and recruitment, dispersal of fish and other organisms, mixing and flushing of waterholes and temporal diversity in aquatic habitats. Special restrictions are implemented to significantly reduce the potential impact on the first post winter flow by water harvesting operations.

The new draft plan also proposes ecological factors that must be considered when deciding environmental management rules and process for releasing unallocated water. These include consideration of water that is required to maintain:

- the connectivity of low flow habitats throughout the river system
- the connectivity between the stream and its adjacent floodplain and riverine environments
- the seasonality of flows, including periods when there would naturally be no flow
- the replenishment of refuge pools, including waterholes
- surface and subsurface flows, ecosystems and habitats associated with groundwater sources
- the occurrence of the first-post winter flow.

Additionally, it is intended that the amended Fitzroy ROP will require an approved land and water management plan for any new irrigation entitlements to ensure that water use practices are ecologically sustainable.

4.2 Securing environmental flows at catchment and aquifer scales

The new draft plan limits water diversions through the specification of environmental flow objectives. These objectives essentially lock in minimum levels of acceptable change from the natural flows for different stream flow or aquifer characteristics that are important in supporting river or aquifer health.

The environmental flow objectives basically help to maintain flows in streams and aquifers to support non-consumptive uses within the basin and ensure the maintenance of environmental assets.

When partnered with the water allocation security objectives, the environmental flow objectives protect both the water users and the environment from, for example, the effects of any trading that may occur, or any infrastructure operational rules established under the resource operations plan.

The surface water environmental flow objectives in the new draft plan were developed through a hydrological simulation of stream flows and water resource development supported by the new draft plan over a 108-year period from 1900 to 2007. The environmental flow objectives are expressed for performance indicators covering low, medium and high-flow characteristics and the characteristic first post-winter flow event, which are listed in Chapter 4 Part 1 Divisions 1 and 2 of the new draft plan.

The surface water environmental flow objectives specified in Schedule 6 Parts 1 to 3 of the new draft plan, are intended to support flow patterns that mimic the natural wet and dry seasonal river cycles. To that end, the surface water objectives range from setting minimum values for times when the river levels should be low through to consideration of the frequency of floodplain inundation.

The groundwater environmental flow objectives in the new draft plan were developed based on recommendations from the groundwater dependent ecosystem assessments. They were then quantified using a hydrologic simulation of aquifer levels and water resource development in the Callide Valley Alluvium supported by the new draft plan over a 108-year period from 1900 to 2007.

Groundwater objectives aim to keep the watertable levels above specified low levels (Schedule 6 Part 4 provides the EFOs for nodes in the Callide groundwater management area).

Environmental flow objectives provide for sustainable development opportunities while recognising existing development and water use throughout the basin.

Table 6 shows the environmental flow objectives in the new draft plan for the mean annual flows as a percentage of the pre-development flow pattern at various nodes in the Fitzroy Basin. It is important to note that these values are based on an assessment of the basin stream flows and proposed level of water resource development, including volumes of unallocated water, supported by the new draft plan over the 108-year period from 1900 to 2007. As long-term statistics, these values should not be viewed as necessarily typical of each year or future years.

Table 6: Draft plan mean annual flows as a percentage of pre-development flows

Location	Mean annual flow	
	Pre-development	Draft plan
Fitzroy River at Barrage	5 941 000 ML/a	77%
Dawson River at Beckers	1 027 000 ML/a	65%
Don River at Rannes	258 000 ML/a	85%
Dawson River at Taroom	383 000 ML/a	90%
Mackenzie River at Tartus	4 049 000 ML/a	80%
Isaac River at Yatton	2 270 000 ML/a	90%
Connors River at Pink Lagoon	1 585 000 ML/a	90%
Mackenzie River at Bingegang	1 784 000 ML/a	70%
Comet River at Comet (10.8 km AMTD)	489 000 ML/a	80%
Theresa (Retreat) Creek at Main Road	355 000 ML/a	90%

4.3 Maintaining ecological and cultural values of waterholes and lakes

Natural waterholes and lakes are important parts of watercourse ecology because the water they hold when stream flows cease provides refuge for many plants and animals throughout the dry periods. For Traditional Owners, they are culturally significant as focal points for ceremonies and activities such as hunting and fishing. They are also important for stock and domestic water uses, particularly in dry times.

The new draft plan allows existing users to continue to take water from natural waterholes or lakes under existing conditions. New entitlements to take water from natural waterholes or lakes will limit drawdown to not more than 0.5 metres below full supply level. This ensures that their functioning as a dry-season refuge for plants and animals, or special place for traditional owners, continues.

4.4 Addressing the potential impacts of climate change

Water resource plan development accommodates long-term environmental considerations and encompasses the natural variability of Queensland's climate and subsequent availability of water resources.

In developing the new draft plan, the hydrologic modelling included three climate change cases—90th percentile (driest), median (best estimate) and 10th percentile (wettest), based on a high emissions scenario to the year 2050. Information from the Queensland Climate Change Centre of Excellence was used for the modelling. The results produced from the climate change modelling were utilised in the Stage 2 environmental assessment report to assess the potential impacts of climate change on selected environmental assets. See Section 7.2.3 of this report for more information.

The main potential climate change impacts identified by the assessments include general decreases in stream flows, small increased risk to riparian vegetation communities in some areas, low risk to the values associated with waterhole habitat and decreases in the reliability of medium priority water allocations and unsupplemented water diversions.

The strategies provided in the new draft plan to help address these potential impacts are as follows:

- seasonal baseflow and first post-winter flow environmental flow objectives and strategies will maintain waterholes and ecological assets with critical links to low flows
- provision for the setting of appropriate thresholds for new licences to take water in unsupplemented areas to protect existing water users and low flows, which will protect environmental assets
- lower overall unallocated water reserves to protect high flow environmental assets

- provision for the expansion of water trading markets to allow more water users more opportunities to manage supply risk.

The climate change assessments undertaken are discussed further in Chapter 7.

4.5 Maintaining and improving water quality through flow management

The flow regime can have an important role in determining the impacts of catchment inputs and in-stream processes on water quality. Factors such as volume, duration and timing of flows have considerable bearing on water quality, with baseflows and medium to high flows being important for:

- removal and dilution of pollutants
- mixing of the water column
- breakdown of stratification and reducing potential for blue-green algal blooms
- scouring sediments
- maintaining refugial waterhole water quality.

The Fitzroy WRP 1999 and Fitzroy ROP contain strategies and rules to support good water quality and mitigate event-based water quality issues. Strategies in the new draft plan will further support good water quality.

- Environmental assessments showed that the seasonal baseflow and first post-winter flow strategies implemented under the Fitzroy ROP in response to environmental flow objectives in the Fitzroy WRP 1999, support good water quality. These strategies are proposed to be continued under the new draft plan.
- Broad strategies and operational rules provided by the Fitzroy WRP 1999 and Fitzroy ROP helped mitigate water quality issues that followed the discharge of Ensham Mine floodwater in 2008. The operators of Ensham Mine were able to access the water market to secure seasonal assignment of water allocations to dilute poor quality water contained in pits to an acceptable level for discharge to the Nogoia River. To further assist with real time responses to potential water quality issues, it is proposed that the amended Fitzroy ROP consider more responsive rules for stream management and infrastructure operating rules.
- With regard to the Environmental Protection (Water) Policy 2009 (EPP Water), draft environmental values and water quality objectives have been developed in collaboration with the Fitzroy Basin Association and key stakeholders. It is highlighted that these are not yet prescribed under Schedule 1 of the EPP Water. The new draft plan provisions are expected to support and maintain the current condition of the ecological assets and estuary while supporting good water quality outcomes consistent with the principles of the EPP Water.

It is important to note that while water resource plans can support good water quality outcomes, there are many other pressures on water quality that are external to water resource planning provisions. Such pressures include climate patterns, land use and management, riparian vegetation condition and authorities to discharge under the Environmental Protection Act.

The environmental assessment provides more information on how the Fitzroy WRP 1999 provided for the maintenance and improvement of water quality.

5 Monitoring and reporting requirements

Monitoring and reporting, required under the Water Act, will provide a valuable tool for assessing and reviewing the effectiveness of the final plan. The information gathered will also contribute to the growing body of knowledge about our river systems and will assist in the next 10-year review of the plan.

The new draft plan provides for a monitoring program for general and ecological provisions. General water monitoring will focus on:

- streamflows
- the taking and diverting of water
- releases from water storages
- water quantity for water storages, including inflow, storage volume or level and outflow
- groundwater levels.

Natural ecosystem monitoring will focus on:

- volume, frequency, duration and timing of stream flows
- information on hydraulic habitat requirements of ecological assets in the plan area.

In addition, continuing and extending the requirements for notification of existing and new overland flow works in the Fitzroy Basin will provide for improved assessment of the current levels of overland flow development and will provide a basis for monitoring new development. In addition, monitoring groundwater developments, including through records of water bores drilled and notifications received from the Isaac–Connors and Callide groundwater notification areas will also assist in assessing groundwater development in the Fitzroy Basin. This data will be used to assess the effectiveness of the plan and resource operations plan in meeting objectives.

The monitoring programs will be conducted by the chief executive or other relevant state agencies and by operators of infrastructure under the resource operations plan. Other monitoring programs considered relevant by the chief executive may also be undertaken.

Operators of infrastructure such as SunWater, as the resource operations licence holder for the Nogoia Mackenzie, Dawson and Lower Fitzroy water supply schemes, will be required to report annually to the chief executive on the monitoring programs implemented for the respective storages and other infrastructure. They will also need to provide periodic operational reports on the management of allocations, stream flows and other matters. Some aspects will require more regular reporting and this will be determined under the resource operations plan.

The minister will report annually on the effectiveness of the implemented resource management strategies in achieving the plan's outcomes.

5.1 Measuring (metering) devices

Metering is currently being rolled out in the Fitzroy Basin plan area under the statewide metering policy in line with the state's commitment to the National Water Initiative. Metering of additional water entitlements in the plan area will benefit the development of future plans.

The new draft plan proposes that measuring devices be required for water allocations, interim water allocations and water licences. The installation of measuring devices will continue to occur as part of the statewide metering program under the Water Regulation 2002.

Metering provides the information needed to ensure that water users comply with the conditions of their water entitlement. These devices also provide accurate water use data which may help users improve their water resource management and water use efficiency.

By accurately knowing the volume and location of take, metering will support and improve future planning activities. The information gathered will be integrated with other knowledge to improve our understanding of how the water resources in the plan area support the rural economy, communities and the natural environment.

6 Implementing and amending the new plan

6.1 Amending the Fitzroy ROP

The final plan will be primarily implemented through amendments to the Fitzroy ROP. The amendment of the Fitzroy ROP is the responsibility of the chief executive for the Department of the Environment and Resource Management rather than the minister, as stated in Section 95 of the Water Act.

The department will prepare the draft amendment to the Fitzroy ROP in consultation with water users, water infrastructure operators and other stakeholders. On its completion, the draft amendment to the Fitzroy ROP will be released for public comment and a formal submissions process prior to finalisation.

6.1.1 What the Fitzroy ROP will do

Amendments to the existing Fitzroy ROP will establish additional or amended arrangements for consistency with the strategies contained in the new plan. Among other things the Fitzroy ROP amendments will:

- convert existing authorisations to supplemented water allocations to take water in the Callide Valley Water Supply Scheme
- convert existing authorisations to unsupplemented water allocations to take water in the:
 - alluvium of the Upper Callide, Lower Callide and Prospect Creek groundwater sub-areas within the Callide groundwater management area
 - Nogoa River from the upstream limit of Fairbairn Dam at AMTD 737.5km to its junction with Theresa Creek
 - Theresa Creek from its junction with Retreat Creek at AMTD 15.0km to its junction with the Nogoa River
 - Retreat Creek, including its anabranches, from its junction with Kettle Creek at AMTD 23.6km to its junction with Theresa Creek
 - the Comet River, including its anabranches, from Lake Brown gauging station AMTD 199.2km to its junction with the Nogoa River
 - the Dawson River from the upstream limit of Glebe Weir at AMTD 356.5km to its junction with the Mackenzie River, including sections of tributaries where Dawson River flows are accessible
 - the Dawson River from Utopia Downs gauging station at AMTD 453.5km to the upstream limit of Glebe Weir at AMTD 356.5km, including sections of tributaries where Dawson River flows are accessible
- determine environmental rules, infrastructure operating rules, water sharing rules, water allocation change rules and seasonal water assignment rules for water in the Callide Valley Water Supply Scheme
- establish licences to take groundwater in the Callide groundwater notification area and the Isaac–Connors groundwater notification area
- establish revised processes to deal with unallocated water available for future water requirements in the plan area
- establish a process for granting or amending water licences for taking overland flow water
- implement the monitoring requirements.

The structure of the Fitzroy ROP will also be updated for consistency with recently developed resource operations plans.

6.1.2 Timeframes for implementation

The preparation of a draft amendment to the Fitzroy ROP will commence after the release of the draft water resource plan. This timing will expedite the finalisation and implementation of the amendment to the Fitzroy ROP. It is expected that the amendment to the Fitzroy ROP will be completed within two years of plan finalisation.

The actual timeframe will depend on the community response to the draft water resource plan, the draft Fitzroy ROP amendment, and resolution of any issues that arise from these plans.

6.2 Amending or replacing the water resource plan

Water resource plans have a statutory life of 10 years under the Water Act. The review and development of the next water resource plan is expected to begin after the final plan has been in place for seven years. However, the plan can be amended during its 10-year life. The new draft plan allows for specific minor amendments to be made. These types of amendments would allow improved ongoing implementation of the water resource plan and are considered to have no effect on achieving the outcomes of the plan. In particular circumstances, the Water Act also allows for more significant amendments or the replacement of the plan during the 10-year period.

Water resource plans are developed through using the best available information and seeking the views of stakeholders through an extensive community consultation process. While they are designed to achieve a range of outcomes and provide certainty over their 10-year life, it is prudent to cater for possible changed circumstances or new information, which may show that the plan outcomes are not being achieved.

The new draft plan directs the minister to consider amending the plan or preparing a new plan if, for example, water entitlements are not sufficient to meet water needs or if the general or ecological outcomes are not being achieved.

7 How the new draft plan was developed

Under the water resource planning process, the minister has a clearly defined set of requirements within which there is flexibility to assess and address the future needs of each individual plan area and its communities.

The Fitzroy WRP 1999 was the basis upon which the new draft plan could be developed. Strategies in the Fitzroy WRP 1999 and their implementation through the Fitzroy ROP were examined for their effectiveness in meeting outcomes. The aim of the new draft plan was to build on the Fitzroy WRP 1999 and improve or include additional strategies where required.

Technical assessments—hydrologic, environmental and socioeconomic—and community consultation were central to preparing this new draft plan.

While these technical assessments provide a comprehensive snapshot of the many factors that must be considered in developing the new draft plan, input from the community in the plan area ensures that they are viewed correctly in the broadest social context.

7.1 Input from the community

Community views were sought formally through the submission period at the commencement of the planning process and through the establishment of a community reference panel. The department also sought views from relevant community and stakeholder groups, as well as from individuals.

7.1.1 The community reference panel

The minister is required, under the Water Act, to establish a community reference panel for the water resource planning process that includes representatives from cultural, economic and environmental interests in the plan area. Although the panel is not a decision-making body, it plays a key role in advising the minister on the views and opinions of the community.

The Fitzroy Basin community reference panel (CRP) was appointed by the minister in October 2008. The panel consisted of 19 members reflecting a diverse set of interests including grazing, irrigated agriculture, mining, industry, commerce, conservation, local government, Traditional Owners, water service providers and the broader community. Additionally, given the large size of the plan area, representation across geographical areas was also included.

The extensive interests represented on the panel were reflected in the breadth of views that were expressed. This, in turn, generated a wide range of factors for the minister to consider in preparing a new draft plan containing the balance of provisions needed to sustainably allocate and manage the water resources of the area.

Representatives from relevant government agencies were also on hand at meetings to support proceedings by providing technical advice and contributing a whole-of-government dimension to the panel's agenda.

The panel met three times during development of the new draft plan to review information and advise the minister on water resource issues of importance to the catchment community. The panel will be reconvened for a fourth meeting to be briefed on the contents of the new draft plan.

The panel provided diverse views and comments on the key areas referred to below details of which can be found in the Fitzroy Basin CRP report. Importantly the different views and comments should not be perceived as a consensus panel view, nor was consensus expected, given some of the potentially more contentious and complex issues. While some of the input provided by the CRP may not relate directly to considerations for the new plan and the Fitzroy ROP, they provide important background information for water management in the broader resource management context.

- **Unsupplemented water management:** CRP comments focused on considerations in relation to prioritising areas for further conversions of existing water licences to tradeable water allocations and for determining conversion parameters for conversions and amendment of existing licences.
- **Unallocated water:** Diverse opinions were put forward about provisions for unallocated water and how and when the unallocated water should be made available. The influences of climate change, expectations for future water infrastructure development, urban water provision and water quality issues were topical issues for the CRP.
- **Overland flow water:** The overland flow management provisions in the existing plan were considered by the CRP and suggestions included changes to the existing arrangements and the need for better community understanding of their regulatory obligations.
- **Groundwater management:** The CRP acknowledged and was briefed on the earlier work done by community reference panels previously established to provide advice in relation to groundwater management for the Callide subcatchment and for the Isaac–Connors subcatchment. Based on background of the work in those areas, the CRP focussed on groundwater management elsewhere and provided suggestions on matters for consideration.
- **Mining:** Given the extensive mining activity undertaken and proposed in the basin, comments in relation to mining

issues were raised under the previous topics. However the CRP also offered more specific comment on the need for more consistent arrangements for water access for mining with those that apply to the agricultural sector, as well comment on matters related to water trading and mining impacts.

- In-stream impoundments: The CRP commented on requirements in the new draft plan for the development of new in-stream storages. Views were given about where new developments should be limited and relevant issues to consider including environmental and cultural heritage.
- Water quality: Water quality was an important issue for the CRP. The panel discussed a wide range of water quality issues and requested that the new WRP support water quality objectives.
- Other matters: Other comments raised by CRP members included support for continued expansion of water use metering, needing to account for climate change in hydrologic assessments, and consideration of native title and cultural heritage.

Community reference panels were formed previously for the Callide and Isaac–Connors groundwater amendments to the Fitzroy WRP 1999. When the groundwater amendments were rolled into the development of the new draft plan all planned panel meetings for these panels had been finalised. Panel members were invited to nominate for the Fitzroy Basin CRP.

For further information the Isaac–Connors and Callide CRP reports are included as appendices in the Fitzroy Basin community reference panel report.

The community reference panel for groundwater in the Callide subcatchment was initially established in 1997 and five meetings were held by October 2008, concluding the planned meetings for the panel. The panel put considerable effort into providing views and comments about groundwater management, in particular how over-allocation of the groundwater resources of the Callide Valley alluvium might be addressed in order to sustainably manage groundwater into the future. This was a confronting challenge and the feedback and comments provided by the panel about possible management options was an important input for further consideration and development of the proposals set out in the new draft plan for community to consider and provide feedback to the minister

The community reference panel for groundwater in the Isaac–Connors subcatchment was established in 1997 and four meetings were held by December 2008, concluding the planned meetings for the panel. The panel discussed a wide range of management issues for groundwater in the Isaac–Connors subcatchment with the main focus on the alluvial aquifers. The panel supported and endorsed policy directions for consideration for groundwater in this area in relation to trading of water, management areas, notification and licensing outside of the existing declared groundwater area and unallocated water provisions. The contributions made by the panel have provided a sound basis on which to develop proposals for groundwater management in the Isaac–Connors for the new draft plan.

7.1.2 Additional community consultation

The minister is required, under the Water Act, to conduct a formal submission process on the intention to prepare the new draft plan. Two formal submissions processes were undertaken during the development of the new draft plan. Submissions were sought both at the commencement of the water resource planning process and following the release of a further notice of intent to include groundwater in the plan area. All submissions received were considered in the development of the new draft plan along with submissions received on the notices of intent for the Isaac–Connors and Callide groundwater amendments to the Fitzroy WRP 1999. The submissions provided the minister with a perspective on community support and their views regarding the new draft plan. Views submitted included that some management strategies of the Fitzroy WRP 1999 has not been implemented through the Fitzroy ROP e.g. overland flow water, the impacts of mining (e.g. coal seam gas water take, mine de-watering and overland flow capture), expansion of water trading and communication and consultation.

While the submissions processes and the community reference panel were the main forms of consultation, other methods of gauging community perspective were also employed. These included:

- Departmental staff attended a number of public information sessions in June 2008 to discuss the notice of intent to prepare a new draft plan.
- At stages through the planning process, departmental staff met with various stakeholders to discuss the development of the new draft plan.

Additional information sessions and stakeholder meetings will be held during the consultation period, which will begin with the new draft plan's release. This will promote informed debate and active input through formal submissions to the plan's finalisation.

7.2 Technical assessments

Socioeconomic, environmental and hydrologic technical assessments were undertaken to support the preparation of the new draft plan.

The community reference panel members reviewed and provided comments on the draft technical reports for the environmental, and socioeconomic assessments.

7.2.1 Hydrologic assessment

Hydrology—the study of water as it moves through the water cycle—is fundamental to learning about the relationship between flows and the environment. For the water resource planning process, the hydrologic assessment relies substantially on mathematical modelling of streamflows and groundwater behaviour.

The department's water assessment group had developed an integrated quantity quality model (IQQM) for surface water for the Fitzroy WRP 1999 and Fitzroy ROP. The IQQM is a computerised daily time-step hydrologic model, developed to simulate stream flows in the plan area. The model simulated stream flows over a 95-year period—from 1900 to 1995.

For the new draft plan a new IQQM has been developed and the simulation period now extends over a historical period from 1900 to 2007 (108 years). The new model also incorporates a number of key improvements including:

- better representation of dams, weirs and water entitlements
- improved derivation of historical streamflows by using the latest modelling techniques
- improved capability to represent operational management rules
- starting the model operation from 1889 to ensure more realistic conditions, particularly for major storages, at commencement of the 1900–2007 simulated period
- improved spatial representation of flow and surface water licences in the Callide subcatchment.

Hydrologic modelling allowed for a comparison between simulated pre-development flows—how streams would behave if there were no dams or other water infrastructure and no water extraction—and different development levels. This demonstrated the potential effects of differing development levels on stream flows and existing water users. The model is also used to test the performance indicators against which the objectives in the new draft plan are assessed.

Scenarios have been developed for pre-development, current development and full development (new draft plan provisions).

The new draft plan will maintain the mean annual flow past the Fitzroy Barrage at a level of 77 per cent of mean pre-development flows as per the Fitzroy WRP 1999. These flows assume full utilisation of existing entitlements and the full development and use of the proposed provisions for unallocated water over the 108 year simulation period.

Further information on the IQQM model for the Fitzroy Basin can be found in the hydrology report.

A Callide groundwater model has also been developed to assess groundwater level responses to a range of allocation and management scenarios for the Callide Valley alluvium. Simulations have been undertaken over the same 108 year period as utilised in the Fitzroy Basin IQQM surface water model. The groundwater flow model uses the simulated flows from the Fitzroy Basin IQQM surface water model to assess groundwater–surface water interaction and groundwater recharge potential. This leads to better capability to simulate groundwater level behaviour for different management scenarios.

7.2.1.1 Climate change modelling

As part of the development of the new draft plan, climate change sensitivity cases were run to assess the areas of the Fitzroy Basin that are sensitive or vulnerable to climate change. For the purpose of the climate change modelling, the IQQM model developed for the Fitzroy ROP (with a simulation period of 1900–1995) was extended with flow sequence data to 2007. The IQQM model was then modified with information supplied by the Queensland Climate Change Centre of Excellence. The results from the climate change modelling were compared across the flow regime and across the basin.

For this assessment the 2050 A1FI emissions scenario was chosen. This is a higher emissions scenario. Eleven global climate models (also known as general circulation models) were chosen based on their ability to predict changes to rainfall. These global climate models were ranked based on their impact on the rainfall. Previous studies have shown that ranking global climate models by rainfall produces the same results as ranking by flows.

Three global climate models were chosen that represent the 10th (wetter), 50th (median) and 90th (drier) percentile cases of climate change. The 50th (median) percentile case represents the most likely impact from climate change and the 10th (wetter) and 90th (drier) percentile cases give an indicator of the range. The climate change cases were applied to two development scenarios: existing levels of infrastructure (current development) and full development including new infrastructure such as Nathan Dam.

The results from the hydrologic assessment indicated the potential for decreases in the availability of water for medium priority water allocations and unsupplemented water diversions under climate change conditions.

The environmental assessment, discussed below in Section 7.2.3, used the results produced from the climate change modelling to assess the potential impacts of climate change on selected environmental assets (Chapter 8 of the Stage 2 Environmental Assessment contains further information). The main potential impacts identified by this assessment were as follows:

- small increase in the risk of local population failure of barramundi
- no increase in the risk of local population failure of king threadfin salmon
- small increase in risk to riparian vegetation communities through a lower average maximum yearly inundation
- low risk to the values associated with waterhole habitat
- a small decrease in the number of high catch years in off-shore reef fisheries under a full development scenario and a slight increase in high catch years under the current development scenario.

The strategies in the new draft plan that will help to address these potential impacts are as follows:

- conservative unallocated water reserves to protect environmental assets and existing water users
- conversion of water licences to water allocations which will allow for the expansion of water trading markets
- seasonal baseflow and first post-winter flow environmental flow objectives that will help to maintain waterholes and ecological assets with critical links to low flows and the first post winter flow
- provision for the setting of appropriate thresholds for new licences to take water in unsupplemented areas to protect existing water users and low flows, which will help to protect environmental assets.

7.2.2 Socioeconomic assessment

The socioeconomic assessment to inform the development of the new plan was carried out in two stages. The two socioeconomic assessments prepared for the Callide and Isaac–Connors groundwater amendments to the Fitzroy WRP 1999 are included as appendices to the Stage 2 report.

7.2.2.1 Stage 1 Baseline Report

This report provides a basic economic, social and water resource management profile of the plan area. A summary of socioeconomic findings from the report include:

- The regional resources boom has been the single biggest factor driving the region's rapid population growth and economic development in recent times.
- Some mining employment practices, such as contract work and fly-in/fly-out or drive-in/drive-out arrangements, have contributed to economic growth in non-mining areas. There is also evidence that local industries struggle to compete against mines in the local labour market. The increase in people moving to Queensland to take up jobs associated with the mining industry will place pressure on water infrastructure supplying urban communities.
- The water resources in the Fitzroy Basin are also significant to the history and culture of the Indigenous population which comprises about five per cent of the total population, a percentage slightly higher than the Queensland figure of 3.3 per cent.
- Water availability is only one of the factors that can potentially constrain the development of water using sectors (urban, industrial or rural). Other factors include land availability, market conditions and the availability of other business inputs such as skilled labour and capital.
- Post global financial crisis market prospects for water-using industries may improve. Better use of available supplies, improved water use efficiency, utilisation of currently unallocated water where available, water trading, and construction of the additional water infrastructure projects nominated in the Central Queensland Regional Water Supply Strategy (CQRWSS) will be required to meet projected increased demands.

- Survey evidence suggests that the permanent trading of water allocations provided under the Fitzroy WRP 1999, and implemented through the Fitzroy ROP 2004 has worked well in the Fitzroy catchment. Participants are able to dispose of water allocations surplus to requirements or acquire additional water allocation with relative ease.
- There are important environmental assets in the Fitzroy catchment. These environmental assets help to support and maintain vital industries such as ecotourism and commercial fishing as well as provide outdoor recreation activities for the community.

7.2.2.2 Stage 2 Assessment Report

This report builds on the Stage 1 report and is a qualitative evaluation of the socioeconomic effectiveness of the Fitzroy WRP 1999 strategies in meeting its outcomes. It also provides an assessment of the socioeconomic implications of water management issues for consideration in developing the new draft plan. The report tabulates findings from these assessments and provides the potential outcomes and assessment tools for consideration in the new draft plan. The findings included ensuring security for existing authorisations and entitlements, improving specification of entitlements, providing for flexibility in water management, including water-use efficiency, providing for non-consumptive uses and providing for future water requirements.

Summarised findings regarding the effectiveness of the Fitzroy WRP 1999 strategies in meeting its four outcomes were:

- security for water users—the Fitzroy WRP 1999 strategies have:
 - increased security for supplemented entitlements by establishing water allocations in all water supply schemes except the Callide Valley Water Supply Scheme where interim arrangements continue
 - increased security and definition for unsupplemented water entitlements from the Nogoia, Mackenzie and Fitzroy Rivers including the creation of water markets in three water management areas. A recent amendment of the Fitzroy ROP to provide for trading between medium and high-priority water in the Nogoia Mackenzie Water Supply Scheme to provide for anticipated urban, mining and industrial development further enhances water trading options
 - managed overland flow water with some transitional provisions.
- security for holders of resource operations licences—the Fitzroy WRP 1999 strategies have delivered certainty to water supply providers through establishment of water sharing and operational rules in water supply schemes
- further water-related development in the plan area—the Fitzroy WRP 1999 strategies have provided for reserves of unallocated water and water markets to allow for future development
- environmental water requirements for natural ecosystems in the plan area—the Fitzroy WRP 1999 strategies have delivered effective water management rules to provide for non-consumptive uses. The effectiveness of this outcome is further analysed in the environmental assessment report.

The Stage 2 report also examined the socioeconomic implications of key water management issues in the Fitzroy Basin. The report looked at key management issues in the context of the National Water Initiative objectives. A summary of key findings and considerations for the new draft plan are as follows:

- Consideration should be given to amending existing licences to include specification of a maximum diversion rate and an annual volumetric limit. Where adequate information is available, such as on trunk streams, consideration should be given to converting additional unsupplemented water entitlements to tradable water allocations.
- Socioeconomic benefits of improved entitlement specification include more certainty for water users, entitlements less open to interpretation, more equitable sharing between all users, and entitlement holders able to make more informed investment and management decisions.
- Socioeconomic benefits of water trading include voluntary participation in water markets which can provide existing water allocation holders the opportunity to restructure or exit enterprises as circumstances change and some opportunity for new developments subject to increased economic return where water moves to higher value uses. It also provides water users with flexibility to manage for uncertainty, such as market conditions, unforeseen events, climate variability and change.
- Consideration should be given to a provision so that mines can apply and pay for unallocated water as an interim measure until an amendment to the Fitzroy ROP to include overland flow water is finalised.
- Consideration should be given to a provision requiring mines to notify details of their existing overland flow works in the same manner as other owners of overland flow storages.
- Consideration should be given regarding the management of groundwater under the new draft plan.

- Consideration should be given to a process to convert groundwater entitlements in the Callide Valley Water Supply Scheme—currently held as interim water allocations—to tradable water allocations and/or other defined entitlements as required.
- Consideration should be given regarding converting unsupplemented groundwater water licences in the Callide Valley alluvium to tradeable water allocations.
- A review and confirmation of the volumes of the unallocated water potentially available in the plan area should be undertaken. This review should recognise the effects of overland flow development and consider providing reserves specifically for government commitments to new infrastructure (a strategic reserve), projects of state or regional significance, town water supplies, and indigenous community projects (a strategic reserve) and a general reserve for any purpose.
- The new draft plan should also consider an unallocated water reserve for the plan area downstream of the Fitzroy Barrage. This area contains nationally significant wetlands adjacent to the estuarine reach of a major river that discharges to the Great Barrier Reef lagoon.
- Strategies will need to be developed in the new draft plan to manage connected surface water and groundwater as a single resource and to return extraction of groundwater from the Callide Valley alluvium to sustainable levels as required under NWI.
- Consideration should be given to providing a water management framework that has regard for the needs of all water users in a catchment that are likely to experience an increase in climate variability:
 - Improved specification of water entitlements and tradable allocations separable from land will provide consumptive water users with flexibility in how they manage and use water
 - The trend towards water users holding a portfolio of water authorisations and entitlements is likely to continue.
 - The recent amendment to the Fitzroy ROP to provide for trading between medium and high-priority supplemented water in the Nogoia Mackenzie Water Supply Scheme provides opportunities for consumptive users to develop strategies to deal with climate variability and climate change.

7.2.2.3 Callide Socioeconomic Report

The Callide Socioeconomic Report was conducted as part of the Callide groundwater amendment to the Fitzroy WRP 1999. The purpose of the report was to provide a baseline assessment of socioeconomic conditions and trends of the Callide subcatchment, including associated water needs. The report focuses on the Callide Valley alluvium which is the main aquifer in the subcatchment area. The report also examines the likely economic and social effects of broad reforms arising from the proposed amendment to the Fitzroy WRP 1999. Key findings from this report were:

- The alluvial aquifers associated with Callide Creek and its tributaries form the main primary groundwater resource in the Callide subcatchment. Most of the Callide Valley alluvium is under considerable stress due to high levels of use in the past. The situation has been exacerbated by the more recent extended dry period and the associated lack of recharge to the aquifer. In large parts of the aquifer water levels are at record lows and many entitlement holders have been unable to access useful supplies for some time. The over-allocation of groundwater in this aquifer threatens the long-term sustainability of the resource, the socioeconomic stability of the area, and the health of ecosystems that depend on groundwater.
- The need to return over-allocated systems to environmentally sustainable levels of extraction is a key objective of the National Water Initiative. A secure management framework that helps to ensure the sustainable use of scarce groundwater supplies will bring economic benefits to the area for current and future generations.
- Agriculture, mining, and meatworks are the major employers in the Callide subcatchment. The share of employment in mining is expected to continue to increase.
- The regional resources boom is driving economic growth and economic change in the subcatchment. This is expected to continue.
- Agricultural water users have adjusted from historic use levels to much lower levels of use caused by current water availability. For example, farmers have responded to reduced groundwater availability in a number of ways, including investments in water use efficiency, movement into dryland agriculture, diversification into other crops and movement into niche industries.
- The employment opportunities provided by the resources sector have helped to supplement income levels for some farmers. This is likely to have assisted some farmers facing the financial effects of the drought.
- Groundwater availability could constrain future expansion of the meatworks and could also pressure urban water supplies if there was population growth.

- Improved security through a well defined water allocation framework will enable water users to make informed decisions for management of their businesses. A framework for sustainable groundwater management will reduce groundwater supply risks for all users including the environment.
- Providing for the conversion of water licences and interim water allocations to water allocations would bring real economic and financial benefits to water users. Trading would be likely to contribute to economic growth in the subcatchment by allowing water to move to higher value uses and/or where the demand for water is high. This effect may take some time as people get used to the opportunities provided by water trading.
- The basis for the conversion of groundwater licences and interim water allocations into water allocations is a complex issue. The best economic approach is to use historical water use as the basis for conversion.
- Developing and implementing a sustainable groundwater management framework is likely to assist in achieving socially, economically and environmentally sustainable water use in the subcatchment.

7.2.2.4 Isaac–Connors Stage 1 Economic and Social Assessment Report

The Isaac–Connors Socioeconomic Report was developed as part of the Isaac–Connors groundwater amendment to the Fitzroy WRP 1999. The purpose of the report was to provide a baseline assessment of socioeconomic conditions and trends of the Isaac–Connors catchment. The report was completed by Marsden Jacob Associates. Key findings from the report were:

- Water use is dominated by mining related activities associated with the increases in coal production. Over the past 5–10 years, the water requirements of mining and associated sectors have grown steadily. In addition, there is a high level of interest in further developing water resources for agricultural purposes.
- The department has received licence applications for an additional 8000 ML of groundwater.
- Recent studies indicate that parts of the groundwater system may be fully committed.
- The Isaac–Connors catchment has experienced rapid population growth in the past five years, primarily attributable to the rapid growth in mining developments.
- Town water requirements are met through a mix of surface water and groundwater systems, depending on location. Much of the population’s water needs are met through the same systems that supply mine requirements. In the longer term the population is expected to decline marginally from the current peak as the development and expansion phase of mining activity concludes and mines move to the long-term operational phase.
- Sectors that are more likely to experience further growth are mining, beef cattle, and irrigated agriculture (particularly fodder to underpin intensive beef production).
- The development of the Burdekin to Moranbah pipeline is likely to meet the short to medium-term requirements of the mining sector and most of the needs of the urban sector. However, the requirements of Nebo township already exceed the sustainable yield of their groundwater source. It is unlikely that supply to Nebo could be augmented without significant investments in infrastructure (e.g. a spur line to other water supply systems).
- Chapter 6 of the report discusses potential options to address future water requirements including Connors River Dam, water use efficiency and unallocated water.

7.2.3 Environmental assessment

The environmental assessment to inform the development of the new plan was carried out in two stages. In addition three technical advisory panel reports had been developed for the Isaac–Connors and Callide groundwater amendments to the Fitzroy WRP 1999.

7.2.3.1 Report 1: Background

This report sets the context for the Assessment Report (Report 2). The report:

- provides a basic water resource management profile of the Fitzroy Basin
- summarises the environmental provisions contained within the Fitzroy WRP 1999 that were developed with the help of a Technical Advisory Panel with specific knowledge of riverine biology, ecology and geomorphology
- outlines the water monitoring and planning activities that occurred within the Fitzroy Basin:
 - Over the past ten years the department has monitored the aspects of the Fitzroy Basin that are of direct relevance to the Fitzroy WRP 1999, including the quantity and quality of surface and ground water resources, and freshwater and estuarine ecological assets. Additionally, in 2004 the department established the Environmental Flow Assessment Program (EFAP).

- Other government and non-government organisations performed monitoring activities relating to water-storage operation; sediment, salinity and nutrients; fish populations, fisheries catch and estuarine habitat; and assessment of the long-term effectiveness of the Reef Water Quality Protection Plan in halting and reversing the decline in water quality of run-off from Great Barrier Reef catchments.
- summarises the key advances in scientific knowledge of riverine and flow-dependent ecosystems.

A science review panel comprising Mr Ian Jowett (Ian Jowett Consulting—retired from the National Institute of Water and Atmospheric Research Ltd NZ); Professor Richard Pearson (James Cook University); and Dr Leo Duivenvoorden (Central Queensland University) reviewed the report and provided comments for incorporation.

7.2.3.2 Report 2: Assessment

This report includes technical assessments and provides considerations for the new draft plan. The report included:

- ecological risk assessments including results from EFAP ecological risk assessment (for current and full development (inclusive of Nathan Dam) scenarios that indicated:
 - for both the current and full development scenarios, 5 out of 14 ecological assets were placed at low risk. Three of these assets were the low flow spawning fish, where persistent and stable low flows in water supply schemes provide greater opportunities for recruitment. Risk to waterholes as refugia in water supply scheme areas is also considered to be low due to top-up flows. Risk to waterholes as refugia in unsupplemented areas, where there are no top-up flows, is higher. Barramundi growth was also considered to be at low risk.
 - Under the current development scenario the following ecological assets were assessed to be at higher risk:
 - floodplain riparian vegetation communities (with emphasis on *Eucalyptus coolabah*)
 - juvenile barramundi (*Lates calcarifer*) recruitment
 - banana prawn (*Penaeus merguensis*) growth
 - high catch years (of fin-fish) at the Capricorn and Bunker groups
 - king threadfin salmon (*Polydactylus macrochir*)
 - wetlands as habitat
 - the population persistence of Fitzroy golden perch (*Macquaria ambigua orientis*).
 - further assessments under the full development scenario where the same assets stated above were again placed at higher risk with increased risk to barramundi year class strength.
 - population viability modelling of the Fitzroy golden perch. This suggests that while no immediate risk exists under the current development scenario, there may be an increased risk under the full development scenario
- a review of the Fitzroy WRP 1999 and Fitzroy Basin Resource Operations Plan 2004 (Fitzroy ROP) environmental strategies and Fitzroy ROP arrangements that indicated that the seasonal baseflow arrangements, the first post-winter flow (FPWF) arrangements and other operational arrangements are generally effective in achieving their ecological intent
- a climate change sensitivity analyses (discussed in Section 7.2.1 of this report)
- options for consideration in the development of the new draft plan which include:
 - additional environmental flow objectives (EFO) and associated Fitzroy ROP arrangements (FPWF and seasonal baseflow) to manage the potential impacts on flow dependent ecosystems and water quality from additional water infrastructure e.g. Nathan and Connors River dams
 - providing for management arrangements to deal with the potential impacts of climate change:
 - apply a conservative approach to the volumes of unallocated water provided for, and stage releases to match demands
 - continue implementing the seasonal baseflow and first post-winter flow objectives and associated Fitzroy ROP arrangements that help maintain low flows, waterholes and ecological assets with critical links to low flows and the first post-winter flow
 - further develop and expand the water trading markets
 - condition any new entitlements arising from the release of unsupplemented unallocated water with appropriate flow thresholds to allow passing of low flows.
 - inclusion of a set of performance indicators (representing no, low, medium and high flows, flow variability and total

flow volumes) to provide for a greater range of flow attributes, represent ecological assets and better align with more recent east coast water resource plans

- for first post-winter flow (FPWF) management:
 - increase the current minimum temperature threshold of 23°C in the Fitzroy WRP 1999 to 24°C for September to help maximise spawning potential for the Fitzroy golden perch
 - temporarily increase the nominal operating levels of storages at the onset of the FPWF period up until the passing of the event to benefit the passing of smaller FPWF events.
 - expand to other existing infrastructure where appropriate.
- more prescriptive specification of changes in the rate of release from storages in the Fitzroy ROP to reduce incidence of fish stranding in tailwater areas
- given the potential for undesirable consequences a strategy is suggested that could assist in responding to event-based water quality issues
- promote maintenance of groundwater dependent ecosystems in the Callide subcatchment and Isaac–Connors catchments by arrangements that may include providing for the:
 - establishment of EFOs with associated nodes and performance indicators
 - provision of more targeted outcomes than those currently specified in the Fitzroy WRP 1999.

A science review panel comprising Mr Ian Jowett (Ian Jowett Consulting—retired from the National Institute of Water and Atmospheric Research Ltd NZ); Professor Richard Pearson (James Cook University); and Dr Leo Duivenvoorden (Central Queensland University) reviewed the draft report and provided comments for incorporation.

7.2.3.3 Callide Subcatchment Groundwater Dependent Ecosystem Assessment

The Callide Groundwater Dependent Ecosystem Assessment was conducted as part of the Callide groundwater amendment to the Fitzroy WRP 1999.

The report was completed by Sinclair Knight Merz (SKM). This report focuses on groundwater dependent ecosystems (GDEs) of the Callide Valley alluvium, which contains the most developed groundwater resource in the plan area.

Assessments were divided into four key areas: wetlands, terrestrial vegetation, river baseflow systems and aquifer ecosystems. Key recommendations for consideration:

- Wetlands: monitoring bores should be established on two selected wetlands, determined in the report to be groundwater dependent. Environmental Flow Objectives (EFOs) should be established at the downstream end of Bell Creek, where numerous wetlands were identified.
- Terrestrial vegetation: all mapped remnant vegetation was within 500 metres of streams, with 80 per cent within 100 metres of a stream. Recommendations include monitoring watertable levels, setting appropriate EFOs and applying setback distances for new bores of 200 metres from major creeks.
- River baseflow systems: these systems comprise lotic (flowing) aquatic ecosystems and riparian ecosystems. It is recommended that setback distances for new bores of 200 metres from major creeks be implemented for new groundwater bores to limit interference to streamflow.
- Aquifer ecosystems and their associated stygofauna: ten bores were sampled by DERM staff for stygofauna (groundwater dwelling invertebrates) and new species of Ostracod and Copepod were discovered at one bore. No specific strategies for stygofauna are being proposed for the new draft plan, because the understanding of the water requirements of stygofauna is in its infancy.
- provisions recommended for inclusion in the draft plan include establishing EFOs at key locations, and utilising existing monitoring bores to monitor wetlands and remnant vegetation sites selected from those identified in the report.

The consultant's report suggests that recovery in groundwater levels will provide an important basis for preservation of GDEs. Groundwater pump setback distances are recommended in the report to protect river baseflow systems and other GDEs.

7.2.3.4 Isaac–Connors Groundwater Project Parts A and B

For the Isaac–Connors groundwater amendment to the Fitzroy WRP 1999, assessments undertaken were the Isaac–Connors Groundwater Project Part A: Conceptual Model for Groundwater and Part B: Assessment of Groundwater Dependent Ecosystems.

The reports were completed by Sinclair Knight Merz (SKM.) Key recommendations from the Isaac–Connors Groundwater Project Part A: Conceptual Model for Groundwater are:

- cap new allocations from the Isaac–Connors alluvial aquifers
- consider reducing groundwater extraction from the Braeside Borefield
- review allocation levels as more data becomes available following metering of extractions
- provide stream buffer zones (setback distances)
- a number of further studies were recommended.

Key recommendations to be considered from the Isaac–Connors Groundwater Project Part B Assessment of Groundwater Dependent Ecosystems (GDEs) are:

- limit further groundwater extractions
- ensure water management arrangements are sufficiently flexible to allow for the large inter-annual variability in groundwater recharge, GDE requirements and human demands
- provision of buffer zones for GDE sites (setback distances)
- undertake further investigations to establish and provide for maintenance of the minimum, and required range, in groundwater levels.

8 Glossary

Aquatic—A word that describes anything to do with water.

Annual volumetric limit—the maximum volume of water that may be taken under a water entitlement, in a water year.

Environmental flow objectives—a flow objective for the protection of the health of natural ecosystems for the achievement of ecological outcomes.

Groundwater—subartesian water and artesian water as defined under Schedule 4 of the *Water Act 2000*.

Interim water allocation—An authority to take water managed under an interim resource operations licence or a resource operations licence that represents a volumetric share of water, and any conditions attaching to the authority.

Interim resource operations licence—A licence granted under Section 175 of the Water Act.

Mean annual discharge—The average volume of water that is discharged at a location. It is found by summing the yearly volumes of water discharged over a series of years and dividing the total by the number of years in the series.

Mean annual flow—the average volume of water that is discharged at a location. It is found by summing the yearly volumes of water discharged over a series of years and dividing the total by the number of years in the series.

Median annual flow—the middle value in a series of values that describe the yearly volume of water discharged at a location, when the values are ranked in order of size.

[For example: The median annual flow for the following sequence is 200 000 ML—500 000 ML, 300 000 ML, 200 000 ML, 150 000 ML and 100 000 ML. The mean annual flow is 250 000 ML.]

Non-point source—the discharge doesn't come from one identifiable source. For example, run-off from agricultural and urban sources does not usually enter a waterway at one point, but enters at a number of points.

Refugia—the habitat required by a species during a time of stress, for example, drought.

Resource operations licence—A licence granted under Chapter 2, Part 4, Division 3 of the Water Act.

Resource operations plan—a plan approved under Section 103 (2) of the Water Act. [Note: A resource operations plan implements water resource plan strategies and, among other things, guides the release of unallocated water and the day-to-day management of streamflows and water infrastructure for consistency with the water resource plan.]

Supplemented water—Water supplied under an interim resource operations licence, resource operations licence or other authority to operate water infrastructure.

Unallocated water—water that can be made available for future consumptive use for urban, rural or industrial uses without compromising the environment or the security of supply to existing water users.

Unsupplemented water—water, occurring in its natural state, that is, not supplemented by releases from infrastructure.

Water allocation—An authority granted under Section 121 or 122 of the Water Act to take water.

Water licence—a licence granted under Chapter 2, Part 6, Division 2 of the Water Act.

Water resource plan—a plan approved under Section 50 (2) of the Water Act. [Note: A plan to allocate and sustainably manage water in a defined part of Queensland.]

Waterhole—a part of a watercourse that contains water after the watercourse ceases to flow, other than a part of a watercourse that is within the storage area of a dam on the watercourse.

9 References

ABS (2006), *Census of Population and Housing*.

Department of Infrastructure and Planning, Planning Information and Forecasting Unit (PIFU) (2008), Queensland's future population 2008 edition.

10 Appendices

Appendix A - Public Notice

Department of Environment and Resource Management

Public Notice

Availability of Draft Water Resource (Fitzroy Basin) Plan 2010
Water Act 2000 Section 49

1. Purpose
 Notice is given under section 49 of the *Water Act 2000* that the Minister for Natural Resources, Mines and Energy and Minister for Trade has prepared a Draft Water Resource (Fitzroy Basin) Plan 2010 (draft plan). The draft plan has been prepared to replace the expiring Water Resource (Fitzroy Basin) Plan 1999.

2. Proposed plan area
 The proposed plan area for the draft plan is identified in the map shown in this notice which is indicative only. The proposed plan area and more details of the location of the area boundaries are held in digital electronic form by the Department of Environment and Resource Management (the department), and may be inspected at the department's offices at 209 Bolsover St, Rockhampton.

3. Inspection of draft plan
 Copies of the draft plan can be inspected at or obtained by contacting the department using the details specified in clause 5b of this notice. The draft plan may also be viewed or downloaded from the internet at <www.derm.qld.gov.au/wrp/fitzroy>.

4. Public information sessions
 The department will be holding public information sessions to provide further details on the draft plan. The dates and times for the information sessions are:

Location	Date	Time	Venue
Rockhampton	17 January 2010	09.00 am – 12.00 pm	Department of Employment, Economic Development and Innovation Conference Centre, corner Yeppoon Road and Bruce Highway, North Rockhampton
Biluela	18 January 2010	09.00 am – 12.00 pm	Department of Employment, Economic Development and Innovation Research Station, Conference Room, 86-102 State Farm Road
Theodore	19 January 2010	14.30 pm – 17.00 pm	Theodore Hotel, The Boulevard
Rolliston	19 January 2010	13.00pm – 16.00 pm	Rolliston Community Hall, Planet Street
Emerald	20 January 2010	09.00 am – 12.30 pm	Department of Environment and Resource Management Conference Room, 99 Hospital Road
Clarke Creek	21 January 2010	09.00 am – 12.00 pm	Clarke Creek Community Hall

Please contact the department on 1800 822 000 to register your interest for a session.

5. Submissions
 Submissions may be made about the draft plan and the contents of the overview report. Anyone may make a submission. Submissions must:

- be in writing and signed by each person who made the submission;
- state the name and address of each person who made the submission;
- state the grounds of the submission and the facts and circumstances relied on in support of the grounds;
- be received on or before 5 pm 28 February 2010; and
- be received by the person stated in clause 5a of this notice.

Email and internet submissions will also be accepted.

Submissions should identify information that is considered confidential. The department will endeavour to maintain the confidentiality of information that is identified in this way, however submissions are subject to the Right to Information Act 2009 and information may be required to be released upon requests made under this Act. Furthermore, other legal obligations, such as the processes of the courts or natural justice may also override confidentiality.

6. Enquiries

(a) Submissions on the draft plan must be addressed to:

Postal address:
 Attn: [REDACTED]
 Water Services (Fitzroy WRP)
 Department of Environment and Resource Management
 Rockhampton State Gov. Bld. 1.3
 PO Box 1762
 Rockhampton Qld 4700

Street address:
 209 Bolsover Street
 Rockhampton Qld 4700

By email:
wrpfitzroy@derm.qld.gov.au

By facsimile: (07) 4938 4011

By internet:
 <www.derm.qld.gov.au/wrp/fitzroy>

(b) Further enquiries should be directed to [REDACTED] Department of Environment and Resource Management at [REDACTED]. Alternatively, information can be viewed or downloaded via the internet at <www.derm.qld.gov.au/wrp/fitzroy>.

www.derm.qld.gov.au Queensland Government

Appendix B - Moratorium Notice

Department of Environment and Resource Management

Moratorium Notice

Fitzroy Basin

Water Act 2000 (Qld) Section 26

1. This is a Moratorium Notice (the Notice) under section 26 of the Water Act 2000 (Qld) (the Act) for the Fitzroy Basin (the Area) as shown in the indicative map below.
 Note: The map shown in this notice is indicative only. The map of the area and more details of the location of Area boundaries are held in digital electronic form by the Department of Environment and Resource Management (the department) and may be inspected at the department's Rockhampton office at 206 Bolsover Street.
2. The Notice has effect on and from 14 December 2010.
3. The following moratorium notices in the Fitzroy Basin cease to have effect on and from the day this notice has effect:
 - (a) the moratorium notice for the Callide Subcatchment which had effect from 15 December 2006; and
 - (b) the moratorium notice for the Isaac River and Connors River catchment which had effect from 15 December 2008.
4. This Notice applies to:
 - (a) the following water within the Area:
 - i. underground water in the Callide, Fitzroy, Highlands and Great Artesian Basin declared subartesian areas that is not dealt with in the Water Resource (Great Artesian Basin) Plan 2006;
 - ii. water in a watercourse, lake or spring.
 - (b) all applications for or about a water licence to take or interfere with the water mentioned in clause 4(a)(i) if granting the application would have one or more of the following effects on the water:
 - i. increase the amount of water that may be taken;
 - ii. increase or change the interference with the water.
 - (c) all applications for or about a water licence to take water from a watercourse, lake or spring in the part of the Area identified in the map below as the Lower Fitzroy Area if granting the application would have the effect of increasing the amount of water that may be taken;
 - (d) all applications for or about a water licence to interfere with the flow of water in a watercourse, lake or spring by impoundment if granting the licence would have the effect of increasing or changing the interference with the water;
 - (e) works to take underground water in the parts of the Dun River catchment and the Isaac and Connors Rivers catchment, as shown on the map below, that are outside the declared subartesian areas mentioned in 4(a)(i) and would increase the amount of underground water being taken or that could be taken.
 Note: The Lower Fitzroy Area is that part of the Area from which water flows into the reach of the Fitzroy River downstream of the Fitzroy River Barrage.
5. Applications stated in clause 4 of this notice received:
 - (a) before the day the Notice has effect, will not be dealt with;
 - (b) on or after the day the Notice has effect, will not be accepted.
6. Clause 5 of the Notice does not apply:
 - (a) if the application relates to water mentioned in clause 4(a)(i) and is an application:
 - i) to reinstate or replace a water licence under section 221 or 229 of the Act;
 - ii) for taking water for stock purposes or domestic purposes;
 - iii) that does not relate to water in the Callide Valley alluvium and is an application:
 - (A) for a water licence to take water for a significant project declared under section 26 of the State Development and Public Works Organisation Act 1971;
 - (B) for taking water for mine dewatering purposes;
 - (C) for a water licence to take water for town water supply purposes;
 - (D) for construction, operation or maintenance of public utilities;
 - iv) if a development permit authorising construction of works to take the water to which the application relates has been given and is current.
 - (b) if the application relates to taking water mentioned in clause 4(a)(ii), is an application for taking water in the Lower Fitzroy Area and is an application:
 - i) to reinstate or replace a water licence under section 221 or 229 of the Act;
 - ii) for taking water for stock purposes or domestic purposes;
 - iii) for a water licence to take water for town water supply purposes;
 - iv) for a water licence to take water for a significant project declared under section 26 of the State Development and Public Works Organisation Act 1971.
 - (c) if the application relates to interfering with water mentioned in clause 4(a)(i) by impoundment and is an application:
 - i) for interfering with water for stock purposes or domestic purposes;
 - ii) for a water licence to interfere with water for town water supply purposes;
 - iii) for a water licence to interfere with water for a significant project declared under section 26 of the State Development and Public Works Organisation Act 1971;
 - iv) to meet the requirements of an environmental authority issued under the Environmental Protection Act 1994;
 - v) to access water under an entitlement granted from a process for the release of unallocated water.
7. While the Notice has effect:
 - (a) new works must not be physically started;
 - (b) completed works in existence must not be raised, enlarged, deepened or changed;
 - (c) works that have been started must be completed by 15 June 2011;
 - (d) a person that is completing the works that have been started must give the chief executive notice about the works by 5:00 pm on 12 February 2011;
 - (e) construction of works must stop if notice has not been given under paragraph (d).
 Note: Notice of started works should be given in writing to the chief executive at the department's Rockhampton office, 206 Bolsover Street, Rockhampton.
8. Works mentioned in clause 7 of the Notice are not started unless:
 - (a) construction of the works has physically started, or if construction has not physically started, a contract had been entered into to start the construction and construction is started within 60 days after the day the Notice is published;
 - (b) an independently verifiable construction program exists for progressive construction towards completion of the works;
 - (c) detailed design plans exist showing, among other things, the extent of the works;
 - (d) if a development permit is required for the works or for other development associated with the works - the development permit has been given.
9. Clause 7 of this notice does not apply to works:
 - (a) for taking water for stock purposes or domestic purposes;
 - (b) for taking or interfering with water for town water supply;
 - (c) for taking or interfering with water for a significant project declared under section 26 of the State Development and Public Works Organisation Act 1971;
 - (d) for which a development permit authorising the works as operational works for taking or interfering with water has been granted;
 - (e) for construction, operation or maintenance of public utilities;
 - (f) for taking water for the purpose of mine dewatering; or
 - (g) to replace works in existence and operable on the day this Notice has effect.
10. A person must not start the construction of works, or continue to construct works, in contravention of clause 7 of this notice.
 Note: A contravention of clause 7 of the Notice is an offence under section 26(6) of the Act and renders a person liable to a maximum penalty of 1665 penalty units.

For further information on this notice, please contact:

Senior Advisor Regulatory Services
 Central West Region Water Services
 Water Management and the
 Department of Environment and Resource Management
 PO Box 1762
 Rockhampton QLD 4700

Telephone: [REDACTED]
 Facsimile: [REDACTED]

Dated this 14th Day of December 2010
 Stephen Robertson
 Minister for Natural Resources, Mines and Energy
 and Minister for Trade



Environmental Flow Assessment Program

What are environmental flows?

Environmental flows are critical to the health of waterways and rivers. They refer to the amount of water required to sustain healthy aquatic ecosystems. This includes the:

- flow regime
- frequency
- timing
- magnitude
- duration.

Environmental flows support the diversity of species and processes in aquatic ecosystems and maintain habitat conditions and river channel shape.

Under Queensland's water resource planning process, environmental flows are defined as the overall patterns of flow that remain after a set of rules have been applied to meet the outcomes of a Water Resource Plan (WRP), rather than a specific amount of water that is reserved for a river.

What is the Environmental Flow Assessment Program?

The Department of Environment and Resource Management (DERM) is responsible for overseeing the Environmental Flow Assessment Program (EFAP) in Queensland, which assesses the rules and strategies specified in WRPs and their effectiveness in achieving the intended ecological and community outcomes.

WRPs are implemented through a Resource Operations Plan (ROP).

What is an ecological asset?

An ecological asset is a highly valued component of the environment.

For the purposes of assessing a WRP, an ecological asset is defined as a species, biological function or place of value for which water is critical.

The term critical means water is necessary to maintain the biological integrity of the asset.

Ecological assets should naturally occur in a plan area and be linked to the ecological outcomes of the plan.

How are ecological assets used?

Ecological assets are used as indicators of an ecosystem.

As it is not possible to monitor all parts of an ecosystem to build knowledge of critical water requirements, the intention is to select a range of assets that adequately represent the ecological outcomes for a plan area, and are representative of the ecosystem as a whole.

Together, the ecological assets selected represent the ecosystem and enable a manageable method for monitoring whole ecosystem outcomes of water management.

What is the purpose of the program?

The purpose of EFAP is to:

- confirm the critical water requirements of ecological assets and build scientific knowledge to underpin water management decisions
- determine if current flow management strategies are providing critical water requirements
- determine the risk to ecological assets and evaluate if ecological outcomes in a WRP are likely to be met under current flow management strategies.

What is the link between the ecological asset and water management?

There may be many links between the ecological asset and water; however, the links of interest are those critical to the protection of the asset.

For example, the survival of a particular fish species may be critically dependent on flow conditions, e.g. rising water level/depth and timing of the rise to allow for spawning (egg laying). In the absence of these flows, adult fish may survive but there will be no spawning, and the long-term viability of the ecological asset will not be guaranteed.

As another example, Murray River red gums need regular flooding to maintain established trees, ensure seed production and seedling development.

Timing, duration and frequency of inundation provide the critical conditions necessary for the long-term survival of the ecological component (asset) that we value (river red gum).

How will we assess if the plan is working ecologically?

The scope of the ecological performance monitoring is to:

- increase scientific knowledge about the critical water requirements of the ecological assets
- determine whether water management, through the strategies in the WRP and ROP, are providing the critical conditions in terms of water for long-term sustainable populations of ecological assets.

Based on this knowledge, the risk to the assets of interest can be predicted over the long term and used to indicate whether the ecological outcomes in the WRP area are adequately provided for.

Activities undertaken each year in the EFAP build toward an assessment of the ecological effectiveness of a WRP when it is reviewed every 10 years.

How is ecological condition assessed?

Ambient monitoring undertaken by DERM will compliment the EFAP. As such, the development of DERM's Stream and Estuary Assessment Program will ensure not only that the condition and trend of ecosystem condition is known but also that potential causes of ecosystem condition decline can be identified.

The EFAP will enable the effect of flow management on this condition to be partitioned from other effects.

When will the results of EFAP be available?

The results of knowledge-improvement projects under the assessment program to confirm critical links of the asset/s to flow will be reported annually in the minister's annual report for a WRP. This report is available via the DERM website <www.derm.qld.gov.au>.

This report also outlines the effectiveness of a plan in achieving its outcomes. A full assessment of a plan's effectiveness will be made as part of the review of a WRP, when triggered, or routinely at year 10 of a plan's life.

What will happen in my catchment area?

This depends on the ecological assets identified in a catchment and their critical water requirements.

Once ecological assets for a catchment have been identified, a preliminary risk assessment will be undertaken to prioritise those areas and assets where monitoring and knowledge improvement activities should be focussed.

Community consultation of asset selection and prioritisation may then occur. The extent of monitoring efforts will reflect the level of risk in the catchment, thus monitoring is likely to be more intensive in some catchments than others.

More information

More information can be found on the DERM website <www.derm.qld.gov.au> or by emailing <water.monitoring@derm.qld.gov.au>.

*August 2009
W130*

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or visit www.derm.qld.gov.au

business case

// the complete picture on river health



The Fitzroy Partnership for River Health is a collaborative new approach to sharing information about local waterways that will deliver:

- More comprehensive and reliable water quality information.
- An engaged community that is more aware of waterway health issues.
- Recognition and improved credibility for monitoring partners.

What makes the Fitzroy Basin special?

The Fitzroy Basin is about twice the size of the state of Tasmania. It is a large and diverse region that includes within its borders around 20% of the state's beef cattle, most of Queensland's coal mines and coal seam gas production, unique landscapes and a rich abundance of flora and fauna. An extensive

20,000km network of waterways snake across the basin's terrain. Five major tributaries flow across the expansive delta and then meet to form the mighty Fitzroy River which drains to Keppel Bay, forming part of the world heritage listed Great Barrier Reef. It is also home to internationally significant wetlands and waterways containing the greatest diversity of freshwater fish in Australia.



Our Challenge

Maintaining healthy waterways as well as economic prosperity is a critical challenge for the Fitzroy Basin. We need to find the right balance to ensure our communities and environment will flourish, and we can capitalise on economic opportunities without degrading our natural resources. Public scrutiny of environmental performance and regulatory measures are increasing across all sectors. This is demonstrated by the fact that over 26 independent waterway monitoring programs currently operate across the basin.

This uncoordinated approach means that:

- Opportunities to value-add and share information are being missed.
- People concerned about waterway health do not have a clear entry point for finding relevant local information.
- Decision-makers must wade through a large amount of monitoring data to inform their management, regulatory and policy choices.

Investment in integration, interpretation and communication of waterway health information will ensure that we as a community have the complete picture, to help us effectively manage waterway health for the future.

Why Participate?

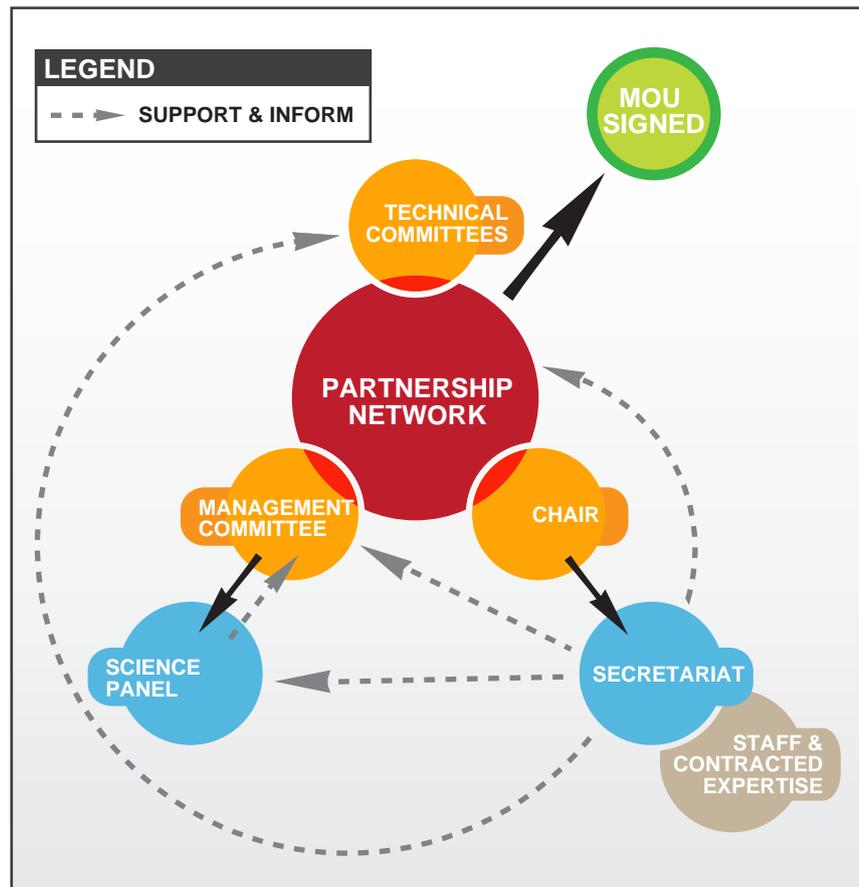
- Demonstrate your commitment to a community informed by a coordinated approach that delivers accessible, reliable and trustworthy waterway health information.
- Meet far field monitoring requirements if you are an organisation with a relevant environmental authority – the Department of Environment and Resource Management has provided assurance that participation in this program will satisfy their requirements.
- Information and knowledge generated will support water management planning activities by councils and be recognised and trusted by ratepayers.
- Achieve cost efficiencies, access to better information and improved credibility within the general public.
- Establish new networks, grow your knowledge base, and gain a competitive decision-making edge.
- Confirm your commitment to better informed policy, planning and management decisions.

Our Proposal

Over the last year representatives from 22 organisations have worked together to lay the foundations of a monitoring partnership. The Fitzroy Partnership for River Health is a collaborative approach where data from current monitoring programs will be compiled. Looking at the combined data will allow us to provide the community with an assessment of waterway health across the basin.

With your support, the process could include:

- Adding to existing monitoring efforts to fill knowledge gaps.
- Development of waterway health methodologies and indices to assess data.
- Reporting waterway health by focusing on the Fitzroy Basin's 10 major catchments, plus estuaries and marine waters (see map).
- Interpreting and presenting scientific information in a simplified and understandable format for the general public.
- Creating compelling and interactive products in print and online, as well as media and events to communicate reporting results.



The partnership will develop a waterway health report card for the 2010-11 year that will be underpinned by several increasingly complex layers of information designed to demonstrate transparency and enable technical interrogation. Reporting and communication products will be made available to partners in June 2012. This will be followed by a

public launch in September 2012, which will provide recognition and exposure for organisations involved in the partnership as well as raise awareness of the report among the general public. In addition, the compilation of water quality monitoring information will be available for ongoing refinement of water quality guidelines for the Fitzroy Basin.

Purpose	Cost
Data Management and Assessment	\$479,772
Reporting and Communications	\$126,418
Governance and Administration	\$275,905
Sub-total	\$882,095
Additional Monitoring	\$315,000
TOTAL	\$1,197,095



Our Resourcing Requirements

Investment is required to support these resourcing requirements. An annual membership fee of \$10,000 will apply to all signatory parties of the MOU and includes a seat at the Partnership Network and the Gold level of recognition and rights.

Funds will be requested in addition to the annual membership fee from particular parties including the Queensland Government, Regional Councils, Australian Government, holders of an Environmental Authority with water conditions, bulk water suppliers, Gladstone Ports Corporation and CQ University. In-kind support is also required in the form of waterway health monitoring data.

In appreciation of their commitment organisations investing \$50,000 or more will secure a Platinum level of recognition and rights.

Further Information

Want to find out more? Several informative documents are available at: www.riverhealth.org.au including the MOU, Project Plan, Monitoring Plan Summary and Communications Plan.

To secure the sustainable development of Central Queensland, decisions must be based on sound science and an understanding of the capacity of our natural systems. The work of the partnership has significant potential to perform an important role in bringing together the extensive water quality monitoring being undertaken by various groups across the catchment and provide the community with integrated water quality information.

Peter Westerhuis - CEO Ensham Resources

Monitoring and Sampling Manual 2009 Environmental Protection (Water) Policy 2009

Version 2 September 2010

Prepared by

Queensland Department of Environment and Resource Management

Citation

Department of Environment and Resource Management (2009) Monitoring and Sampling Manual 2009, Version 2. ISBN 978-0-9806986-1-9

This document contains the common techniques, methods and standards for sample collection, handling and data management for use by Queensland Government agencies, relevant persons and other organisations for release and impact monitoring and to assess the condition and trend of Queensland waters.

Copies of the Monitoring and Sampling Manual 2009

An electronic version is available for download from the Department of Environment and Resource Management website at <www.derm.qld.gov.au>.

Compact disc copies can be requested by submitting an email to <epa.ev@derm.qld.gov.au>.

Limited compact disc copies are available from departmental business centres throughout Queensland.

Information or comments on the manual

For further information or comments on the Monitoring and Sampling Manual 2009 please contact:

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Disclaimer

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Version 2, September 2010

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Introduction

Water monitoring is undertaken by the Queensland Government for a variety of reasons, including the provision of information to government for policy and investment decision-making, to underpin natural resource management decisions by government and stakeholders, to assess impacts on the environment and to educate and inform stakeholders and the community generally.

Monitoring is also required to be conducted by persons under statutory approvals, and is additionally conducted by other organisations across Queensland, including local government, industry, regional natural resource management bodies and community groups. Many of these organisations collect valuable information on the condition of Queensland waters that complement Queensland Government monitoring.

The Monitoring and Sampling Manual 2009 provides the common techniques, methods and standards for sample collection, handling and data management for use by Queensland Government agencies, relevant persons and other organisations.

Where monitoring is required under legislation to be carried out under a protocol, the Monitoring and Sampling Manual 2009 is the principal document to decide the protocols. This manual is intended to be used by persons and organisations involved in the monitoring of the condition and trend of Queensland waters.

The Monitoring and Sampling Manual 2009 will facilitate consistency and increased scientific rigour of monitoring data available for interpretation by all stakeholders. It will allow them to assess the condition and trend of Queensland waters so that the aquatic environment can be managed for sustainable development and aquatic ecosystem health.

Department of Environment and Resource Management

September 2010

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Context

1.1 Edition identification

This second edition of the Monitoring and Sampling Manual 2009 (the manual) supersedes the first edition of that manual, and sampling manuals published by the former Environmental Protection Agency, Department of Primary Industries, and Department of Natural Resources and Water.

Each page has the publication title, version number and date of publication.

A copy can be downloaded from the Department of Environment and Resource Management's (the department's) website at <www.derm.qld.gov.au>.

1.2 Purpose of the manual

The purpose of the manual is to provide the common techniques, methods and standards for sample collection, handling, quality assurance and control, custodianship and data management, for use by Queensland Government agencies, relevant persons and other organisations.

The manual is a part of an integrated monitoring framework to decide the priorities, indicator selection, data storage, data analysis and reporting, as shown in Figure 1 below.

Where monitoring is required under legislation to be done under a protocol, including the *Environmental Protection (Water) Policy 2009* (EPP (Water)) and the *Environmental Protection Regulation 2008*, the manual is the primary document to decide the protocols.

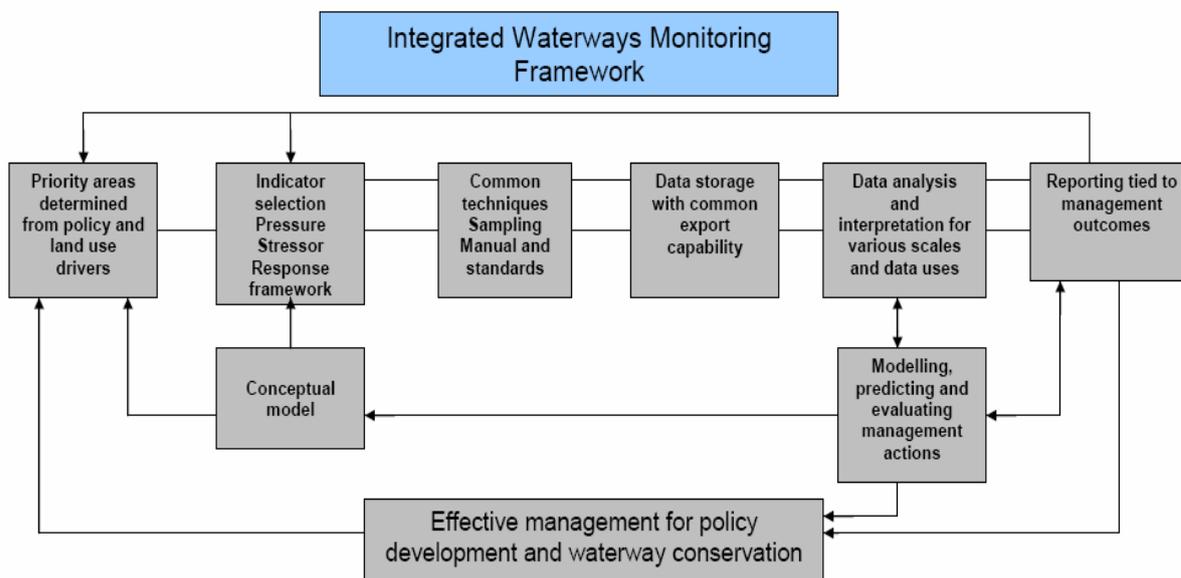


Figure 1.1 Integrated monitoring framework

1.3 Status of the manual

This manual is the updated version of the primary document originally listed in the, repealed, *Environmental Protection (Water) Policy 1997* for use in deciding 'protocols'. Accordingly, if there is any inconsistency between this manual and the other documents, this manual takes precedence to the extent of the inconsistency.

Some standards and other documents that have been used in preparing this manual will be revised from time to time. This could result in a procedure differing from that presented in the manual. The rules provided in Box 1.1 cater for such instances. In any situation where users of this manual use a revised document and/or adopt a protocol on the advice of an analyst, they should note the use of any revisions adopted and keep a record of the analyst's advice.

Box 1.1 When a standard is revised

If this manual is found to differ from a revision of any of the other documents listed in the EPP (Water), amended after the date of this manual, a user may decide that the updated version of the document is more appropriate than the manual for deciding a 'protocol', either generally or in particular circumstances. This manual should not be interpreted as being inconsistent with the other document provided that:

- the revision of the document is subsequent to the date of this manual
- the specific procedure in the document is revised in the updated document
- an analyst advises that use of the revision in deciding the 'protocol' will lead to a determination of a quality as good as or better than that derived from using the manual.

1.4 Intended users

This manual is intended to be used by:

- those who hold instruments under the *Environmental Protection Act 1994* such as environmental authorities and development approvals (that comprise licences and approvals to carry out environmentally relevant activities) and Environmental Protection Orders
- employees and consultants of those who hold instruments under the *Environmental Protection Act 1994*
- those who analyse the samples collected for water quality determinations
- other persons and organisations involved in the monitoring of the condition and trend of Queensland waters.

1.5 Content of the manual

The manual's content has been prepared in consultation with other Australian environmental agencies and Queensland state and local government agencies. Australian and New Zealand and relevant international standards were considered during the preparation of this edition.

The manual is consistent with the nationally adopted framework presented in the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ 2000) and covers the sections of the framework indicated in Figure 1.2 below.

Australian Guidelines for Water Quality
Monitoring and Reporting 2000

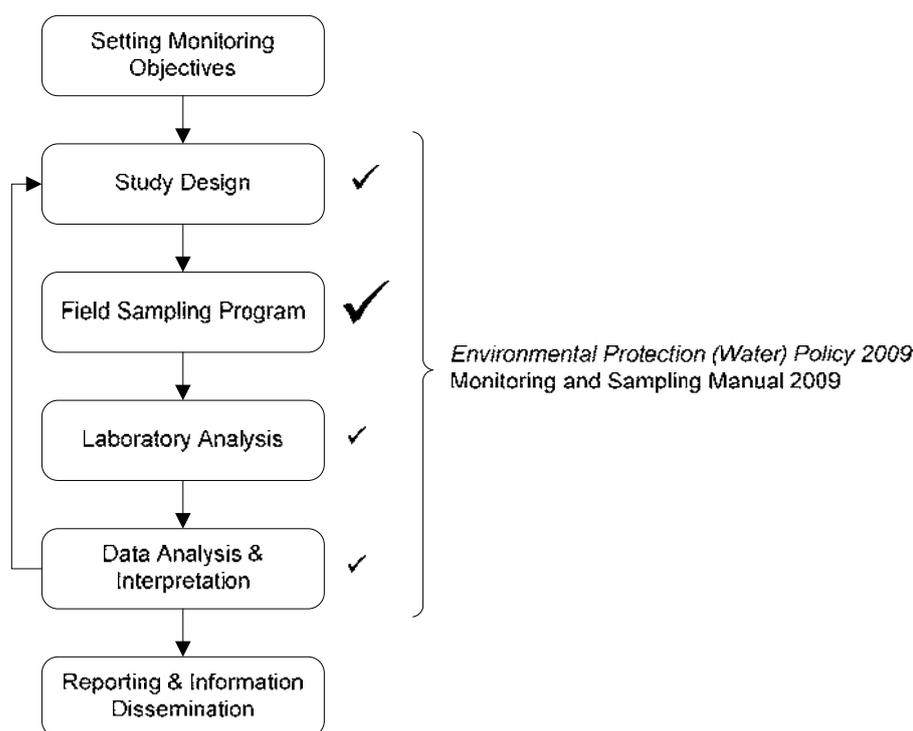


Figure 1.2 Framework for a water quality monitoring program—Australian Guidelines for Water Quality Monitoring and Reporting (2000).

This manual presents procedures for:

- sampling design
- sampling in the field:
 - making in situ tests and water quality measurements
 - taking samples for water quality assessments, including samples of wastewaters, environmental waters, sediments and biota
 - preserving and storing samples for water quality assessments, including samples of wastewaters, environmental waters, sediments and biota
 - security and transport of samples
- arranging laboratory analysis
- data analysis and interpretation.

1.6 Limitations

The manual cannot cover every set of circumstances encountered when determining a 'protocol' for sampling, and may not always provide sufficient or relevant directions. In situations where the user has little confidence that the samples might produce useful data, this should not stop them from being collected, particularly if there is no other opportunity to obtain the information they could provide.

1.7 Disclaimer

Where particular brand names of equipment are mentioned, this has been done for illustration purposes only. Other makes or brands providing equivalent function are equally applicable.

PART A Sampling design overview

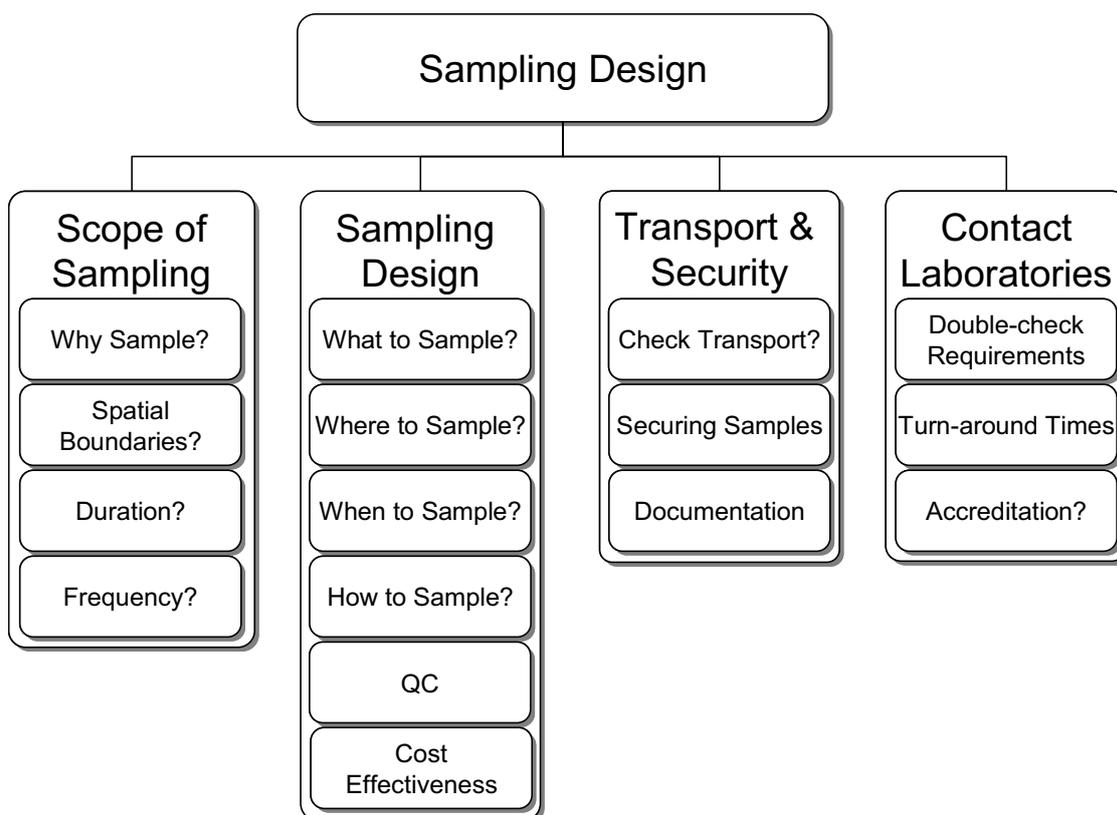


Figure 2.1 Essential components of a comprehensive sampling design

2.1 Sound sampling design is essential

Before any sampling is carried out, the aim of the sampling exercise and how the results will be used need to be established. For example, a single result might be compared with a written specification or benchmark (such as release limits in an environmental authority or development approval or with relevant guidelines). Alternatively, several results might be used in calculations, and if so, it needs to be understood how the calculated quantities will be used. Prior to collecting samples, the need to assess the circumstances and the kinds of inferences that could be drawn from the results of sample analyses should be determined. That information will help identify where and when sampling should take place, and the quality characteristics that need to be determined for those samples.

The essential features of a sampling strategy are to ensure that the material sampled is genuinely representative of the body of material from which it was collected, that in situ measurements are reliable, and that the integrity of materials sent for laboratory analysis has not been compromised by contamination, degradation, transformation or losses.

The basic intent of environmental analysis is that analysis is carried out with selected portions (i.e. samples) from the location of interest, and the quality of the source material is then inferred from that of the samples. If the source material quality is temporally and spatially consistent then this inference would be uncomplicated. However, such constancy is rarely, if ever, observed in the real world. For example, virtually all waters show both temporal and spatial variations in quality (see Box 2.1 and Box 2.2), and consequently the timing and choice of location/s for taking water samples must be chosen with great care. Other materials such as sediments and biota typically also show such variations.

When designing monitoring programs it is important to ensure that the sampling regime is representative of the system and parameter/s of interest. For example, where a water body is well mixed and a parameter of interest is evenly distributed in the water column a grab sample may be appropriate. However, it is important to consider that parameters of interest may not be equally distributed. In such circumstances it may be necessary to assess the variability of the parameter of interest within the water column **prior** to sampling.

Such an evaluation would aim to determine whether sampling at a particular point is representative of a homogenous unit of water at a given point in time. Where the extent of variation is not known, the variation might need to be established by a pilot sampling program designed for that purpose, or a comprehensive range of samples taken to enable variability to be determined along with the primary aim of the sampling exercise.

In circumstances where undertaking an assessment of variability is not practical or possible it is recommended that information from relevant peer reviewed literature on the likely variability is used to provide guidance on an appropriate sampling strategy.

A similar approach to dealing with variability is recommended when designing sampling programs involving the collection of other materials such as sediments and biota.

When deciding the number of samples to collect and the frequency of sampling required, ideally, sufficient samples and replicates would be collected to represent the full range of variability present in space and time. Sampling designs should ultimately be defined by program objectives that can include the required statistical power required for discriminating between hypotheses or be based on the levels of acceptable sampling variability. Sampling designs should also be guided by the 'where to sample' and 'when to sample' sections in this manual (Sections 2.3.3 and 2.3.4).

Box 2.1 Variability of water quality over time

If the environment to be sampled shows changes over time—for example, river systems within minutes or hours, or lakes within days or weeks—the temporal pattern of sampling is of great importance. The schedule for the sampling program should take account of the expected temporal resolution of changes in the environment. In programs for monitoring wastewater treatment effluents, sampling around the clock may be required to determine whether control variables have been met or exceeded. A single sample can only be a snapshot at a single point in time and may not reliably represent typical conditions for a system that varies over time.

If many samples are taken over a period of time, it is often appropriate to match the sampling rate to the expected pattern of variation in the environment.

When it is necessary to quantify a contaminant load, multiple sampling periods may be needed. For example:

- Time-proportional sampling: samples containing identical volumes are taken at constant time intervals.
- Discharge-proportional sampling: the time intervals are constant but the volume of each sample is proportional to the volume of discharge during the specific time interval.
- Quantity-proportional sampling (or flow-weighted sampling): the volume of each sample is constant but the temporal resolution of sampling is proportional to the discharge.
- Event-controlled sampling: depends on a trigger signal (e.g. a discharge threshold). For example, to detect peak concentrations during short-term changes of water quality, event-controlled samplers are useful.

Alternatively, passive samplers can be used to integrate variations in water quality over an extended period of time. For further information on the applicability and use of passive samplers see Appendix C2.

Box 2.2 Variability of water quality in space

It is important to understand how natural processes in environmental waters can affect water quality characteristics, and to be aware that water bodies are not homogeneous within a cross sectional area or depth profile.

Water bodies can be stratified (layered). This means the composition of the different layers is substantially different in respect of at least one characteristic. For example, in estuaries, water quality characteristics can vary because of ingress/egress of saline waters. Estuaries are commonly stratified when freshwater flow is much larger than tidal flow; the fresh flows seawards over the saline waters and a 'salt wedge' develops. Stratification could also result from temperature effects in waters with low current velocities. Such stratification is usually most pronounced in summer months when surface waters are much warmer than bottom waters. After separation, the water layers often develop markedly different chemistry. Such layers also tend to prevent mixing of discharged contaminants.

When sampling environmental waters (typically, when investigating a pollution incident), it could be important to remember that stratification might have occurred, and to take measurements at different depths to show whether this is so. The reverse process (de-stratification) can occur when the seasons change. The resulting inversion ('turnover') of the water can result in low oxygen water rising to the surface and causing adverse effects (such as odours from anaerobic decomposition at depth, and/or nutrient/metal enrichment). Other examples include the distribution of suspended solids within the water column from physical processes of re-suspension, deposition and flocculation. The concentration of suspended solids is dynamic in the water column and can fluctuate naturally according to flow conditions and water chemistry.

When the purpose of sampling is to assess compliance with a statutory provision such as a condition attached to an Environmental Authority or Development Approval, the sample should be taken to provide a reliable measure of the specific characteristic or parameter specified (e.g. the concentration of suspended solids at a defined sampling point). Where the statutory provision is not explicit, the sample should represent fairly the body of material from which it is taken during the period of the sampling.

Where the aim of the sampling is to measure compliance with conditions of an environmental authority or development approval, and the conditions include a statistical sampling regime, this should be followed so that the results can be of use. However, if there is reason to believe variability is a confounding factor, additional samples may be needed to check this out.

The *Environmental Protection Act 1994* and its subordinate legislation, including the Environmental Protection Regulation 1998 and the Environmental Protection (Water) Policy 2009, must be taken into account when deciding where and when to sample for compliance in a pollution investigation, checking compliance with an environmental authority or development approval, or undertaking a receiving environment monitoring program.

Reference should be made to the current conditions of any relevant licence or permits, particularly when confirming compliance. The conditions may include specific sampling locations, times of release and quality characteristics that will assist with designing the sampling strategy.

2.2 Determining the scope of the sampling strategy**2.2.1 Defining the aims and objectives of sampling****2.2.1.1 Purpose of sampling**

Monitoring and assessment that involves sampling can be undertaken for a range of reasons. Some of the primary reasons covered by this manual include:

- investigating pollution incidents—sampling at a site where pollution has been reported can be challenging as you might not be aware of the constituent pollutants, or often the source of the release. In such cases, the aim of sampling should be to obtain evidence that will:
 - discover and prove the nature, the source, and the effects of the contaminants
 - be performed in such a way as to be legally admissible in court
- confirming compliance to licence conditions of an environmental authority or development approval—sampling of wastewater that is stored or released by the holder of an environmental authority or development approval or similar legal instrument is often performed routinely to confirm compliance with the imposed conditions of release. To test for compliance with the conditions, samples must be collected in a manner that will ensure valid analysis results for those particular contaminants
- undertaking a receiving environment monitoring program
- undertaking an environmental evaluation of an activity.

2.2.1.2 Specific sampling objectives

The objectives of the sampling program should be determined and documented. These should be as specific as possible. Common sampling objectives include:

- determining if one or more contaminants found in a waste or in the environment have originated from a singular or multiple source
- determining whether one or more contaminants in a release are in sufficient quantity to cause adverse environmental effects consistent with those observed at the time of the incident
- determining whether the contaminants in a waste release are having a measurable impact on the receiving environment water quality and whether environmental values are being affected
- determining whether the quality of waters have changed significantly, consistent with the definition of the term 'environmental harm' in the *Environmental Protection Act 1994*, and confirm whether the observed environmental change(s) occurred as a result of the release.

2.2.2 Define the spatial boundaries of sampling

The geographic boundaries of the sampling event should be based on the issue of concern and the ecosystem type rather than on convenience and/or budgets. For example, some important considerations would include:

- the likely spatial uniformity of the parameter(s) of interest
- the size of the area to be assessed.

2.2.3 Define the temporal scale of sampling

Temporal scale refers to the length of time over which a system is to be observed; that is, the appropriate period of time over which the samples are to be collected.

Different processes operate at different temporal scales, and the sampling designer should incorporate all the important time-related considerations into the design. For example, the movement of sediment in a river system occurs over tens of years at the catchment scale, whereas toxicant effects may occur over days (transient) or be continuous in nature. The temporal scale and, similarly, the frequency of sampling (see below) need to be suited to the temporal characteristics and occurrence of the contaminant.

2.2.4 Define the frequency of sampling

Consideration needs to be taken of the frequency of observations (sampling events) required to provide sufficient resolution of the issues of concern. Sampling may be required every hour, day, week, fortnight, month or possibly only once a year. The sampling designer needs to determine a frequency of sampling (level of resolution) that is sufficient to satisfy the requirements of the program objective, yet not sample too frequently and cost more than necessary.

2.3 Sampling design

2.3.1 Importance of understanding the system being sampled

The achievement of good sampling design can be assisted if the designer has some understanding of the ecosystem for which the sampling program is being designed. This understanding is best formalised in a conceptual model (or process model) of the system being examined. The model can be a simple box diagram that illustrates the components and linkages in the system, or a graphical representation of the system. Whatever model is used, it should present the factors that are perceived to be driving the changes in the system and the consequences of changes to these factors.

During the formulation of a model, several decisions must be made or the model will be too complex. For example:

- What are the major issues of concern (e.g. nutrients, metal loads, bioavailable metals)?
- What ecosystem (including subsystem type) should the model describe (e.g. freshwater, marine waters, estuarine waters, wetland, seagrass bed, mangroves)?
- Which state of flow should the model describe (e.g. base flow, flood event)?

Once formulated, the process model can be used to help define:

- important components of the system and the important linkages
- key processes
- cause–effect relationships
- important questions to be addressed
- spatial boundaries
- valid measurement parameters for the processes of concern; what to measure, and with what precision
- site selection
- time and seasonal considerations.

Examples of graphical conceptual models that may assist sampling design are at Figures 2.2, 2.3 and 2.4.

The importance of having an understanding of the ecosystem for which the sampling program is being designed is demonstrated by the complexity of nutrient cycling processes in waterways.

Plants use light as a source of energy for everyday growth and repair. They also require elements such as carbon (which they derive from carbon dioxide in the atmosphere) and the nutrients nitrogen (N) and phosphorus (P). Nutrients stimulate the growth of aquatic plants and are required to maintain the productivity of ecosystems. However, the growth of aquatic plants can be limited, despite there being sufficient light available, when nutrients are present only at minimal concentrations. Nutrients can become an environmental problem when they occur at

excessive concentrations. Negative effects of higher-than-normal nutrient concentrations include the eutrophication of waterways.

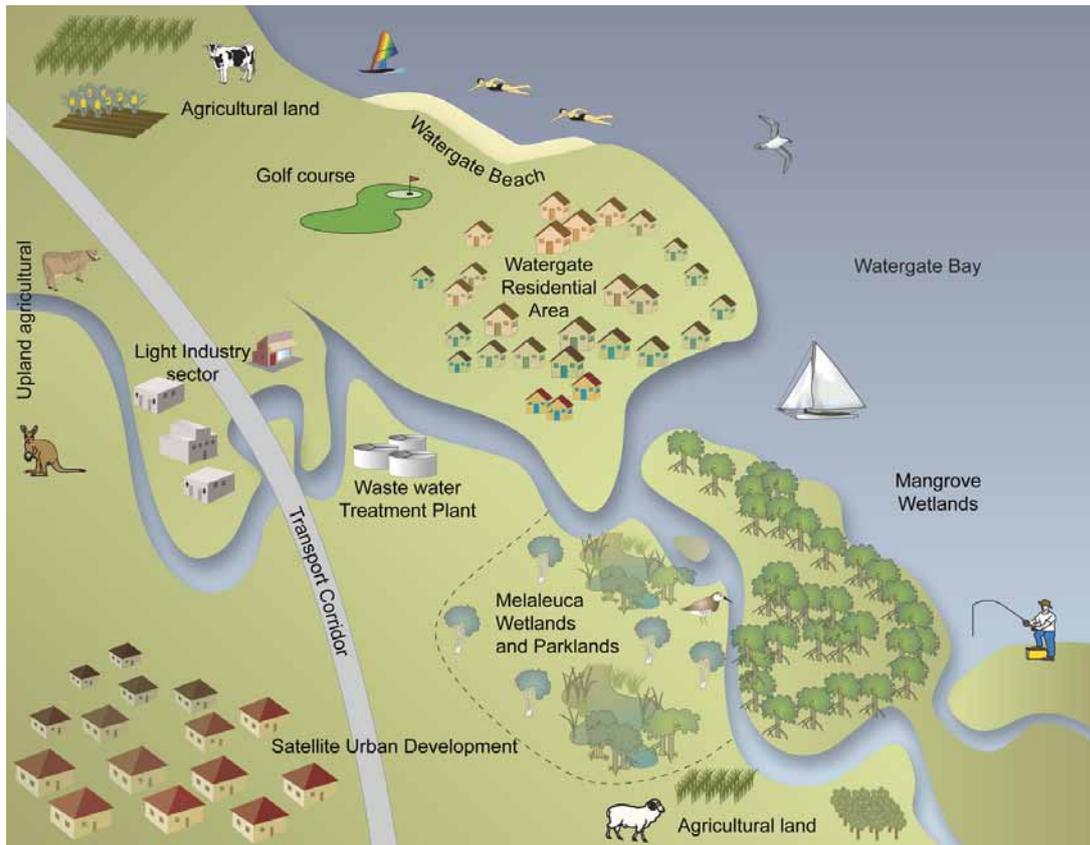


Figure 2.2 Conceptual diagram of a coastal system including anthropogenic activities, inputs to waterways and areas of value

Typical direct effects of eutrophication include increased frequency of algal blooms (including toxic algae) and hypoxia. Increased production of aquatic plants and algae may temporarily increase oxygen production within a water body, but when these decompose, this may cause a depletion of dissolved oxygen (DO). Low DO levels can lead to fish kills and the death of other aquatic fauna. Other effects of eutrophication may include increased turbidity and changes in community composition.

The nutrients N and P occur naturally in Australian surface water systems. They often occur in both particulate (i.e. organic and sediment-bound) and dissolved forms. The movement of nutrients from land may originate from both diffuse and point sources. Pathways for diffuse sources include riparian litter fall, soil erosion and sediment transport (see Figures 2.3 and 2.4). Fertilisers may be a source of N and P in agriculturally dominated catchments. The concentration and types of particulate and dissolved forms of N and P in waterways can indicate potential stresses from land uses and land management practices in the catchment.

An understanding of the relationship between flow and nutrient concentrations, coupled with N and P cycling (and the transformation from one form to another), is crucial when interpreting concentrations and loads and subsequently making any type of assumption or conclusion (e.g. is the nutrient a new contribution to the cycle or a transformation of a previously deposited load?). Without this understanding, changes in N and P concentrations and/or loads may be more attributable to variable flow regimes and biological factors rather than any imposed management action.

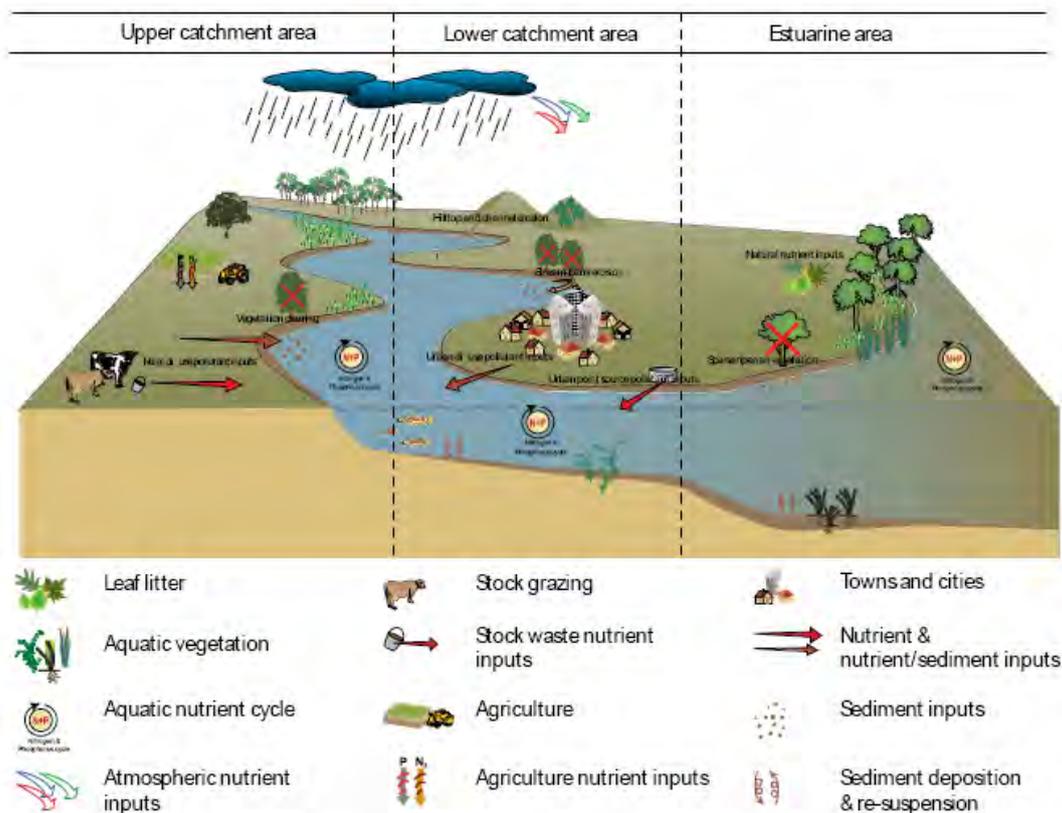


Figure 2.3 Typical processes affecting nutrients within different parts of a catchment

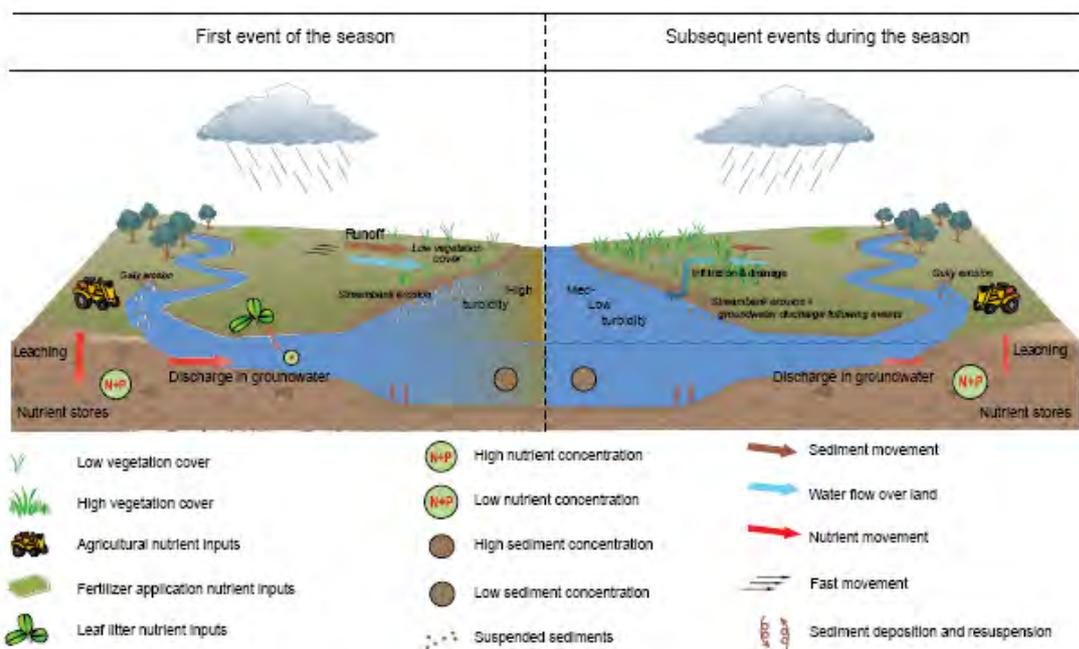


Figure 2.4 Illustration depicting typical nutrient and sediment inputs into catchments

2.3.2 What to sample

What material is relevant to collect samples of, and what measurements should be taken?

When checking compliance, environmental authority or development approval conditions typically specify the contaminants and the permitted ranges of concentrations allowed in the release. However, in cases of suspected environmental pollution incidents, you might not know what pollutants are present. Furthermore, when sampling the receiving environment, there are a range of related indicators that may need to be measured across different media such as surface water, sediments or biota. This section provides guidance on determining which characteristics should be sampled.

When choosing indicators, it is important to know whether there are defined benchmarks such as water quality objectives, guidelines, limits or other standards relevant to your situation to compare with your measured data. Indicators may be chosen because they have such benchmarks and may best indicate water condition or potential environmental harm. If no defined benchmarks exist, it is essential that your sampling design includes appropriate reference or control sites so that you are able to make a comparison against something.

2.3.2.1 Sampling media

The aim of sampling is to estimate quality characteristics of one or more of the following:

- wastes released to a water body (or potentially released)
- the receiving environment via:
 - a permanent or temporary water body—usually surface waters, but occasionally groundwater
 - bottom sediments of a permanent or temporary water body
- specimens of animal or plant life thought to have been affected by a release or by a change in natural conditions.

2.3.2.2 Sampling waste streams

Environmental authority or development approval conditions typically specify the contaminants and the permitted ranges of concentrations allowed in the release. Additional characteristics may provide greater information about the potential environmental harm that might be caused, for example, although only biochemical oxygen demand (BOD) might be specified in the environmental authority or development approval, chemical oxygen demand (COD) and total organic carbon (TOC) often provide more information, and could be worth assessing. It may also be important to measure other characteristics due to a change in an operating condition or a specific incident.

The characteristics being measured should relate to the potential contaminants used and/or generated in the process that produces the waste stream, in addition to their potential effects on the receiving environment.

In addition to measuring water quality characteristics, flow measurement of wastes/wastewater is often required for point source releases. This allows regulation and quantification of flow and loads of contaminants. Flow measurements of water bodies can be important for regulation as they can be used to assess initial mixing of point source discharges or as triggers to allow licensed discharges, particularly for event-based releases. Flow measurements of waterways may also be required for pollution incidents to assess or predict the extent of impact. Further information on flow measurement can be found in Appendix C3.

2.3.2.3 Sampling the receiving environment

Your assessment should take into account:

- potential sources of contamination
- likely contaminants
- type of waterway and flow rates; whether freshwater, estuarine or marine, and whether a flowing stream, lake, or ephemeral (in which case it may be wet or dry, or evaporating and concentrating contaminants at the time of sampling)
- licensed releases into the waters
- potential sources of releases
- recent weather such as heavy rain, showers or drought conditions
- historical occurrences of similar incidents.

2.3.3 Where to sample

2.3.3.1 Where should samples be collected and measurements taken?

Many environmental authorities have conditions which specify where samples are to be taken. Some have more than one sample point (two or more outlets, or an intake as well as an outlet). Where no sampling location is specified, you should take a sample from a site you judge to be representative of the release material (and the receiving waters, where relevant).

In more populated areas identification of a particular location can be assisted by a map of the area at a suitable scale (typically 1:25 000 or larger), or an aerial photograph showing individual buildings, preferably printed beforehand and taken with you. In more remote areas, use other points of reference, such as topographic features (hills, quarries, stream bends, etc.) or structures like fences or stone walls, and a global positioning system (GPS).

When investigating environmental pollution incidents, you should consider all possible sources of the pollutant, including licensed and unlicensed sources of release. You should aim to sample at the site of the pollution reported, at the point of any suspected contributing releases and also in an area upstream/distant from the suspected source.

It is important to identify with sufficient accuracy the location from which a sample has been collected to avoid raising a doubt about 'what the sample represents', particularly in cases where a location a few metres away might have given significantly different results. For example, in a river, was the location upstream or downstream of a tributary stream; or on the inside or outside of the bend? Or, where multiple discharge points exist, could it have been the one 'next to' the one claimed? This last instance could be significant when investigating complaints in situations where you do not know what other discharges may have occurred.

2.3.4 When to sample

2.3.4.1 Timing of sampling

The timing of the sampling should address the pre-defined objectives of the program. When there is a suspected environmental incident, it is prudent to sample as soon as possible after the incident has occurred.

Some conditions on environmental authorities specify that release is to take place only at certain times of the day (for example, on an outgoing tide) or under certain weather conditions. This should be considered in your sampling design where applicable.

For impact assessments, sampling before and after is important (but not always possible), preferably with multiple before and after reference sites. In situations where there is no 'before' information available at the impact location, data collected by sampling from reference sites may be indicative of conditions at the impact location prior to the incident. For example, a chemical spill may have contaminated the receiving environment, and caused impacts on local biota, but there are no pre-spill data available. However, concentrations of contaminants or macroinvertebrate population indices measured at unimpacted reference sites after a chemical spill can be indicative of what those parameters could have been at the incident location prior to the spill.

Water quality varies with stream flow conditions, so in considering the timing of sampling, it is important to establish whether sampling during baseflow or during flood event conditions (or both) is appropriate.

2.3.4.2 Sampling during baseflow and event conditions

As maximum and minimum values for water quality indicators may be reached either during high and or low flow events, it may be necessary to target either baseflow and or event conditions of rivers or streams. Fluctuations in water quality may also occur due to effluent discharge from a point source. Baseflow sampling is carried out when the flow is predominantly influenced by groundwater and has little overland flow component (i.e. no flow derived from runoff after rainfall). Baseflow sampling of streams should be undertaken with adequate lag time following an event. In general, a period of at least six weeks following a major flow event should be allowed to elapse to ensure samples are solely baseflow water and are not capturing the tail of an event. An 'event' is classified as any significant rise in water level caused by rainfall. Sampling regimes for event sampling may be targeted at obtaining results from either smaller more frequent events, or larger but less frequent events. Episodic events are known to transport large quantities of some contaminants though, in some circumstances significantly higher concentration peaks can occur in much smaller but frequent flood events (see example in Figure 2.5). In some cases, these smaller more frequent events may also have a greater contribution to total or annual contaminant loads. Sampling of a flood event can include a series of discrete 'grab' samples collected to represent the extent of the event. See Appendix C10 for more information on grab sampling procedures.

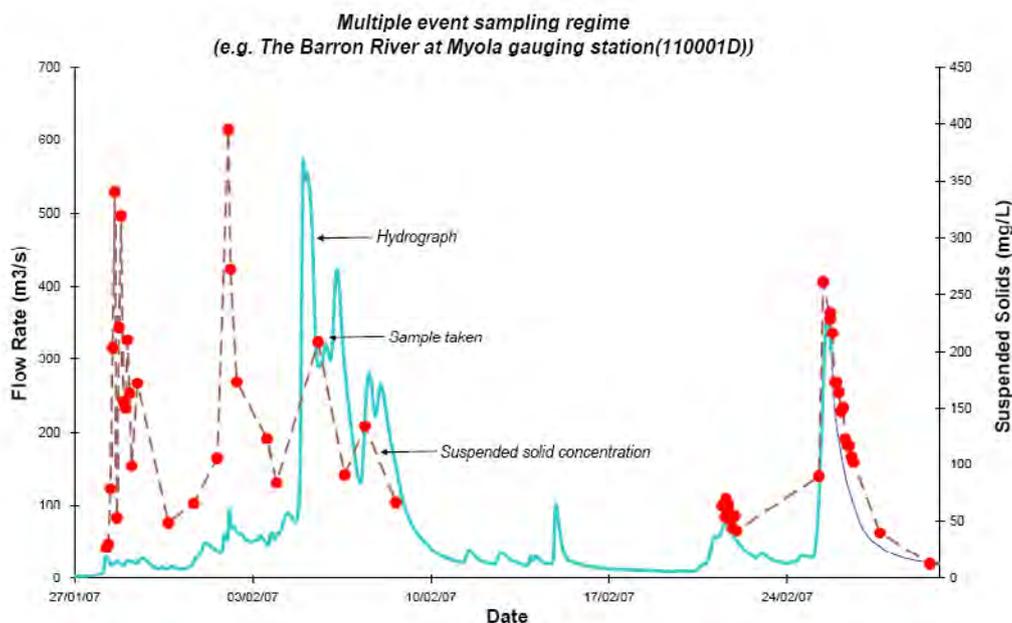


Figure 2.5 Example of contaminant fluctuations with stream flow

2.3.5 How to sample

2.3.5.1 How many samples should be collected?

Unless the material being sampled is known to be well mixed (well mixed water body or end-of-pipe discharge), it is unlikely for a single measure to be representative of the source body of material. Multiple measurements are needed to allow the calculation of a mean and confidence interval for the characteristic of interest, or to allow statistical testing for significant differences between locations or non-compliance with statutory provisions. This requires multiple readings for in situ measurements and multiple samples where laboratory analysis is involved. A minimum is three data points per site for basic statistical tests, but more may be required depending on the inherent variability in the measurement data. Just how many data points are needed may not be known until after chemical analysis of some samples. Accordingly, it is sometimes good practice to take additional samples and to store these for subsequent analysis if required. However, the requirements of maximum holding times for many contaminants may make this untenable.

2.3.5.2 Is grab sampling adequate or should composite samples be taken?

Most samples taken will be grab samples—taken by filling sample containers over a ‘short’ period (seconds or minutes). A single grab sample may be used where a hazardous situation has arisen or is suspected and the sample is taken to confirm the presence of the hazardous substance.

A single grab sample may also be used where the body of water being tested is well mixed and its quality can be adequately described by a single sample. However, in many situations, a single grab sample in isolation is of limited use because it takes no account of variations in quality with time or space (see Box 2.1 and Box 2.2). In such a situation, the taking of a composite sample is a useful strategy. A composite sample may be temporal by combining contributions of material collected over a longer period (minutes, hours or days). Alternatively, a composite sample may be spatial, for example, comprising a series of equal contributions of material taken along a transect (e.g. across a channel). This gives a spatially ‘more representative’ sample than a single grab sample at a single point. An example of the advantage of using composite sampling occurs in measuring concentrations of total nitrogen from a sewage treatment plant for the purpose of estimating loads. A single weekly grab sample will not capture the variations across a day or week. A suitable alternative would be to take a 24-hour composite sample.

Notes:

Composite sampling will not provide information on the maximum concentration reached (i.e. spikes in concentrations) which is often relevant when dealing with toxicants.

The use of automatic samplers to prepare composite samples over a period of time could be problematic due to delays in delivering samples to the laboratory for analysis. Under some circumstances this might not be significant, but you should check with the analyst before sampling with such equipment.

2.3.6 Quality control in sampling

Quality control is an important part of any sampling exercise. The purpose of a quality control scheme is to check whether bias, sample contamination, or analyte loss could affect the results, and so invalidate the process.

Suitable techniques include:

- reference sites: comparable (but unimpacted) locations where samples are taken for comparison with others (for example, upstream of a discharge point, or a tributary other

than the one of interest). Unless the condition of the reference site/s is known, and because of variability, it is often wise not to rely on a single reference site

- control samples, including:
 - field spikes—an uncontaminated sample of the media (e.g. water) contained and preserved in an identical fashion to the field samples is spiked with contaminants of interest and accompanies the field samples during the sampling. Analysis of the spiked sample quantifies analyte loss (if any) through comparison with the spiked concentration
 - field, transport and container blanks—uncontaminated samples of the media (e.g. water) contained, handled (for example filtered) and preserved in an identical fashion to the field samples are analysed and measures of introduced contaminant (if any) are used to quantify and trace contamination problems associated with the sampling methods and materials.

These techniques are discussed in AS/NZS 5667.1:1998.

It is recommended that you discuss this aspect with the analyst during planning of a sampling exercise, particularly if the results are liable to be used in making decisions which could have significant health related, financial or legal implications.

2.3.7 Cost effectiveness

It is preferable for the cost of sampling programs to be as small as possible while still meeting the stated objectives of the monitoring study. Cost-effectiveness considerations involve trade-offs between loss of statistical 'power' (i.e. the capacity of a program to discriminate between various hypotheses) and the cost of data acquisition. Costs of data acquisition taken into account for cost effectiveness include:

- the number of sampling stations, sampling occasions and replicates
- the cost of collecting samples (staff, transport, consumables)
- the cost of analysis
- the cost of data handling and interpretation (cost of reporting).

Cost-savings can result from collaborative monitoring, for example, when local councils pool resources with other water managers to comprehensively monitor a particular water body.

2.4 Transport and security of samples

Samples collected in areas remote from the laboratory might need to be freighted by private companies—road or air transport—if the sampler cannot deliver them personally. The samples need to be delivered within the maximum holding times.

2.5 Contact laboratories

When possible, contact the appropriate laboratories before going to the field to ensure that analysis can be performed before expiry of the maximum holding times.

You should inform the laboratory of details concerning the samples you will be sending. One way is to send a completed copy of a form such as the Notice of Samples Expected shown in Appendix C1. Send this by mail when the sampling is planned some days ahead, or by facsimile or email if urgent. If this is impracticable, try to contact the analyst by telephone to give details of the samples.

You should also try to give the laboratory any information you can about the sample source, likely range of concentrations and purpose for which the results are to be used. This will help the analyst choose a suitable analytical method with appropriate 'limit of reporting' (LOR). In some cases the LOR can be improved if the analyst knows these details beforehand.

If sampling from areas affected by a chemical spill, try to advise the laboratory to expect high concentrations in the samples. Providing the laboratory with such information may help avoid results such as 'out-of-range' concentrations, and subsequent delays while your samples are diluted and re-analysed.

2.6 Sampling schedule

Once the sampling design has been finalised a sampling schedule should be prepared that includes such information as:

- where and when the samples are to be collected
- source of each sample—whether from wastes, waters or sediments
- the nature of the material to be sampled
- the quality characteristics being sampled
- the sampling containers (and associated paraphernalia) needed
- preservatives needed
- the maximum holding time for each sample.

A blank copy of a sampling schedule form is located at Appendix C1. (Details of sample containers, preservatives and holding times are given in Appendix C8).

2.7 Useful source documents for sampling design

Source documents for sampling design are shown in Table 2.1.

Table 2.1 A selection of relevant Australian and New Zealand standards related to water and sediment sampling

AS/NZS 5667.1:1998	Water quality—Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
AS/NZS 5667.4:1998	Water quality—Sampling Part 4: Guidance on sampling from lakes, natural and man-made
AS/NZS 5667.5:1998	Water quality—Sampling Part 5: Guidance on sampling of drinking water and water used for food and beverage processing
AS/NZS 5667.6:1998	Water quality—Sampling Part 6: Guidance on sampling of rivers and streams
AS/NZS 5667.9:1998	Water quality—Sampling Part 9: Guidance on sampling from marine waters
AS/NZS 5667.10:1998	Water quality—Sampling Part 10: Guidance on sampling of wastewaters
AS/NZS 5667.11:1998	Water quality—Sampling Part 11: Guidance on sampling of groundwaters
AS/NZS 5667.12:1998	Water quality—Sampling Part 12: Guidance on sampling of bottom sediments
AS/NZS 2031:2001	Selection of containers and preservation of water samples for microbiological analysis
AS2360:1993 various parts	Measurement of fluid flow in closed conduits
AS/NZS 3778: various parts	Measurement of water flow in open channels

PART B Sampling physico-chemical indicators of water quality and environmental health

3.1 Sampling in the field

This section details the equipment and materials to be used in sampling. Appendix C1 contains a checklist of equipment and materials. You can copy this checklist for each sampling trip, and modify it as needed.

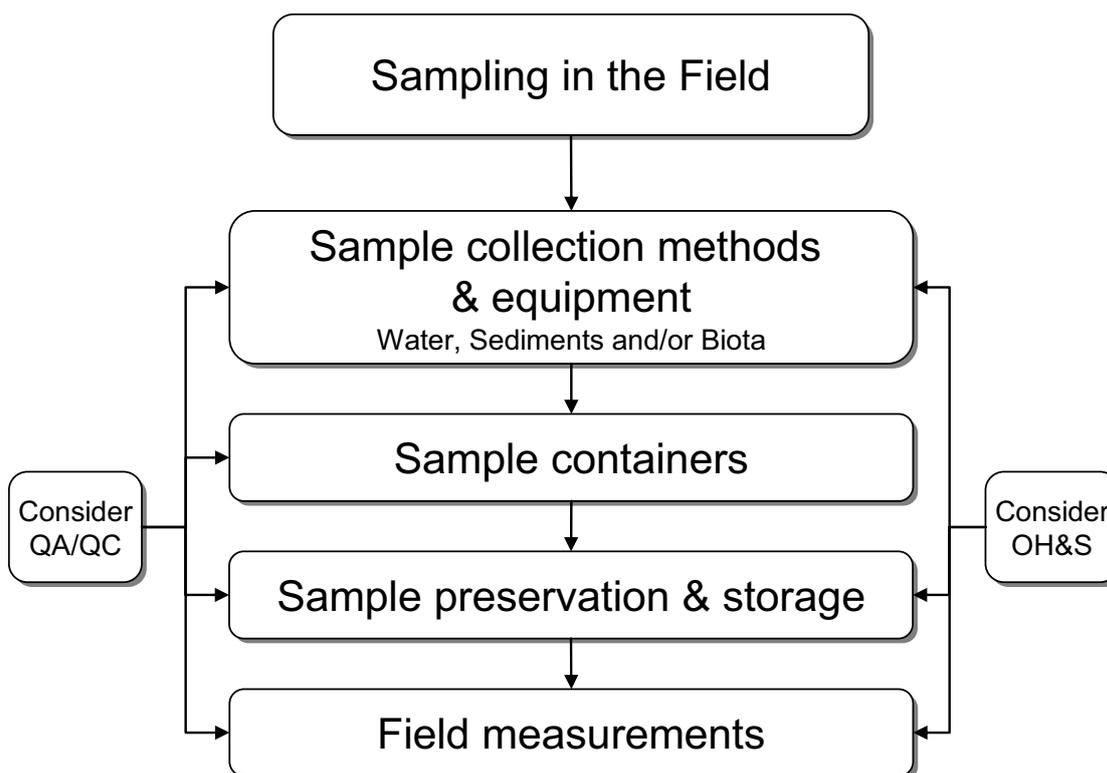


Figure 3.1 Necessary materials and equipment considerations for sampling in the field

3.1.1 Using intermediate containers and sampling rods

It is always best to collect samples directly into the appropriate bottle or jar. However, it is sometimes necessary to use an intermediate container in order to collect samples, using buckets, beakers, pumps, filters, syringes, sediment grabs, trowels and/or sampling rods.

In using intermediate containers, contamination of the intermediate containers from previous samples becomes a risk. Contamination of the sample can occur by leaching of previous substances from the walls of the intermediate container, or loss of analyte by adsorption on to the walls of that container.

For samples containing substances in 'trace' concentrations, typically in the microgram-per-litre ($\mu\text{g/L}$) range (such as trace metals and pesticides), use of an intermediate container should be avoided if possible. Sometimes the use of 'intermediate containers' such as syringes and filtering equipment or components of automatic samplers is unavoidable, and so precautions to reduce the risk of contamination are critical.

If samples need to be collected using intermediate containers, it is important that intermediate containers be pre-washed (for example syringes and filters) or flushed (for example in the case of automatic sampler lines) with existing site water before being used for the final collection of samples. The use of field blanks (see section 2.3.6) can identify sample contamination issues.

A sampling pole with a large clamp (or other suitable device) to hold the sampling containers can be used to give greater reach when collecting samples (see Figure 3.2). If the rod becomes contaminated, wash it promptly, making sure the washings cannot contaminate any samples or any material about to be sampled (for example by disposing of washings downstream of the sampling site).



Figure 3.2 Sampling pole and sample bottle

3.1.2 Automatic samplers

In some circumstances it may be preferable to use an automated sampling device to collect samples (Figure 3.3). When sampling flood waters it is often unsafe to approach a stream bank to collect a sample manually due to the presence of high flows or in stormwater drains that can have flashy unpredictable flows. Also, in some instances it may be necessary to sample at regular intervals throughout a 24 hour time period or at times when it is not possible to collect them manually. In these situations it is appropriate that an automated sampler be used to collect grab samples. Automated sampling devices include refrigerated or non-refrigerated automatic pump samplers and rising/falling stage samplers.

Automatic pump samplers, both refrigerated and non-refrigerated are comprised of a number of bottles in a carousel, a sample intake line that is fixed in place within the stream and connected to a pump or pumps, and a computer controlled data logger that requires programming. The equipment is programmed to be 'triggered' when a pre-entered set of conditions are met. For example: a certain stream height, time of day, change in temperature, the rate of rise or fall of the stream level, a particular turbidity reading or any number of possible programmable triggers. Once triggered, the automatic sampler starts sampling according to the program set. Installation of automatic samplers should be in accordance with manufacturer instructions. When using automatic samplers for taking water samples, it is important to adhere to the requirements for sample handling including sample holding times and sample containers for the parameter of interest (see Appendix C8). If using automatic samplers, the sampling lines (tubing or pipes) must be regarded as an intermediate container (see section 3.1.1), and the possibility of exchange between the sample and the walls of the lines must be considered. The time of contact between the sample and the wall material is important, and residues of previous samples must be properly flushed out before liquid is delivered into the sample container. More detail on this aspect is given in AS/NZS 5667.1: 1998.

Automatic samplers also include remote samplers, such as rising-stage and falling-stage samplers. In regards to sampling event-based flows in ephemeral or temporary waterways, only falling-stage samplers should be considered, as rising-stage samplers tend to sample first flush waters. If the data is to be used to determine locally-derived water quality objectives (as per ANZECC/ARMCANZ 2000) then it is recommended that in accord with the AusRivAS sampling protocols (see section 4.1) sampling takes place 4–6 weeks after a flood event and flow has been established.



Photo shows ISCO sampler and Ava anche fridge

Figure 3.3 Auto-sampler

With rising stage samplers, water samples are taken as the river level rises and samples can only be retrieved after the river level has receded (Figure 3.4). As the water rises it reaches the crown of the intake, flow starts over the crown and begins to fill the bottle. Sample bottles fill progressively from bottom to top. Sampling ceases when the level of the water in the bottle reaches the inner end of the air exhaust, which then prevents circulation through the sampler. An air lock forms in the intake and prevents enrichment of the sample from water flowing back and forward and transporting sediment into the sample container.



Figure 3.4 Rising stage sampler

Rising stage samplers do not involve refrigeration and because samples are exposed to light and ambient temperatures they are only valid for total nutrient and sediment analysis. Note however that samples must be retrieved within a few hours for total nutrient analysis to be valid (particularly for N). Rising stage samplers are useful for collection of samples from flashy, intermittent streams at remote or sites that are not easily accessed.

Sampling units must be securely mounted, one above the other, with adequate support provided to prevent dislodging by large logs and other debris. Samplers should be erected and installed so that they are pointing in a downstream direction (ensure bottles are facing upstream). Sampler location is recommended in the following areas:

- on the inside of river bends (debris tend to be swept to the outside of bends)
- adjacent and mid stream of large trees (providing partial protection)
- downstream of small shrubs and trees (provide partial protection).

Each visit to the site should also involve inspecting sampling units for evidence of insects in the intake and breathing tubes, a common reason for missed samples (and contamination).

3.1.3 Field filtration equipment

For some characteristics listed in Appendix C8, the samples must be filtered in the field before they are placed in the container used for transport to the laboratory. Depending on the characteristics being measured, either vacuum or pressure filtration equipment may be needed.

An important factor in field filtration is to note that the equipment used for the filtering task is an 'intermediate container' and as such the equipment is a potential source of contamination of the sample (see section 3.1.1) so that pre-rinsing and the use of field blanks (see section 2.3.6) is advisable.

Vacuum filtration is recommended for chlorophyll samples; the pressure difference across the filter should not exceed 40 cm of mercury to prevent lysis (rupturing) of the cells. You need to filter a known volume of the water and send only the filter paper to the analyst (see Appendix C8). The equipment comprises a vacuum flask, vacuum pump, sintered glass filter funnel and a supply of the specified filters. It is not essential to filter the volume shown in Appendix C8; usually, only one filter paper needs to be submitted. It is essential to record the actual amount of water passed through the filter and report this to the analyst, so that the concentration can be calculated.

Pressure filtration is recommended for dissolved metals and some nutrient characteristics. The water passing through the filter is sent to the laboratory and the filter discarded. Typical equipment comprises a hand-operated syringe with a supply of 0.45 μm filters and, for waters with high suspended particle load, pre-filters (see Figure 3.5).



Figure 3.5 Pressure filtration equipment

Occasionally, a high content of suspended matter could make it difficult to filter the volume shown in the table. In cases where the aim is to give the analyst a stated volume of filtered liquid, the use of more than one filter might solve the problem. Alternatively, you could measure or estimate the volume actually filtered, and provide this information when submitting the sample.

3.1.4 Items for sample security

Ensure that you have an adequate supply of items such as sample seals, evidence bags, and locked storage boxes as detailed in section 3.7.1.

3.1.5 Sample carrier boxes

To keep samples at suitably low temperatures they are transported in cleaned/ uncontaminated insulated carrier boxes (coolers). These are kept cool by adding block or crushed ice, dry ice, freezer-blocks, or other similar substance, or are refrigerated by a power source.

Samples requiring refrigeration are generally packed in crushed ice. Crushed ice is used in preference to block ice as it can be packed in much closer contact with the samples.

Note: An acceptable alternative to crushed ice is a combination of crushed ice and 'ice bricks' (frozen containers of refrigerant solution having a freezing point not greater than 0°C), provided that the 'ice bricks' are in a frozen state when the samples are packed in the carrier, are completely surrounded by crushed ice, and are used only to lessen the amount of crushed ice required—not as the sole or primary means of cooling the samples.

Dry ice (solid carbon dioxide) is used where samples must be frozen immediately after collection. It is available in block and pellet form. Pelletised dry ice is preferable for the same reason as for crushed ice. A combination of block and pellets could also be used, the pellets being placed next to the sample containers. Suppliers of dry ice are listed in the telephone directory or can be found via web search.

An acceptable alternative is a transportable freezer, provided that the samples, once placed in it and frozen, are taken to the laboratory promptly, and care is taken to ensure that they do not thaw before delivery. In an emergency, samples can be frozen by surrounding them with a slurry of crushed ice mixed with common domestic salt (sodium chloride). This rapidly achieves temperatures well below 0°C.

When storing chilled or frozen samples in coolers, note that the coolers can be a source of sample contamination under some circumstances. For example, if a cooler has been used for storing fish, and is then used for storing samples collected for nitrogen or phosphorus, residual odorous substances from the fish (such as ammonia) can permeate the container walls, even if the container is of high density polyethylene (HDPE). If a cooler used for odorous material needs to be used for samples, be sure to clean it thoroughly before use.

If air transport of samples is involved, take account of air transport and company requirements regarding wet and dry ice.

Workplace health and safety—it is hazardous to transport dry ice inside a motor vehicle with all of the windows closed.

3.1.6 Marking pens

Only waterproof pens should be used for labelling. Marking pens used to label samples must have waterproof ink. Enamel paint pens are useful in this regard. Writing a label before taking the sample (e.g. dipping the bottle into a waterway) avoids the difficulty of trying to write on a wet label. Only write on dry labels, and carry spare pens.

Note that when sampling waters for the presence of solvent-type compounds, extra caution should be used as marking pens contain solvents and could contaminate your sample.

It is advisable to place labelled samples inside a plastic bag to protect the label details from rubbing or scratching off.

3.1.7 Camera

Photographs are useful when investigating pollution incidents. Check that you have appropriate spare items such as films, memory cards and batteries. Accessories such as glare/ultra-violet light filters, extra lenses or flash equipment could be appropriate in some circumstances.

Cameras that automatically imprint the exposure date and time on the photograph can be useful, but you need to be sure that the camera's clock is set correctly. This also applies to digital cameras.

When taking photographs, it is essential to clearly identify when and where each shot is taken. Shots may be numbered consecutively and descriptive notes made at the time. Where practical, include identifying features such as a sample label or placard within each shot.

Note that conventional photographic images on film or paper, and electronic image files produced by scanning or by digital cameras, can all be manipulated. Therefore, images intended for legal purposes should be stored in secure places to guard against unauthorised access.

3.1.8 Voice recorder

A voice recorder can be useful for immediate recording of your observations if circumstances make writing on paper difficult. If you use one, you should listen to the recording and transcribe it as soon as practicable.

3.1.9 Global positioning system (GPS)

A hand-held GPS can be useful in quickly recording the location of your sampling sites by storing them as waypoints. Hand-held GPSs are typically accurate to around 5 m, but this can change with cloud cover, altitude, tree cover, the number of satellites the unit can 'see' at the time of the reading and which map datum you have used (e.g. Aust Geod. 84, WGS84, etc.). The accuracy of your readings, and which map datum you have used should be recorded at the time of your GPS reading.

If you store positions as waypoints, you should note the waypoint number in your notebook while in the field, and transcribe the coordinates of each location from the GPS as soon as practicable. Some models of GPS can also be connected to a computer for easy download of waypoint data.

3.2 Labelling

Adequate sample description and labelling are extremely important in sampling (see Figure 3.6). Complete the labels at the sampling site and record details in your notebook. To guard against possible confusion between samples, each sample should be given a unique number. This number can be made up of parts containing codes for different pieces of information, if required. However, the label must include the following information:

- sample location
- sample number/label
- sampler ID
- date.

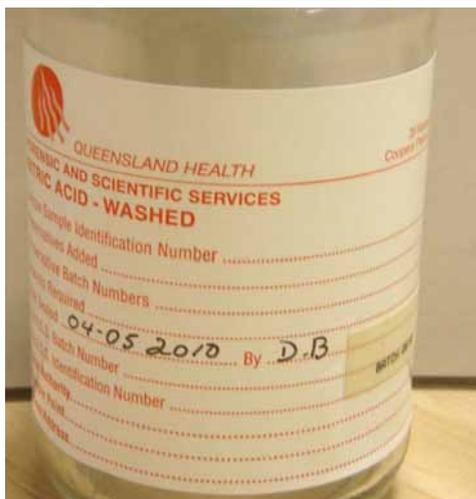


Figure 3.6 Typical label on sample bottle or jar

3.3 Sample containers and preservation methods

Ideally, analysis of samples should be performed in situ or at least on site. However, as this is usually not practicable, it is essential that you follow correct procedures for collection, preservation and transport of samples to a laboratory for analysis.

3.3.1 Sample containers

This section applies to samples of wastes, waters and sediments. Handling and packaging requirements for animal and plant samples are discussed in Sections 3.5.4 and 3.5.5.

For samples of waters, wastes and bottom sediments, each sample should be collected and stored in a container appropriate for the quality characteristics of interest. However, if when investigating a pollution incident there is only one chance of taking the sample, and the specified type of sample container is not available, it should not be assumed that sampling is not worthwhile.

Appropriate containers and preservation methods are necessary to avoid risks of contamination of the sample and/or losses of analytes of interest during storage and transit prior to analysis. Details of sample containers and preservation are given in Appendix C8. These are based on Australian Standards AS/NZS 5667:1998 and AS 2031:2001 and overseas standards, with updating and other changes on the advice of Queensland Health Forensic and Scientific Services (QHFSS). The information in Appendix C8 is intended as a field reference with specific directions that can be followed without need for detailed knowledge of analytical procedures.

It is important that you follow these specifications exactly. If this is not possible, ensure you make a written record of what methodology you adopted.

The requirements listed in Appendix C8 include:

- the type of material/s suitable to contain the sample (container body and cap)
- the suitable method/s of pre-cleaning sampling containers
- preservation procedures
- maximum holding times
- comments on sampling procedures.

Containers should preferably be supplied by the laboratory, prepared as described in this manual and ready for use. Each container should already have a waterproof label attached with spaces for the user to fill in the appropriate details for the sample.

Prepared containers should preferably be supplied in sealed plastic bags with some type of tamper evident closure such as a suitable seal incorporating the laboratory's name (see Figure 3.7). All containers must be subjected to a quality control program to ensure their integrity with respect to the parameters being analysed.



Figure 3.7 Sample bottles security sealed in plastic

Once samples are taken, some of their quality characteristics can change naturally. To keep these changes to a practical minimum, for some analytes of interest specific chemicals such as acids are added as preservatives (see section 3.3.2 and Appendix C8).

If using an intermediate container, you should, ideally, have it prepared in the same way as the final one (e.g. acid-washed). If that is not practicable, and if you consider it essential to collect a sample there and then, at least ensure that the container is visibly clean, and report its preparation and use to the laboratory.

3.3.2 Preservation and storage

For some quality characteristics listed in Appendix C8 there is a choice of preservation method. This is shown by a solid horizontal line separating the preservation details in the respective columns within the particular entry. A note below the name of the quality characteristic alerts you to this fact.

The amount of each preservative to be added is stated in one of these ways:

- until the sample pH reaches a stated range

or

- as an amount relative to the volume of sample; this amount is stated by mass (if a solid) or by volume (if a liquid)

or

- as one or more multiples of a fixed amount relative to the volume of sample, until an observable condition is met. For example, the system for preservation for metals analysis incorporated in Appendix C8 was designed to make the added preservative approximately one per cent by volume in the sample given to the laboratory.

Preservatives should preferably be supplied in small vials sealed in plastic bags, as described above for sample containers. The vials (e.g. Figure 3.8) should be labelled with the following information:

- preservative type and quantity
- preservative expiry date
- batch number
- hazard warnings if necessary.

Sometimes sample containers are supplied with preservatives in situ. This may be in the form of a small volume of liquid or crystals inside the empty container (for example, sodium thiosulphate crystals inside sterile jars intended for taking water samples for bacteriological testing). Check the supplier's labelling in respect of included preservatives. Should included preservatives be present, then care is needed to prevent loss of preservative when filling the container, for example, avoiding overfilling or spillage.

If your sample volume is different from the stated 'typical volume', you must ensure that the proportion of preservative to sample remains at the intended ratio or greater.

For characteristics where the Appendix C8 tables show 'Refrigerate' or 'Freeze' in the column headed 'Storage conditions', the appropriate temperature range is shown in the table heading. The sample should be cooled to this range as rapidly as is reasonably practicable and kept within that range until analysis commences (Note: AS/NZS 2031:2001 indicates 2–10°C for refrigeration).



Figure 3.8 Example of preservative container for preservation of samples

3.4 Preventing contamination

Avoiding sample contamination is an important aspect of sampling. There are always potential sources of contamination, and the aim should be to keep the risk of contamination to a practical minimum, consistent with the types of analytical tests required. Possible sources of contamination include:

- Sunscreens (zinc oxide) or insect repellents (organic chemicals) on skin could contaminate a sample if transferred by some unintentional means to the material sampled.

- Where samples are being taken for both metals and nutrients, there is risk that nitric acid (used as preservative for the metal samples) could contaminate the nutrient samples. Precautions could include keeping the acid container closed while collecting nutrient samples, or having a different person collect each group of samples. More information on sampling for nutrients is given in Wruck and Ferris (1997) and QHSS (1998).
- Residual sample material from previous tests could give incorrect readings when measurements are being made with field instruments. Special attention should be given to probe and test kit item rinsing after each field measurement in order to prevent future contamination. See section 3.1.1 concerning intermediate containers.
- Avoid smoking and wear Nitrile gloves at all times.
- Corrosion and oxidation of metal components in probe cathodes, electrodes and membranes could contaminate a sample and yield inaccurate readings.
- Note that some container caps have inserts; never touch the inserts with the skin or remove them from the caps.
- Cover work spaces used for sample handling (e.g. vehicle tray or tailgate) with new alfoil or plastic to provide a clean working surface. Replace it after driving to a new site.

3.5 Collecting samples

Figure 3.9 summarises the steps in the general procedure for samples of wastewaters and surface waters.

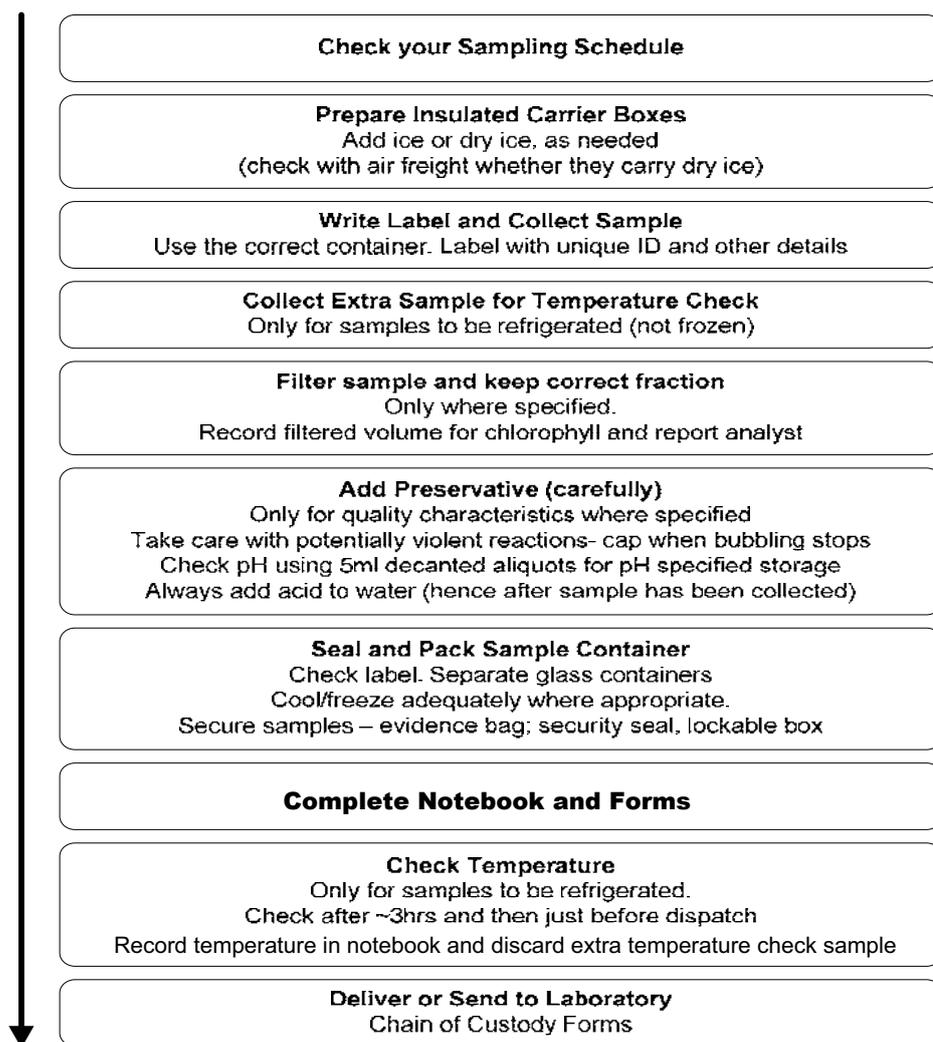


Figure 3.9 Steps in the sampling procedure

Further detailed directions and tips for these steps can be found for some sample types in the relevant subsections.

3.5.1 Surface waters

Using a waterproof pen, complete details on the label attached to the container, if possible before you collect the sample; details of labelling are addressed in Section 3.2. Be sure to let the ink dry completely before immersing the container. You might also use a strip of waterproof tape fastened around the container to ensure the label does not become detached (one end of the tape adhering to the other), and place the container into a plastic bag.

If practicable, collect the sample directly into the sample container, holding it either by gloved hand or by means of a sampling rod. If this is not practicable, collect the sample with a sampling beaker and transfer it promptly to the sample container, but beware of contamination (see Section 3.1.1).

If sampling from an open channel, try to take the sample in the centre of the channel, where the velocity is highest. Hold the mouth of the sampling container well above the base of the channel, to avoid disturbing and picking up any settled solids.

If the water depth permits, the mouth of the sample container should be held approximately 10 cm below the water surface. The surface layer of water often comprises a lipid-rich surface microlayer that may contain organic contaminants many times more concentrated than the water just below the surface.

Keep your hand out of the flow as much as possible to minimise risk of contaminating the sample, or causing infection or other harm to yourself. If the sample is to be analysed for substances present in 'low' concentrations—for example, nutrients—any contact of your skin with the sample should be avoided. If sampling from a boat in shallow waters, beware of stirred up sediment created by the turbulence of the boat's movement. If this happens, do not collect the sample as soon as the boat arrives at the site. Wait until the sediment has settled. If sampling in deeper waters, avoid taking a sample in or near the wake. Take the sample from ahead using a pole, or intermediate container.

To avoid labels rubbing off sample bottles while stored and transported in eskies filled with ice, it is advisable to place bottles within individual zip-lock bags.

Avoid:

- scraping the walls of drains, tanks, sewers, and so on; this could dislodge adhering matter into the sample, and so make it unrepresentative
- disturbing sediment, if sampling in shallow waters; this could also make the sample unrepresentative of the water column.

Do not:

- smoke during operations
- rinse sample containers with waters or wastes being sampled
- risk loss of preservatives by overfilling sample bottles.

Should a problem arise while you are collecting a sample—for instance if your sample becomes contaminated by floating fats in a waste pond or disturbed sediments in a stream—use a fresh sample container and start again.

It is preferable to use the unique sample ID number rather than write descriptive text on labels. You must record the descriptive text in notes for future reference.

If taking **microbiological samples** from a body of water that has enough depth to immerse the sterile container, hold the container by the sides and keep it nearly upright as you lower it into the water, so that it fills without spilling any pre-added sodium thiosulphate preservative from the sample jar (if present). For situations where it is not practicable to immerse the sterile container in the water or wastes to be sampled, you might need additional equipment as follows:

- an intermediate container that can be dipped into the water or wastes and that can be sterilised (by flaming) in the field immediately before use—for example, a stainless steel jug
- a means of sterilising the intermediate container—for example, a portable butane or propane burner. AS 5667.1 states that methylated spirit flames should not be used as they are not hot enough and are difficult to control. NOTE: Flaming involves a risk of causing serious injury to people and damage to property. While flaming the jug, hold it by the handle with a sampling rod, piece of rag, or other suitable insulating material; if using a rag or other combustible material, take great care you do not set fire to it. Transfer the sample immediately to the sterile sample container. Turn out the flame as soon as you are finished.

If sampling **temporary waters**, refer to [Appendix C4](#) for further information.

If sampling for **suspended solids or nutrients** refer to [Appendix C10](#) for further information on sample collection with different types of sampling equipment.

If collecting bulk water samples for use in **direct toxicity assessment** (DTA) laboratory trials, refer to Appendix C5.

When completing your notebook, record the following sample details even if already included in a sampling schedule:

- name of the sampler
- date and time of sampling
- details of sample location and source
- quality characteristics to be determined
- container type (volume, washing, material etc.)
- sample volume collected
- preservation method used
- serial numbers of seals affixed to sample container
- unique sample identification number (a different number for each sample container and package)
- any other details relevant to the sampling, for example, photographs by number.

3.5.2 Groundwaters

Groundwater sampling requires special equipment for sampling from a bore-hole or well, for example, a suitable bailer or pump, and a procedure to ensure sampling of fresh recharge water from the aquifer. Sometimes special precautions are needed to prevent changes in quality of the groundwater due to effects such as:

- reduced pressure when brought to the surface: this can cause gases in solution at the higher pressures underground to be evolved – in some cases, these can be toxic gases, such as hydrogen cyanide if the groundwater has been contaminated by cyanide solution
- exposure to components of the atmosphere such as oxygen; this can oxidise compounds naturally present in the reduced form (for example, ferrous ion).

Collecting groundwater samples needs specialised knowledge. If you need to take groundwater samples and have not been trained to do so, it is recommended that you refer to AS/NZS 5667 11 1998 (Water Sampling Guidelines—Part 11 Guidance on sampling groundwaters).

Sampling groundwater for microbiological examination requires the normal precautions mentioned above, plus the precautions for preventing microbial contamination of the sampling equipment and the sample applicable to surface waters sampling (section 3.5.1). If you need to collect such samples, you should obtain advice from reliable sources such as those cited above.

3.5.3 Sediments

Sediment samples are typically more heterogeneous than water and wastewater samples. This means special care is needed in removing sediment samples from a stream bed. It also means that a composite sample is more likely to be appropriate than a single sample.

For detailed advice on sediment sampling, refer to AS/NZS 5667.12:1999 'Guidance on the Sampling of Bottom Sediments' and Simpson *et al.* 'Handbook for Sediment Quality Assessment 2005 (CSIRO)'.

General rules when sampling sediments include:

- If direct collection into a sample container is impracticable, use a suitable mechanical device such as a stainless steel grab, dredge, or corer, washed in waters at the sample site.
- If the sample is NOT to be frozen, fill the container almost to the brim. Chill samples in ice or refrigerate promptly.
- If freezing of samples IS required, fill the container to only two-thirds of capacity, including any cover water taken from the same site. Place samples promptly in dry ice or portable freezer.
- It may be necessary to sample sediments from temporary waters such as intermittent streams or ephemeral streams. In such cases you should refer to Appendix C4.3.2 for further guidance.

3.5.4 Fish and other aquatic animals

Public complaints of 'fish kills' are a common reason for taking samples of aquatic animals. The Fish Kill Reporting and Investigation Manual (DEH, 1998) contains detailed advice on collecting these samples. The information below is a summary.

How many to collect

Usually, there will be many more fish than you need to collect for analysis or examination. In such cases, if some fish appear to be still alive (e.g. some might be moving but showing signs of lethargy or distress), choose them rather than those that already appear to be dead (such as any that do not move when touched, or any showing signs of decomposition, for example odour). Nevertheless, if only already-dead fish are available for sampling, they are suitable for chemical testing (but not histopathology).

Under the *Animal Care and Protection Act 2001*, approval from an Animal Ethics Committee is required for the sampling of live fish for scientific purposes. If approved, the handling of fish collections should be consistent with the guidelines set out in the Animal Care and Protection Act. Subject to approval, the euthanasia of aquatic fauna via chilling is a widely accepted technique consistent with preserving sample material and any related contaminants. A practical method of chilling for this purpose is to place the fish in a plastic bag of water and ice for 10 minutes or longer. In the case of fish from brackish or salt water habitats, the ice should first be placed into a separate plastic bag, in order to avoid rapid changes in salinity as the ice begins to melt.

The amount collected should be:

- for physicochemical analyses at least three whole fish (of the same species) of approximately uniform size if possible to allow valid comparison between sites. If the fish are small, you might need to collect more than three to get enough material for analytical tests. Collect as many as needed to provide:
 - for organic analyses such as pesticides, herbicides and PCBs—at least 250 grams (whole body mass)
 - and/or
 - for inorganic analyses such as heavy metals – at least 100 grams (whole body mass).

Note: As you might not know which contaminants are present, it is usually best to collect enough material for both types of analyses.

For histopathological examination:

- At least three whole fish (of the same species) of approximately uniform size if possible to allow valid comparison between sites. Note: histopathology requires live or freshly euthanased samples, or tissue samples preserved with 10 per cent formalin.
- Do not freeze samples.

See Part E of this manual for more detailed advice on taking and handling samples for veterinary examination.

Dissection of fish for samples of organs

If physicochemical analysis of fish organs (such as gills, livers) is to be performed by the laboratory, the fish should be dissected and the organs separately packaged, labelled and preserved before despatch.

Cross-contamination of samples can easily occur if dissection is done without proper care. Reference to the Fish Kill Reporting and Investigation Manual (DEH, 1998) is strongly recommended.

Packaging and preserving

Samples of aquatic animals and fish organs should be packaged according to the tests required as follows:

Physico-chemical analysis:

- Where poisoning by pesticides or organic compounds is suspected:
 - wrap specimens in aluminium foil with the dull side of the foil inwards
 - freeze as soon as practicable.
- For other analyses, including metals:
 - place samples in polyethylene bags or wrapping
 - freeze as soon as practicable.

Histopathological examination:

- If fish are dissected on site, follow directions in the Fish Kill Reporting and Investigation Manual for fixing the organs in 10 per cent formalin in plastic sample jars.
- Send to the histopathologist as soon as practicable.

See Part E of this manual for more detailed advice on taking and handling samples for veterinary examination.

3.5.5 Vegetation and algae

Chemical analysis of aquatic or terrestrial organisms associated with the site of an incident can sometimes give information concerning the nature or source of a release of wastes or other source of contamination. For example:

- Plants could have accumulated a deposit or show discolouration on leaves or other parts.
- Aquatic plants can bio-accumulate metals and organics from the water column and the sediments.

- The leaves of emergent aquatic plants can bio-accumulate metals and organics from the atmosphere.
- Terrestrial plants can bio-accumulate metals and organics from the atmosphere and the soil.

Typical plant samples include leaves, bark and roots.

If vegetation surfaces (e.g. leaves) may have been contaminated by spray drift, consider wipe sampling (Section 3.5.6)

Plant samples should be packaged in a similar way to fish:

- If the sample is to be analysed for organics, wrap in aluminium foil with the dull side of the foil inwards, and chill or refrigerate.
- If the sample is to be analysed for inorganics, wrap in polyethylene bag or wrapping, and chill or refrigerate.

It may be necessary to collect samples from algal blooms for identification of the offending species. See part D of this manual for more detailed advice on taking and handling algal samples.

3.5.6 Wipe sampling of surface contaminants (also known as 'swab sampling')

The presence of surface contamination (for example, by dusts, spray drift, or residues from containment) can be assessed by taking a swab from the surface concerned.

This is a useful technique for testing for the presence of contaminants on a surface. However, although there are regulatory measures of surface contamination for some contaminants (for example, for 'PCB-free' materials), the use of wipe samples for a purpose other than detecting contaminant presence (for example, comparing surface contamination on a spatial basis, for checking the efficacy of decontamination, or for comparison with environmental effects guidelines) is not recommended. In the latter case, the units are incompatible (surface contamination is measured in mass per unit area, and environmental effect levels are concentrations per unit volume or mass).

Wipe sampling is applicable for assessing surface contamination both from organic contaminants such as pesticides and from inorganics such as metals. Wipe sampling is most efficient on smooth surfaces such as glass, metal, painted surfaces, and smooth vegetation surfaces such as leaves. It is less effective on surfaces that are rough and/or porous such as timber and concrete.

There is no standard method for wipe sampling, although there are published standard methods for specific tasks (for example, ASTM E1728 for sampling lead dust from surfaces).

The design of a wipe sampling protocol involves choosing a material for the swab, a solvent to wet it, and a standard area to swab. A minimum of 100 sq cm surface should be wiped. If only trace levels of contamination are anticipated, wiping a much larger surface area is advisable, for example, up to a square metre. For wiping such large areas, more than one wipe may be used, and wipes can be pooled for analysis.

A variety of readily available materials are suitable for use as swabs. The portions of material chosen should be uniform in all respects and free of measurable contamination in respect of analytes of interest. The latter should be checked by analysing blank swabs. Examples of suitable swab material supplied in uniform packs are filter papers and small gauze pads such as those used for small wound dressing.

The wetting solvent of choice in most cases is an organic solvent such as isopropyl alcohol or hexane. Methylated spirits purchased in a glass bottle from a pharmacy can be used. Water is only appropriate for inorganic dusts. The purity of the solvent needs to be assured against the possibility that it is a source of any of the analytes of interest (for example, by testing a blank).

The sampling protocol should define a standard area for swabbing, as well as a standard method of taking the swab. For example, it might involve wetting each swab with 2 ml of alcohol, and wiping the swab across a pre-marked 10 cm x 50 cm surface from left to right until the whole surface has been covered, then wiping again from top to bottom, while applying an even pressure and holding the swab flat against the surface. An alternative to pre-marking a surface is to swab within the boundaries of a pre-cut template held against the surface (the template would need to be appropriately cleaned between sites). In the case of leaves, a uniform area could be approximated by swabbing the surfaces of a fixed number of leaves of similar size at each site.

Nitrile gloves should be worn and changed between sites, and used swabs sealed in labelled sampling containers appropriate for the storage of the analytes of interest, for example, a solvent-washed jar if pesticides are of interest.

3.6 Instrument-based field tests

To obtain accurate results for some quality characteristics, measurement on-site is necessary.

Typical field equipment used for this is:

- thermometer
- pH meter
- dissolved oxygen (DO) meter
- conductivity meter
- turbidity meter
- Secchi disc.

Some modern field instruments (multi-parameter instruments) can measure more than one quality characteristic, for example, both temperature and DO (see Figure 3.10). Note that not all field instruments give results of similar accuracy. It is important to check that the instrument used meets requirements and is calibrated (indicated by documentation of current calibration status).



Figure 3.10 Testing waters with a water quality meter

3.6.1 General guidance on taking field measurements

3.6.1.1 Background

Information in this subsection is provided to help you take water quality measurements in a scientifically valid manner so that the results will represent the field conditions fairly.

You should be familiar with the contents of the manufacturer's manual specific to any instrument that you use, specifically in respect of calibration, use of the instrument and any limitations. If the instrument is not in calibration or is used incorrectly the data is of dubious value.

3.6.1.2 Instrument maintenance and calibration

Due to the variety of instruments currently available that perform these tests, it is not practical to provide instrument-specific advice on storage, calibration and maintenance in this manual. It is strongly recommended that instruments are stored, calibrated, maintained and used as per manufacturer's instructions.

As a general principle, calibration should be checked and recorded before, during and at the conclusion of field use.

It is essential that unambiguous written records are kept of instrument maintenance and calibration. See Box 3.1 for guidance.

3.6.1.3 Take multiple readings

As with any other sampling, when taking instrument-based field measurements, multiple readings should be taken and recorded, and reference sites should be used to acquire background or 'normal' data for comparison purposes.

3.6.1.4 Keeping records of field measurements

Because the results of field measurements could be used in court actions, it is important to carry out all measurement procedures in a precise, consistent and reliable manner.

The original records made during measurements should be entered directly in a notebook, in case they are required for presentation in court.

3.6.1.5 Response to atypical or non-complying instrument readings

If readings appear atypical or non-complying (based on 'acceptable criteria' in the standard operating procedure for the instrument in question), the first step should be to check for equipment problems, such as a broken electrical cable or insulation, faulty probe, depleted batteries, etc. If equipment appears sound you might take extra measurements to confirm that the results are valid.

The value of calibration before and after instrument use, and the taking of measurements at reference sites are particularly important if atypical or non-complying readings are encountered at a site of interest.

3.6.1.6 Importance of general observations

Your observations during measurements can be extremely important in assessing atypical events or long-term trends, especially when investigating pollution incidents. Such observations could include:

- atypical water colour or clarity (such as greenish, muddy, pale brown and cloudy)
- odours
- wind speed and direction

- surface scum
- heavy algal or plant growths
- dead or dying vegetation in waterways or on banks
- dead or dying fish
- flotsam
- dumped material
- nearby earthworks or other construction activity
- nearby agricultural activities
- nearby industrial establishments or wastewater treatment works.

As visible conditions could be difficult to describe accurately in words, it is strongly advised to take photographs if possible (but note that some films have known colour bias). You should keep a record of the photograph number on the memory card/film to avoid any later confusion.

Box 3.1 Maintenance and calibration of water quality measuring instruments

All instruments used for taking measurements in the field (e.g. pH, temperature, conductivity, dissolved oxygen) must be maintained and calibrated to ensure reliability and credibility of the data they produce.

The aim is to ensure that each instrument is maintained in a sound operating condition, is capable of operating at acceptable performance levels, will not deteriorate from lack of required servicing, and that the credibility of the data the instrument produces can be demonstrated (for example, by the production of maintenance records and calibration logs in evidence).

Manufacturer's recommendations should be the basis of maintenance and calibration, in terms of both methods and frequency. As a general principle, the calibration of an instrument should be checked before and at the conclusion of a sampling exercise. It may be advisable to also re-check calibration once or more during an extended period of use, and after transport between sites or other circumstances that may affect reliability. Such 'in-field' calibrations should be recorded in a notebook and later transcribed into the calibration log book for the instrument (see below). Variability in performance shown by such calibration checks before, during, and at the conclusion of a sampling exercise should be reported with the data.

Because 'in-house' calibrations rely on buffer solutions and other techniques, a 'cross check' calibration using a real water sample should be conducted from time to time. This is done using two or more instruments simultaneously to test a bucket of typical environmental water (e.g. from a creek). The readings of calibrated and reliably performing instruments should be consistent with each other for such a sample.

For each instrument the following procedures and documents should be established and kept up to date:

- a list of spare parts and suppliers/sources of repair (it may also be feasible for a realistic supply of user-replaceable items to be kept on hand)
- written inspection, maintenance and calibration schedules (based on the manufacturer's documentation and the usage pattern for the instrument)
- a log book in which is recorded inspection, maintenance and repair activities detailing dates and persons involved. This may best be documented as a ring file arranged in chronological order covering the service life of the instrument. Sample inspection/maintenance records are provided in Appendix C1
- a log book in which is recorded calibration activities detailing dates, times and persons involved. This may best be documented as a ring file arranged in chronological order covering the service life of the instrument. Sample calibration records (log sheets and charts) are provided in Appendix C1

(Box 3.1 continued next page)

- adequate supplies of calibration standards (if these are required) should be maintained and where applicable storage and shelf life requirements followed.

Some of the above documents may be combined, for example, the maintenance schedule could be combined with the maintenance records, and the calibration schedule with the calibration records.

It is strongly recommended that within each work unit the oversight of instrument inspection/maintenance/calibration be tasked to a specific person/s as an unambiguously assigned responsibility. Such assigned person/s would be expected to personally perform or supervise the performance of all tasks and completion of related records according to the established schedule/s for the instruments held by the work unit.

3.6.2 Overview of field measurements

3.6.2.1 Temperature

Accurate temperature measurements are required for accurate determinations of pH, specific electrical conductance, and dissolved oxygen. You need to be aware whether the instrument you are using compensates for factors such as temperature when measuring another parameter, or whether results need to be adjusted by calculation.

Stratification is common in summer months when surface waters are much warmer than bottom waters. Accordingly, unless the water is shallow (less than 0.5 metres) and flowing, take temperature readings at different (measured) depths.

Warm water is less capable of retaining dissolved oxygen than cold water. For this reason, temperature should be measured at the same place within the stream at which dissolved oxygen is measured. This allows the correlation between the two parameters to be observed.

3.6.2.2 pH

A pH of 7 is called neutral, above 7 is basic (or alkaline), and below 7, acidic. Strong mineral acids such as concentrated phosphoric acid can have pH less than 1; strong alkalis such as caustic soda solutions can have pH approaching 14.

3.6.2.3 Dissolved oxygen (DO)

The maximum concentration of dissolved oxygen (DO) in water under ambient conditions is typically within the range of about 6–10 mg/L, depending on the atmospheric pressure and the water temperature and salinity.

Dissolved oxygen concentrations are most often reported in units of milligrams of oxygen gas (O₂) dissolved in each litre of water, i.e. mg/L (the unit mg/L is equivalent to parts per million = ppm).

An alternative measure is dissolved oxygen saturation (per cent). This is the percentage of dissolved oxygen concentration present relative to what the concentration would be if water at the specified temperature and salinity was fully saturated with dissolved oxygen. Most dissolved oxygen probes compensate automatically for temperature and salinity when calculating dissolved oxygen saturation in water (check the instrument manual). Note that under natural conditions such as high algal density during sunlight, super-saturation (more than 100 per cent DO) can occur.

Considerable differences between DO concentrations at the surface and in the lower depths can result from stratification of the water column, due to temperature or salinity effects. This effect is usually most pronounced in summer months when surface waters are much warmer than bottom waters. Accordingly, unless the water is shallow (less than 0.5 metres) and flowing, take readings at different (known) depths.

3.6.2.4 Electrical conductivity (EC)

Electrical conductivity (abbreviated EC, and often simply called 'conductivity'), the ability of water to carry an electric current, is used as an indicator of salinity and the concentration of dissolved salts in a waterbody.

The unit of measurement for conductivity is siemens (S) per unit of length. A commonly used example of this unit is microsiemens per centimetre (µS/cm). See Conductivity units and their abbreviations in Appendix C7 for further explanation.

Typical values of EC in µS/cm are:

- De-ionised water in equilibrium with the atmosphere approximately 1
- Potable waters 50–500
- Freshwater less than 1500 (varies widely between catchments)
- Seawater approximately 52 000

Note that conductivity varies with temperature, and values reported are usually those corresponding to 25°C. A difference of 5°C can alter conductivity by approximately 10 per cent. Many conductivity meters have compensation functions so that EC at 25°C can be read directly. However, if necessary, a manual correction can be made by using the formula

$$K_{25} = \frac{K_t}{1 + 0.019(t - 25)}$$

where t = water temperature °C where conductivity is measured

K_t = conductivity at temperature t °C

K_{25} = corrected (25°C) conductivity of the water

3.6.2.5 Relationship of EC to salinity and dissolved salts/solids

Confusion can arise from the fact that salinity is sometimes equated to one of the terms 'total dissolved ions' or 'total dissolved salts' or 'total dissolved solids', and that the same acronym (TDS) may be used for the last two terms. The following notes explain the distinction.

- 'total dissolved ions' is the sum of the ion concentrations. This sum is used in a formula to calculate 'total dissolved salts'.
- 'total dissolved salts' is determined by calculation from the results of analysis for common ions (e.g. sodium, calcium, chloride).
- 'total dissolved solids' is determined by filtering a sample, drying at a specified temperature, and weighing the residue. It includes non-ionised species if present (e.g. sugars, other organics, colloidal particles too small to be retained by filter medium), with the result that 'total dissolved solids' can be greater than 'total dissolved salts'.

For typical fresh waters, the approximate total dissolved salts can be calculated from conductivity using the formula:

$$TDS = 0.68 \times K_{25}$$

Where TDS = Total Dissolved Solids (in mg/L)

K_{25} = conductivity of the water at 25 °C (in mS/cm)

Note—this formula is not appropriate for water of atypical content.

Salinity in parts per thousand (g/L) can be calculated from conductivity at 25 °C using the formula:

$$S = a_1(K_{25}) + a_2(K_{25}) + a_3(K_{25}) + a_4(K_{25}) + a_5(K_{25}) + a_6(K_{25})$$

Where S = salinity in parts per thousand (g/L)

K_{25} = conductivity of the water at 25 °C (in mS/cm)

$$a_1 = 4.980 \times 10^{-1} \quad a_2 = 9.540 \times 10^{-3} \quad a_3 = -3.941 \times 10^{-4}$$

$$a_4 = 1.092 \times 10^{-5} \quad a_5 = -1.559 \times 10^{-7} \quad a_6 = 8.789 \times 10^{-10}$$

3.6.2.6 Turbidity

The turbidity of a water body is a measure of the presence or absence of soluble, suspended and colloidal particles that hinder the transmission of natural light from the surface to the lower depths. Turbidity affects the potential rate of photosynthesis, and hence the growth of plants or algae in the water body.

3.6.2.7 Water clarity

The clarity of a water body is an indication of the presence or absence of suspended and colloidal particles that hinder the transmission of natural light from the surface to the lower depths. Clarity affects the potential rate of photosynthesis at any given depth, and hence the growth of green plants or algae in the water body.

This method is based on the common experience that the deeper a submerged object is, the less easy it is to see from the water surface, and the more cloudy the water, the less easy to see at a fixed depth. It entails the use of a Secchi disk (see Figure 3.11 and Figure 3.12) and is a relatively simple and quick way to obtain a measure of clarity, without the need to take

samples and analyse them for turbidity or suspended solids. The Secchi disk also has the advantage of integrating turbidity over depth (where variable turbidity layers are present).



Figure 3.11 Testing clarity of water using a Secchi disk

A Secchi disk is not appropriate for use in shallow waters where the disk can still be seen when resting on the substrate. In such cases you should use a turbidity meter or take water samples for laboratory analysis.

NOTE: The observer's visual acuity will affect the perception of the disc. It should be observed with 'corrected vision' (spectacles or contact lenses if these are normally worn) and not be performed on the side of the boat casting a shadow. Tinted lenses or sunglasses should not be worn, as they could affect the depth where the disc is recognised.

3.6.2.8 Chlorine (free, combined, and total residual)

Chlorine is widely used for disinfection of public water supplies, swimming pools, and treated wastewaters. Although the role of chlorine addition in water treatment is to disinfect (kill pathogens), some of the added chlorine can be consumed in reactions with oxidisable substances present in the water including ammonia, nitrite, and organic matter. 'Chloramines' are a common product of such reactions, which also deplete the chlorine available to kill pathogens. The reaction products are generally less effective disinfectants than chlorine, but are more persistent.

Chlorination treatment of water or wastewater usually involves the addition of a measured dose of one or more of chlorine gas (Cl_2), hypochlorite ion (OCl^-), and hypochlorous acid (HOCl). The addition of chlorine gas alone results in a mix of all three in proportions dependent on factors such as pH and temperature.

The term 'free chlorine' is used to refer to the total concentration present of dissolved chlorine gas, hypochlorite ion, and hypochlorous acid, each of which has good disinfection capability.

The term 'combined_chlorine' is used to refer to the chloramines, and the term 'total_residual chlorine' is the sum of 'free chlorine' and 'combined chlorine'. These are the terms used in the Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ 2000). Other terms for these mixtures of chlorine-containing substances may be encountered, for example some environmental authorities (EAs) include quality specifications for 'free chlorine residual' in an effluent. The term 'residual' refers to chlorine (as the total concentration of dissolved chlorine gas, hypochlorite ion, and hypochlorous acid) remaining after added chlorine has reacted with wastewater constituents. Thus 'free chlorine residual' is equivalent to 'free chlorine'.

The quality specification for chlorine (free, combined, or total) in an EA is usually the concentration measured at the outlet of a 'detention tank' designed to provide contact between the chlorine and the wastewater for a stated period to enable disinfection to occur prior to release.

Because the levels of 'free chlorine' relative to 'combined chlorine' can change over a short period of time, it is usual to measure chlorine in situ using a test kit or probe attached to a water quality meter. There are more sophisticated and accurate laboratory based methods available but these are generally not practical for field use.

Test kits commonly used for in situ chlorine testing are based on a colorimetric system, involving the addition of a chemical (DPD, typically supplied in the form of tablets in a sealed containment) to a fixed volume of sample water and measuring the intensity of pink colour produced by the reaction of the DPD with chlorine present in the water. The methods used to measure the colour intensity vary between kit types. Simple kits involve comparison by eye of the colour intensity with a calibrated chart or filter. More sophisticated (and accurate) kits measure colour intensity digitally. The results from DPD-based test kits may be adversely influenced by colours and interferences from chemicals present in the waters being tested (see section 3.6.3).

If using a DPD kit, it is essential to ensure that the DPD tablets are fresh (hard), that the seal is intact, and within the expiry date. The kit directions for use must be followed exactly, and cells and colour filters etc. kept scrupulously clean. Residues from previous tests can give false readings for subsequent tests.

3.6.3 Test kits

A range of commercial field kits are available for rapid testing of water quality. These include tests for analytes such as pH, metals and nutrients (among others). Test kits are a substitute (surrogate) for a range of instrumental techniques of which probes are just one. These kits can provide valuable on-the-spot information, although caution is advised in their use. It should not be assumed that a test kit will perform as specified by the manufacturer.

There are many factors which influence any instrument's performance. Test kits are often subject to a range of limitations and interferences depending on the type and nature of water being analysed (sample matrix). It is imperative test kit performances are initially verified to ensure they are fit for their intended purpose. This can be achieved by undertaking validation experiments covering the analytical range and the matrices being investigated. Once validated, acceptance criteria can be ascribed to the various tests. These acceptance criteria may or may not align with the manufacturer's specifications. Some level of quality control, such as use of check standards, must be utilised and monitored each and every time they are used.

It is important to remember the following points:

- Test kits are utilised in field environments and can be subjected to extreme physical conditions which will impact on kit performance. How do you know the test kit is functioning adequately? Has its performance characteristics changed since the last time it was used?
- Most kits have expiry dates for reagents that should be checked and adhered to.
- Test kits will require storage in an appropriate fashion (e.g. within certain temperature ranges; out of direct sunlight).
- Test kits often have varying levels of accuracy (e.g. $X \pm y$ units). Will this accuracy suit your application? (e.g. will the accuracy of this kit allow you to differentiate between sites?).

- Test kits often have varying detection limits (i.e. only detect down to a certain concentration). If comparing to guidelines/standards/benchmarks, does the kit report within the range of these documents?
- Test kits can behave differently in fresh, waste and salt waters.
- Water containing particulate or suspended matter (even at small concentrations) can severely impact on the test kit producing a reliable result. For these types of samples, they should be filtered appropriately before using the test kit.
- Different brands of kits may vary in all of the above points.

N.B. It is NOT advisable to rely on test kits for data that may be required for legal purposes.

3.7 Sample security and transport

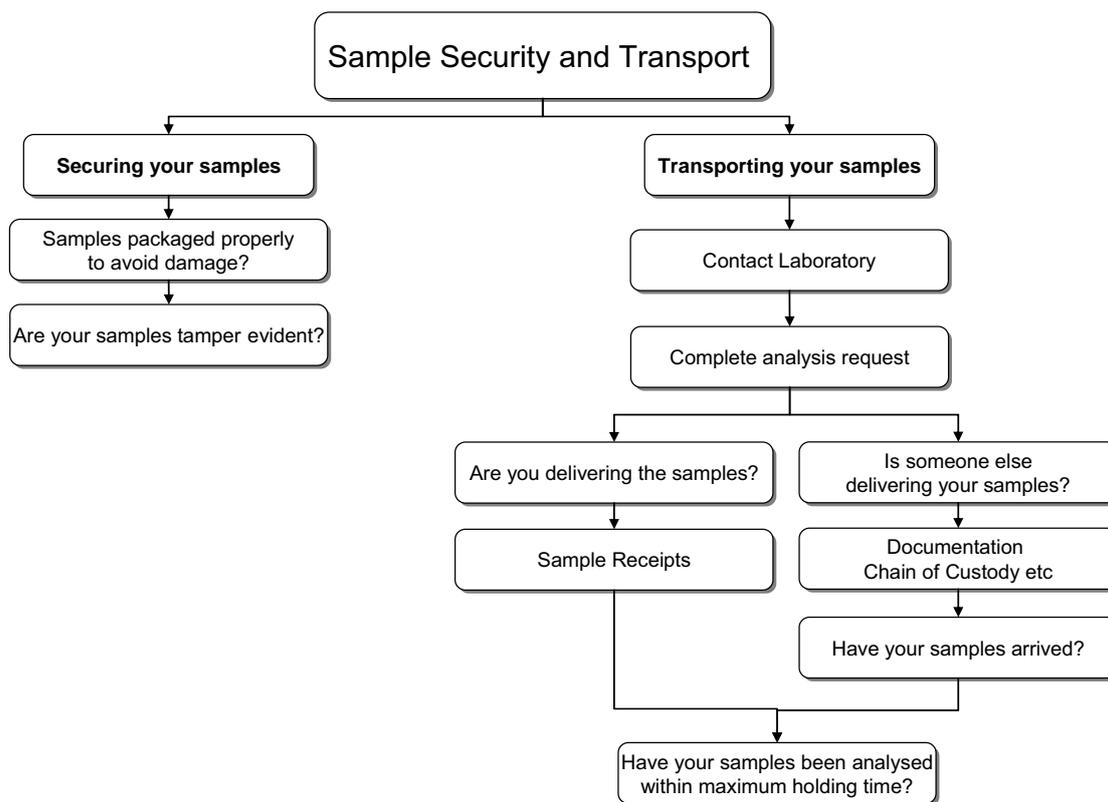


Figure 3.13 Overview of the components of a sample security and transport system

3.7.1 Securing your samples

It must be possible to demonstrate that there was minimal risk of the sample having been interfered with between the time of sampling and the time of analysis. This requires a well designed system for security of the samples, including precautions to make any such interference evident upon receipt by the analyst. The system described in this manual is summarised in Box 3.2 and should be adequate for most purposes.

3.7.1.1 Sample seals or evidence bags

Sample seals and evidence bags can be obtained from a range of commercial suppliers.

Typically seals are specially printed self-adhesive ‘security’ labels, designed to be affixed across the body and cap of the sample container. Each seal is made of a ‘self-destruct’ material so that any attempt to remove it will result in its disintegration so it cannot be re-affixed in its original condition. Each should have a unique seal number. Uniquely numbered and tamper-proof tough-plastic ‘evidence bags’ are commercially available in a range of sizes.

When you are issued with seals and evidence bags, you are responsible for keeping them in a secure place. At any time you must be able to account for the numbers received, the numbers used, and the numbers still in your possession. Include the seal/evidence bag number and the sample identification number when recording details of samples. Refer to Figure 3.14 for examples of security labels and seals.



Figure 3.14 Examples of security labels and seals

3.7.1.2 Locked carrier boxes

One way to hinder unauthorised access to samples is to use a system of insulated carrier boxes fitted with locks that can be opened *only* by:

- an appropriate staff member of your organisation having authority to do so
- the analyst or other laboratory staff member having similar authority.

If using such a system you should be able to testify in court that the keys were kept in secure places.

A person wishing to interfere with samples might try to remove the lock and later replace it without leaving evidence of their actions, such as cuts or holes in the box or the lock assembly. Each lock should be fitted to make this as difficult as practicable. Any attempt at access should leave evidence that laboratory staff will notice.

Each lock should preferably be a part of the body of the carrier box, or a padlock that fastens a hasp and staple assembly permanently fitted to the body. The two parts of the assembly would need to be fastened by, for example, suitable rivets, rather than screws that could be removed and replaced without leaving evidence of the fact. Padlocks should preferably be case hardened to resist cutting by a hacksaw.

3.7.2 Transporting your samples

3.7.2.1 General

After collecting the samples, you must have them transported to the appropriate laboratories, ensuring that the integrity of the samples is maintained. You can do this by:

- delivering them personally
- having a work colleague deliver them
- sending them by commercial carrier (such as road transport, air cargo)
- other reliable means.

Whatever means you use, the following points are important:

- Sample containers and packages need to be packed in sample carrier boxes to minimise the risk of breakage, leakage or spillage during transport.
- Sample carrier boxes must be handled and stored so as to protect the samples.

- Appropriate security measures must be in place.
- Documentation must accompany the samples.

If samples are transported by an air carrier, they are subject to the International Air Transport Association (IATA) Dangerous Goods Regulations. These regulations are updated annually, and failure to comply with them can lead to prosecution of the consignor. It is wise therefore to consult the airline company or the Civil Aviation Safety Authority (CASA) before sending samples, to check that the sample packaging (including the carrier box) and the labelling of the carrier box meet the requirements.

If you give samples to someone else for transport, such as a commercial carrier, it may be wise to contact them at reasonable intervals afterwards to check on the actual location of the samples, or whether they were actually despatched (by road or air, for example) at the time necessary to ensure delivery within the recommended maximum holding time.

Samples should be analysed within the maximum holding times specified; otherwise the analyst must report on the probable effect of the delay.

3.7.2.2 Transport precautions

Take the following precautions when preparing samples for transport:

- Re-check caps on containers to make sure they are tight and properly sealed, so that if any should fall over they will not leak. If necessary, tighten cap, re-tape and re-seal.
- Separate glass bottles from each other to prevent physical contact, which could cause breakage.
- If you use a transportable freezer to freeze samples in the field, but need to transfer them to an insulated sample carrier for transport (for example, by a freight contractor), add dry ice to the sample carrier to keep the samples frozen during transport. Contact the freight company (air or land) to discuss refrigeration options for your samples if required.
- Ensure that the following legends are plainly readable on the sample carrier boxes:
 - 'FRAGILE'
 - 'HANDLE WITH CARE'
 - 'THIS SIDE UP'
- To minimise thawing of ice or dry ice, protect samples from heat; for example, do not leave sample carrier boxes in the sun for long periods.
- Carrier boxes containing dry ice must not be hermetically sealed. Venting must be provided to release the carbon dioxide gas generated.
- Make every effort to minimise delays in transporting samples.
- Complete chain of custody documentation (Appendix C1).
- Where samples are carried by air, the carrier box must be leak-proof, and must have labels and complete documentation as required under the IATA regulations.
- Ensure that the laboratory will receive the completed analysis request either with the samples or earlier (for example, by fax or email).

BOX 3.2 Summary of sample security system***What the sampler does:***

Collect sample.

Place sample in labelled container and put cap on container.

Fasten security seal across lid and container or place sample in security bag.

Put sample in sample carrier box (cooler or other type) or freezer.

Secure carrier box or freezer by:

- a lock

or

- a padlocked chain, fastened around the body so that the lid cannot be opened without unlocking the padlock or cutting through a chain link or padlock.

NOTE: the chain links should be of welded construction (NOT able to be opened and closed using pliers) and the padlock body should be a solid casting (NOT laminated from sheet metal). Padlock and chain should preferably be case-hardened.

Give sample carrier box or freezer to transport carrier with chain of custody sheet (Appendix C1) attached and get receipt (on consignment documents).

Fax or email the completed analysis request to laboratory.

What the laboratory does:

Receive sample carrier box or freezer from transport carrier, complete chain of custody sheet and give receipt (on consignment documents).

Check:

- locks and chain are intact
- there are any other signs of tampering with the carrier box or freezer.

Unlock sample carrier box or freezer and remove sample container/s.

Check:

- all samples stated in the completed analysis request are present
- security seals are intact
- there are any other signs of tampering with the samples.

If there is reason to suspect tampering, contact sampler immediately and give details.

Determine whether samples should be analysed or not.

Record results of checks and any action taken because of them.

3.7.2.3 Addresses for despatch

It is suggested you keep a list of names, addresses and contact numbers (phone, fax and email) of appropriate staff at the laboratories that your organisation employs to perform analyses, for ready reference in the field. Appendix C6 contains space for you to enter these details.

3.7.2.4 Delivery of samples

The receiving laboratory should be advised in advance that samples are to be dispatched. If you notify the staff by mail or facsimile, you should get an acknowledgement. Only in exceptional circumstances should you send samples without this prior notification.

Samples delivered to the laboratory must be handed to a supervisor or other appropriate responsible staff member. This person should acknowledge receipt of the samples by signing the consignment documents accompanying each sample carrier box, chain of custody documentation or other appropriate form of receipt.

On receiving samples, the analyst must first check the contents against the analysis request, noting:

- the time and date when the samples were received
- whether the carrier box was locked when received
- any irregularities such as breakages or missing samples
- the condition of the samples—whether they are frozen, and if not, their temperature
- the condition of the seals and tape on sample containers and packages.

The purpose of this is to check on how well the samples were preserved, and whether there are any signs of tampering. The analyst must contact the sampler promptly if there are any signs of tampering or other irregularity, such as missing samples, broken or damaged containers, thawed samples that should have still been frozen, or samples at room temperature instead of chilled. In such a case, you should discuss with the analyst and decide whether analysis should proceed or whether you will re-sample. Keep a record of the discussion.

The analyst's report should include details of the condition of the samples on receipt. If any irregularity was discovered on receiving the samples, the analyst must also give details of this.

3.8 Laboratory analysis

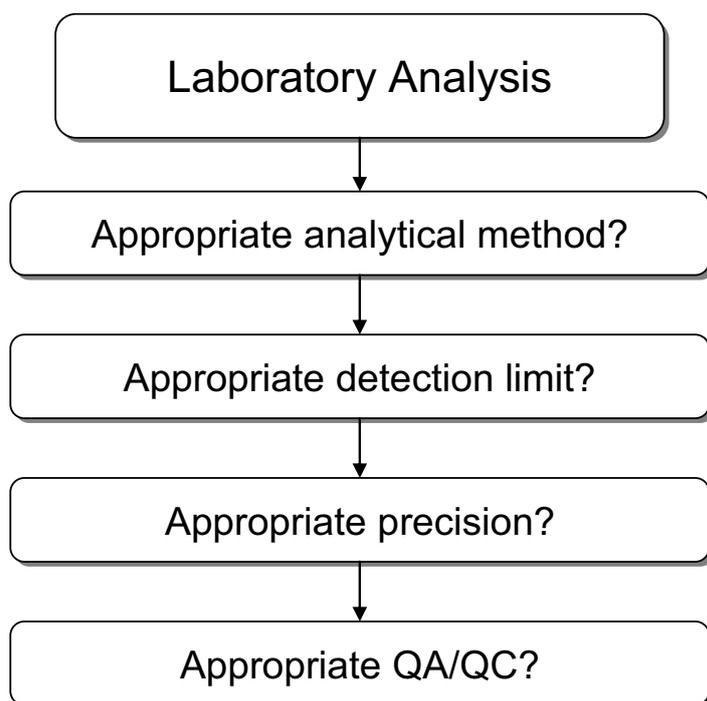


Figure 3.15 Essential laboratory analysis components for incorporation into a sampling protocol

3.8.1 Selection of analytical methods

Unless otherwise prescribed, samples should be analysed, as a minimum, in accordance with a method specified in one of the following reference texts (see References section):

- APHA AWWA Standard Methods for the Examination of Water and Wastewater (current version)
- USEPA (current version)
- ASTM, Annual Book of ASTM Standards (current version)
- relevant Australian Standards published by Standards Australia, as amended from time to time
- relevant ISO Standard (current version).

The method of analysis should be chosen by the analyst so as to be appropriate to the type of sample and to the expected concentration range of the constituent to be measured. The methods used by a laboratory should be verified or validated (for example, by using standard reference materials or standard addition techniques) and preferably be a method accredited by the National Association of Testing Authorities (NATA) or shown to be at least equivalent. Alternative methods to those described in the reference texts can be used provided that the analyst can validate the alternative method and prove that the results so obtained are equivalent to the results obtained using the prescribed method within the limits of the accuracy stated for the prescribed method.

3.9 Data analysis and interpretation

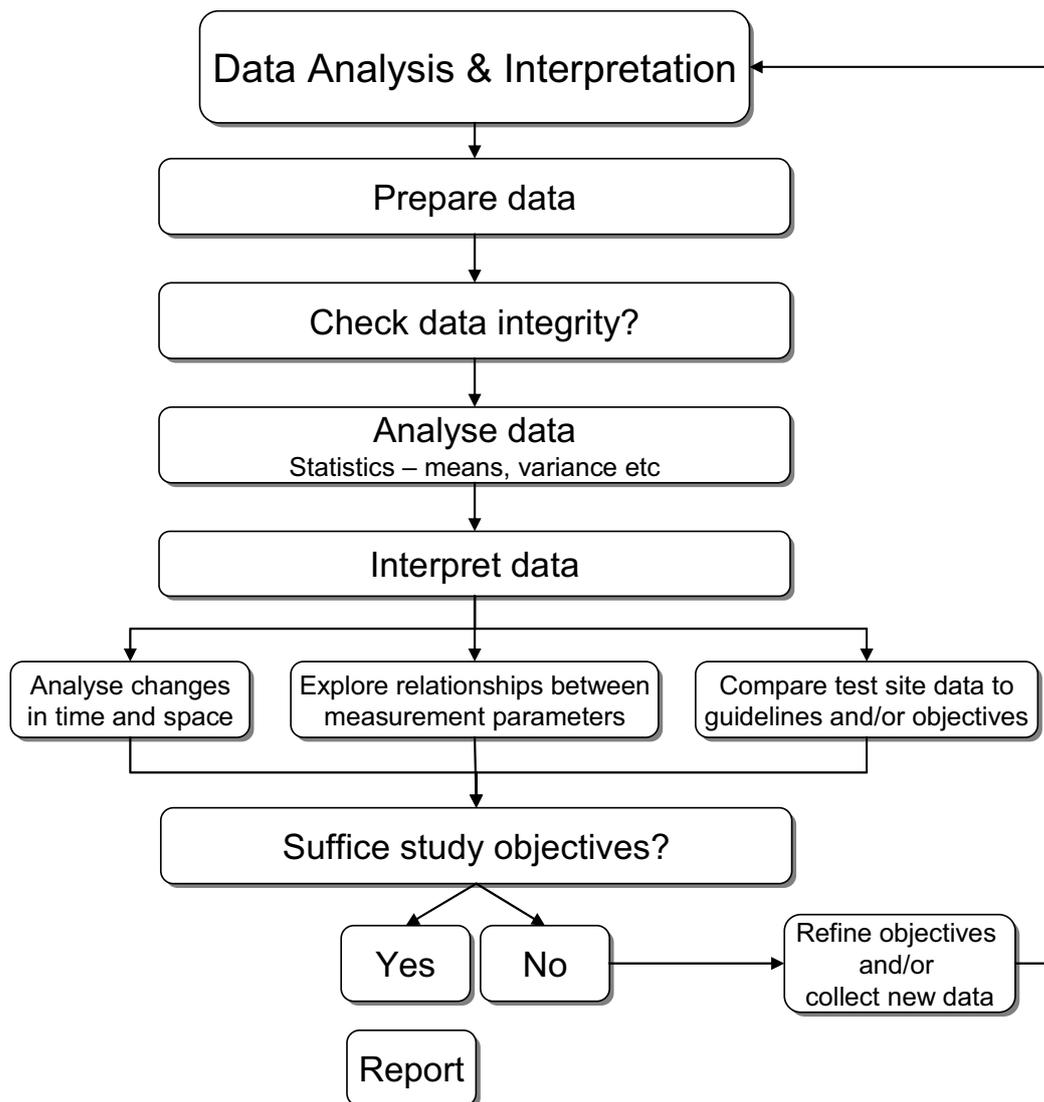


Figure 3.16 Essential data analysis and interpretation components for incorporation into a sampling protocol

3.9.1 Sources of reference values

Once you have results from field measurements and laboratory analyses, you will need to be able to draw some conclusions based on sound scientific reasoning. The following resources act as a guide to the levels and indicators of water quality that your results should be compared against.

Reference documents useful for benchmarking environmental water and sediment quality data:

- ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality
- Environmental Values and Water Quality Objectives scheduled under the EPP Water, available through the department’s website at Schedule 1 of EPP Water (including plans)
- NHMRC (2004) Australian Drinking Water Guidelines

- NHMRC (2008) Guidelines for Managing Risks in Recreational Water
- DERM (2009) Queensland Water Quality Guidelines
- Queensland Environmental Protection (Water) Policy 2009.

3.10 Data custodianship, management, and submission for regulatory purposes

Reliable and defined custodianship and data management is essential to ensure data is collected, maintained and used appropriately.

Data typically relates to measurements or statistics from measuring devices or observations, usually presented in a numerical or structured format. A collection of data may be referred to as a dataset, usually held electronically in databases (either as a collection of related data stored together in one or more computerised files, or an electronic repository of information accessible via a query language interface).

Generic classification of data includes time series data, spatial data and metadata:

- Time series data are a set of observations, results, or other data obtained over a period of time, often at regular intervals.
- Spatial data are data that refer to specific geographic areas. Records would generally include a geographic reference, for example, map references, latitude and longitude references, river catchment areas, local government areas, or others.
- Metadata is information which describes the content, quality, condition, and other appropriate characteristics of the data. The term information is a broader term often used to describe any data that is processed, organised or classified into categories, images, graphs, etc. for a designated purpose.

Good custodianship of data is needed to provide accountability for data sets and give users confidence with the level of integrity, timeliness, precision and completeness of data sets. All data, whether they are generated by government or obtained from an external source, must be managed by a custodian. A data custodian can be defined as a person or organisation that is responsible for ensuring specific data is collected, maintained and made available according to standards and policies or other licences, agreements or specifications.

Custodians are responsible for ensuring that the following minimum standards are applied to each dataset:

- documentation of the methods and process for data collection
- ensuring data is fully validated and quality assured with sufficient detailed metadata to enable its use by third parties without referring to the originator of the data
- the dataset must be recorded to enable the ownership, access constraints and licence conditions to be determined
- a contact for allowing the release or use of data by other parties.

There are a number of situations where individuals and organisations may need to submit water monitoring or other related data to the Queensland Government for the purpose of regulatory decision making. This could include but is not limited to purposes such as environmental impact statements, development approvals, environmental management plans and environmental evaluations.

In many cases, water monitoring data is required to be submitted electronically. The provision of correct and accurate data is the sole responsibility of the submitter and water monitoring data should be collected in accordance with this document and other relevant standards, guidelines and policies. The Queensland Government will not be held responsible for submission of incorrect data. The Queensland Government also reserves the right to use submitted monitoring data for any purpose it sees fit including supply of data to a third party.

Refer to Appendix C1 for further guidance and checklists of what information needs to be included when submitting electronic water monitoring data.

Part C Appendixes

Appendix C1 Forms

Examples of forms mentioned in the manual are provided here for use directly or as templates. They are:

- Sampling Schedule for Waters, Waste, Sediments
- Checklist of Equipment and Materials
- Analysis Request
- Chain of Custody Data Sheet
- Examples of Field Instrument Maintenance and Calibration Record Sheets.

Checklist of Equipment and Materials

Insert \times if not required during trip; for remaining items, tick \checkmark when packed.

[Modify as needed]

Item	\times/\checkmark
For Personal Safety:	
<i>Respiratory protection:</i> Face mask (suited to hazards expected)	
<i>Head protection:</i> Hat	
Safety helmet	
Sunscreen cream	
<i>Face protection:</i> Face Shield	
Safety Spectacles	
<i>Hand protection:</i> Gloves - disposable	
Gloves - heavy duty	
Hand-washing disinfectant cream	
Water for hand washing (if no access to suitable facilities)	
Ear muffs or ear plugs	
Safety boots	
Coveralls (disposable if required)	
For Field Measurements:	
Calibrated Thermometer	
Distilled water in wash bottle	
D.O. Meter	
D.O. probe, checked intact	
spare battery	
air calibration table	
manufacturer's instructions	
pH Meter	
electrode(s), checked intact	
buffer solutions	
small beaker (50 mL)	
spare battery or battery charger	
manufacturer's instructions	
Conductivity Meter	
electrode(s), checked intact	
calibration solution	
small beaker	
manufacturer's instructions	
<i>Chlorine test kit:</i> Comparator	
Comparator colour filters	
Moulded cells	
DPD No. 1 tablets	
DPD No. 2 tablets	
DPD No. 3 tablets	
Glass stirring rods	

Item	\times/\checkmark
For Sample Collection and Preservation:	
Sampling schedule	
Containers as per sampling schedule	
Preservatives as per sampling schedule	
pH test strips	
Sampling beaker or similar (if necessary)	
Sampling rod	
<i>Microbiological Sampling Kit:</i> Stainless steel sampling jug	
Gas torch for flaming inside of jug	
Igniter or matches	
<i>Vacuum Filtration Equipment:</i> Vacuum flask (1 Litre)	
Hand-operated vacuum pump	
Filter funnel with support screen	
Fine glass fibre filters	
Chlorophyll Sample Tubes	
Aluminium foil	
<i>Pressure Filtration Equipment:</i> Filtration syringe	
0.45 μm membrane filters	
Glass fibre pre-filters	
For Sample Security and Transport:	
Official seals for Samples	
Waterproof Marking Pens for labelling	
Waterproof transparent tape	
Insulated Carrier Boxes (coolers)	
Padlocks for Carrier Boxes (if used)	
Crushed Ice	
Dry Ice (or alternative)	
For Recording Information:	
Official Notebook	
Waterproof Ink pens (including spares)	
<i>Forms:</i> Analysis Request	
Notice of Samples Expected (if not already sent)	
Camera	
Spare film(s)	
Spare batteries	
<i>any accessories needed:</i>	
Tape recorder	
Spare tape cassette(s)	
Spare battery	

Analysis Request

NOTE: USE ONE FORM FOR EACH SAMPLE, OR EACH GROUP OF SAMPLES FROM THE SAME SOURCE

To: 	From: District: Postal Address: Telephone: Facsimile:
--------------------	--

SAMPLER

NAME (BLOCK LETTERS):	Telephone:
-----------------------	------------

DETAILS OF SAMPLES

NOTE: LABORATORY STAFF ARE TO FILL IN HEAVILY OUTLINED BLOCK

MATERIAL SAMPLED: <small>(circle one)</small>	WATER <small>ANIMAL</small>	SEDIMENT <small>VEGETATION</small>	Unique Sample Identification Number	Official Seal Number	Laboratory's Sample Reference Number
HOW MANY CONTAINERS?					
DATE COLLECTED					
TIME COLLECTED					
DATE SUBMITTED					

REASON FOR ANALYSIS

RESULTS TO BE USED FOR: <small>(circle one)</small> Court case / Other
IS A LEGAL CERTIFICATE REQUIRED? <small>(circle one)</small> Yes No

ANALYSIS OR EXAMINATION REQUESTED

Tick boxes opposite quality characteristics required. Add others if necessary.

BOD, 5-day	<input type="checkbox"/>	Aluminium	<input type="checkbox"/>	Hydrocarbons, Petroleum	<input type="checkbox"/>
COD	<input type="checkbox"/>	Arsenic	<input type="checkbox"/>	Oil and Grease	<input type="checkbox"/>
Colour	<input type="checkbox"/>	Cadmium	<input type="checkbox"/>		<input type="checkbox"/>
Solids, Dissolved	<input type="checkbox"/>	Chromium, Total	<input type="checkbox"/>	Chlorinated Hydrocarbons	<input type="checkbox"/>
Solids, Suspended	<input type="checkbox"/>	Chromium, Hexavalent	<input type="checkbox"/>	Polyaromatic Hydrocarbons (PAH's)	<input type="checkbox"/>
Turbidity	<input type="checkbox"/>	Copper	<input type="checkbox"/>	Polychlorinated biphenyls (PCB's)	<input type="checkbox"/>
	<input type="checkbox"/>	Iron	<input type="checkbox"/>	Pesticides (excluding Herbicides) - <i>Please specify</i>	<input type="checkbox"/>
<i>E. Coli</i>	<input type="checkbox"/>	Lead	<input type="checkbox"/>		<input type="checkbox"/>
Thermotolerant Coliforms	<input type="checkbox"/>	Manganese	<input type="checkbox"/>		<input type="checkbox"/>
Enterococ	<input type="checkbox"/>	Mercury	<input type="checkbox"/>		<input type="checkbox"/>
Ammonia	<input type="checkbox"/>	Nickel	<input type="checkbox"/>	Herbicides (excluding Pesticides) - <i>Please specify</i>	<input type="checkbox"/>
Nitrate + Nitrite	<input type="checkbox"/>	Silver	<input type="checkbox"/>		<input type="checkbox"/>
Nitrate	<input type="checkbox"/>	Zinc	<input type="checkbox"/>		<input type="checkbox"/>
Nitrite	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
Nitrogen, Total Kjeldahl (TKN)	<input type="checkbox"/>		<input type="checkbox"/>	Total Organic Carbon (TOC)	<input type="checkbox"/>
Nitrogen, Total	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
Phosphorus, Dissolved	<input type="checkbox"/>		<input type="checkbox"/>	Lipid Content (<i>example: fish specimen</i>)	<input type="checkbox"/>
Phosphorus, Total	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
Chlorophylls	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>	Surfactants, Anionic	<input type="checkbox"/>
Chloride	<input type="checkbox"/>		<input type="checkbox"/>	Surfactants, Non-ionic	<input type="checkbox"/>
Cyanide [note 1]	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
Fluoride	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
Sulphate	<input type="checkbox"/>		<input type="checkbox"/>	Trihalomethanes	<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Name (BLOCK LETTERS): Signature: Date:

Note 1. Specify whether the form of cyanide required is 'total', or 'weak acid dissociable', or 'amenable to chlorination', or other.

Chain of Custody Data Sheet

Consigned TO (laboratory)	Name	
	Address	
Date sent		
Person or organisation responsible for Transport		
Consigned BY (sampler)	Name	
	Address	
	Phone/e-mail	

DETAILS OF SAMPLES

Number or other Identification on Carrier Box	Unique Sample Identification Numbers of Sample Containers in Carrier Box

ADD TO THIS TABLE EACH TIME CUSTODY OF THE SAMPLES CHANGES HANDS

Organisation	Name of Person (BLOCK LETTERS)	RECEIVED BY:			RELINQUISHED BY:		
		Time	Date	Signature	Time	Date	Signature

RECEIVING LABORATORY; Please Fax or email a copy to Consignor at.....

Examples of Field Instrument Maintenance and Calibration Record Sheets

These are examples of record sheets suitable for storing chronologically in a ring file binder. They are provided here as a guide for designing record sheets specific to brands and models used by work units. For specific instruments, both the frequency of maintenance tasks and the appropriate calibration endpoints for recording should follow the manufacturer's recommendations.

Maintenance Records

Example 1 – Preventative Maintenance Checklist

PREVENTATIVE MAINTENANCE CHECKLIST
 YSI/GRANT MODEL 3800 WATER QUALITY LOGGER
 METER NUMBER 703 DATE 15/10/99

GENERAL

Probes mounted in the sonde require routine maintenance to ensure accurate water quality measurements are available at all times. Refer to appendix 7 of the Water Quality Monitoring Quality Assurance Manual for details of maintenance procedures.

No	REQUIREMENT	STANDARD	ACTION	INITIALS
1	Battery Check	Replace if < 7.7 volts	8.1 V	
2	Clean Conductivity Probe	Weekly/as required	✓	
3	Clean DO probe	Weekly/as required	✓	
4	Replace DO probe membrane	Every 2 - 4 weeks/as required		
5	DO anode ammonia treatment	As required		
6	Clean pH probe	Weekly/as required	✓	
7	Recondition pH probe	As required		
8	Clean Temperature Probe	Weekly/as required	✓	
9	Clean Depth Probe	Weekly/as required	✓	
10	Reinitialise meter	Monthly	✓	
11	Recharacterise depth probe	Annually (by manufacturer)		

Example 2 – Preventative Maintenance Log Sheet

LOGSHEET METER NUMBER 903

DATE	ACTION/INCIDENT/FAULT	INITIALS
16/10/96	D.O. membrane displaced a little in site of probe. Replaced	
16/10/96	Turbidity "0" recalibrated. Was reading 2 in 0	
23/10/96	Turbidity "0" recalibrated. Was reading 4 in 0	
7-1-97	Reinitialised etc	
6-1-97	At 0.58, the second point on pHV survey, meter function on pH 8.75 Temp 25.5	
	Looses 40. Jaws beam switch off and on. Unusable but last date.	
6-1-97	in 40% problems - Reinitialised	
	time. DO still unstable.	
7-1-97	All OK - operated fine all day until last thing. 0.01% all probes. Reconnected cable from both ends to no avail.	

Calibration Records

Example 1 – pH Meter Calibration Log

SONDE NUMBER 1817
 CALIBRATION LOG - FREQUENCY WEEKLY WHEN IN USE.
 pH ± 0.2

DATE	STAIN AND	-4		-7		-10		INITIALS
		PRE CAL VALUE	POST CAL VALUE	PRE CAL VALUE	POST CAL VALUE	PRE CAL VALUE	POST CAL VALUE	
1-8-11	4.00	4.03	4.00	6.87	6.94	9.20	9.20	
1-8-11	4.00	3.98	4.00	6.87	6.80	9.20	9.19	
1-22-11	4.00	4.03	3.99	6.87	6.93	9.20	9.20	
1-29-11	4.00	3.98	4.00	6.87	6.88	9.20	9.26	
2-5-11	4.00	3.98	4.00	6.87	6.87	9.19	9.19	
2-12-11	4.00	4.02	4.00	6.87	6.89	9.20	9.19	
2-19-11	4.00	4.02	4.00	6.87	6.86	9.19	9.20	
2-26-11	4.00	4.03	4.00	6.87	6.97	9.20	9.18	
3-5-11	4.00	4.00	4.00	6.87	6.87	9.20	9.19	
3-12-11	4.00	4.05	4.00	6.87	6.85	9.20	9.20	
3-19-11	4.00	4.00	4.01	6.87	6.88	9.20	9.18	
3-26-11	4.00	4.03	4.00	6.87	6.87	9.20	9.22	
4-2-11	4.00	4.03	4.00	6.87	7.03	9.20	9.17	

Example 2 – Turbidity Meter Calibration Log

SONDE NUMBER 1817
 CALIBRATION LOG - FREQUENCY WEEKLY WHEN IN USE.
 TURBIDITY
 ± 0.05 NTU ± 12 NTU ± 42 NTU

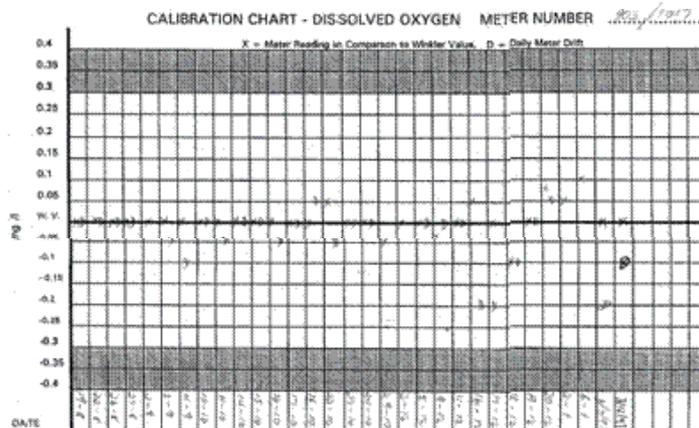
DATE	PRE CAL VALUE	POST CAL VALUE	0 NTU		200 NTU		800 NTU		INITIALS
			PRE CAL VALUE	POST CAL VALUE	PRE CAL VALUE	POST CAL VALUE	PRE CAL VALUE	POST CAL VALUE	
1-8-11	0	0	190	203	612	799			
1-8-11	0	0	186	200	601	800			
1-22-11	0	0	120	200	628	800			
1-22-11	0	0	179	200	757	800			
1-29-11	0	0	197	200	808	800			
2-5-11	0	0	197	197	797	800			
2-5-11	0	0	199	200	808	801			
2-12-11	0	0	188	201	800	800			
2-19-11	0	0	197	200	810	800			
2-26-11	0	0	166	201	800	800			
3-5-11	0	0	197	200	810	800			
3-12-11	0	0	166	201	783	800			
3-19-11	0	0	195	200	754	800			
3-26-11	0	0	196	200	801	800			
4-2-11	0	0	200	200	784	801			
4-9-11	0	0	193	200	794	800			
4-16-11	0	0	203	200	784	798			
4-23-11	0	0	193	200	824	800			
4-30-11	0	0	190	200	803	800			
5-7-11	0	0	203	200	783	800			

Example 3 – Dissolved Oxygen (DO) Meter Calibration Log

SONDE NUMBER 1817
 CALIBRATION LOG - FREQUENCY: DAILY WHEN IN USE.
 Dissolved Oxygen ± 0.3mg/L

DATE	TIME	TEMP °C	PRESSURE Kpa	ORIG. %Sat	PRE CAL VALUE %	POST CAL VALUE %	WINKLER mg/L	METER mg/L	INITIALS
1/8/11	08:30	23.6	101.4	0.402	98.9	100.1	7.4	7.34	
POST	15:15	20.4		0.402			7.05	7.1	
1/15/11	09:45	26.9	102.3	0.258	101.5	100.0	7.6	7.6	
POST	14:00	24.5		0.096			7.6	7.6	
1/22/11	08:15	23.7	101.4	0.406	98.0	100.1	7.2	7.0	
POST	17:00	24.2		0.402			7.4	7.3	
1/29/11	08:25	25.1	101.8	0.110	100.3	100.0	8.0	8.01	
POST	12:35	25.9		0.200			7.9	7.93	
2/5/11	08:20	24.8	102.0	0.280	98.7	100.0	7.4	7.35	
POST	14:45	29.2		0.171			7.3	7.20	
2/12/11	07:10	24.2	101.9	0.358	101.1	100.0	7.6	7.57	
POST	14:45	28.2		0.280			7.2	6.97	
2/19/11	06:55	23.1	100.6	0.450	99.2	100.0	6.3	6.27	
POST	14:00	24.73		0.261			7.0	7.0	
POST									

Example 4 – Dissolved Oxygen (DO) Meter Calibration Chart



Appendix C2 Methods for overcoming limit of detection problems: in situ extractions and the use of passive samplers

The standard grab sample water bottle has a volume of 1 litre or less. However, this is an insufficient volume for the analysis of many contaminants at the sub-microgram per litre concentrations necessary for assessing compliance with water quality guidelines. In principle the level of detection could be improved by collecting a larger sample (e.g. a 10 litre volume could provide an order of magnitude improvement over a 1 litre volume) but this presents many practical difficulties of preservation, transportation, storage and extraction.

More practical options available include in situ extraction of the contaminants of interest, or the use of passive sampling devices.

In addition to resolving level of detection limitations, such techniques (especially passive sampling) provide a practical means of time-integrated sampling whereby contaminants can be monitored on a continuous basis for extended periods (up to several weeks at a time).

These sampling techniques provide an additional set of tools useful for modern monitoring programs.

C2.1 In situ extraction

One such system, solid phase extraction (SPE), makes use of the tendency of contaminants with low water solubility to bind to specific solid materials.

The main advantage of in situ concentration is that large amounts of water can be extracted in the field and need not be transported. In addition, because these systems can be deployed for long periods, they can provide a relatively inexpensive method for integration of contaminants over time. The basic elements for such a system (piping, filter/s, sorbent column/s, pump, power supply, flow meter, control system) can be assembled readily by a good laboratory workshop. Such a system is illustrated in Figure C1.

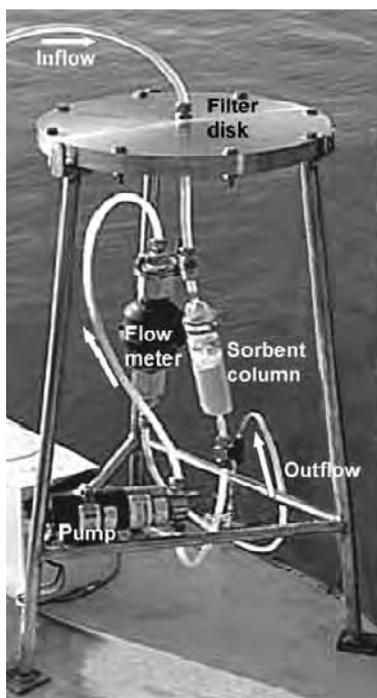


Figure C1 An in situ sampling system pumps a measured volume of water through a sorbent cartridge

Due to the risk of contamination during field extraction of water samples using SPE, it is highly desirable to avoid contact between the water being sampled and the mechanical components of the pump prior to the water reaching the solid phase. Generally, this necessitates plumbing the pump so that it sucks rather than drives water through the extracting media. In practice this requires that the sampling device be situated as close as practical to the level of the water source because suction is limited to one atmosphere of negative pressure, and in practice, due to inherent resistances in the system (piping, filter/s and extracting media), 1–2 m altitude difference is the maximum achievable.

The risk of introducing contaminants from tubing and other components of an in situ sampler is similar to that inherent in automatic samplers (see section 3.1.2). Other requirements of QA/QC also apply such as the wearing of gloves to avoid contamination of sampler components that come in contact with the sample.

C2.2 Passive sampling devices

In principle the use of a passive sampling device involves the deployment of a chemical-absorbing material in the water column (or sediments). After a period of exposure, the absorbent material is retrieved and the accumulated chemicals analysed. Passive samplers can be used to detect contaminants and also to estimate average exposure concentrations during the period of deployment. The latter can be calculated from the duration of exposure, the measured concentration of contaminant accumulated, and the absorption rate of the material used in the sampler.

The basic components of a passive sampling device are an accumulating medium, a membrane to control the rate of uptake, and a mounting structure to contain and protect these components but at the same time expose them to the water being sampled.

Passive sampling devices can be deployed in the field in a variety of situations—hung from floats, suspended from jetties, fastened to stakes inserted in a stream bottom, or anchored to the bottom but held up into the water column by a float.

The normal requirements of QA/QC apply when sampling with passive sampling devices. These include the use of field blanks, replicate samplers, and precautions such as the wearing of gloves to avoid contamination of the sampler or its housing during handling.

Time-integrating passive sampling techniques have become widely used in the last decade. In particular, the use of performance reference compounds introduced into the sampler to enable adjustment of field data from the samplers using kinetic data from the laboratory has increased user confidence in these sampling techniques.

A variety of accumulating media for passive sampling are available, allowing a choice based on the chemical properties of the target contaminants. Examples of common types are as follows.

C2.2.1 Passive sampling for organic pollutants

C2.2.1.1 Semi-permeable membrane device

The most widely used passive sampler design for non-polar chemicals in water is the semi-permeable membrane device (SPMD) shown in Figure C2. It consists of a length of sealed lay-flat PE tubing (the membrane) containing a small volume of triolein (the absorbent phase) woven around a stainless steel frame. The device is then inserted into a perforated stainless steel shroud for protection from mechanical damage during deployment.

Trace levels of contaminants that cannot be detected in conventional water samples are often concentrated to detectable levels by SPMDs or similar devices placed in water for a controlled exposure period.

An alternative to the triolein-based SPMD described above is to use a strip of silicon rubber such as polydimethylsiloxane (PDMS) placed inside the deployment shroud as the absorbent material.



Figure C2 Housing and components of an SPMD passive sampler. The protective cage covers the absorbent strip during deployment

C2.2.1.2 Chemcatcher

This device is a very robust passive sampling device that employs the C18 Empore disk as the absorbent media, combined in most cases with a membrane that allows diffusion of polar chemicals. Depending on the polarity range of the analytes of interest, a range of devices incorporating appropriate membranes and solid phase absorbent media have been developed. One of these devices based on the Empore disk is illustrated in Figure C3.

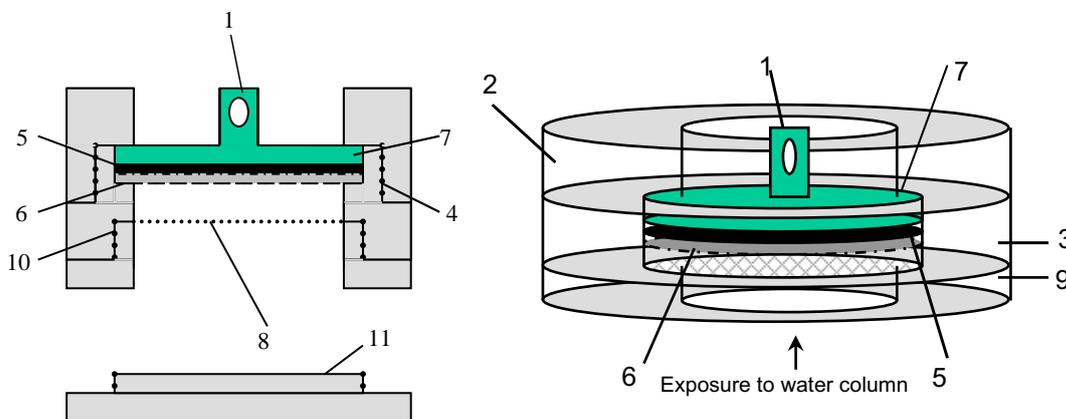


Figure C3 Housing and components of a Chemcatcher passive sampling device

The sampler consists of three interlocking sections (2, 3, 9) manufactured from polytetrafluoroethylene (PTFE) that screw together during deployment to form water-tight seals (4, 10).

Integral to the device is a 50 mm rigid PTFE disk (7) designed to support both the absorbent material (Empore) (5) and the diffusion-limiting membrane (6).

On the reverse is a lug (1) for attaching the device during deployment.

The outer surface of the diffusion-limiting membrane is protected from mechanical damage during deployment by a mesh (8) of either stainless steel for organic analytes or nylon for inorganic analytes. This mesh is held in place during deployment by a removable PTFE ring (9).

A PTFE screw cap (11) replaces the ring (9) during transport to and from the deployment site.

C2.2.2 Passive sampling for metals

The diffusive gradient in thin film (DGT) device employs a resin gel as the accumulating absorbent media, overlaid by a filter (to exclude particulates) and a diffusive hydrogel to maintain a concentration gradient, with the whole loaded into a cylindrical plastic housing (see Figure C4). A series of different gels have been developed to sample a range of metals (both labile and organic species), phosphorus, sulphides and radioactive caesium, and are available in a range of thicknesses. Parallel deployment of two DGT units assembled with different diffusive gel thicknesses allows accurate measurement under low flow conditions.

An important advantage of using DGT to measure metals in saline or marine waters is that the gels do not accumulate the major ions that often cause interferences in the analysis of metals in grab samples of water. The devices sample satisfactorily over a range of pH, with the range limits varying between metals (e.g. down to pH 2 for Cu, but only 4.5 for Cd) and over the range pH 2 to 9 for phosphate.

A variant of the device, known as DET (diffusive equilibrium in thin films) can be deployed to perform relatively rapid (within a day) response times and has the ability to measure at high spatial resolution. The DET comprises a single relatively thick sheet of gel (typically 0.8 mm) supported in a holder. Solutes in the surrounding water diffuse into the gel until concentrations in gel and water are equal.

DGT and DET devices, for both of which the University of Lancaster (UK) holds a worldwide patent, are available commercially, either pre-assembled or in kit form (gel disks and strips for local assembly). For details of supply visit the DGT for measurements in waters, soils and sediments website at <www.dgtresearch.com>.

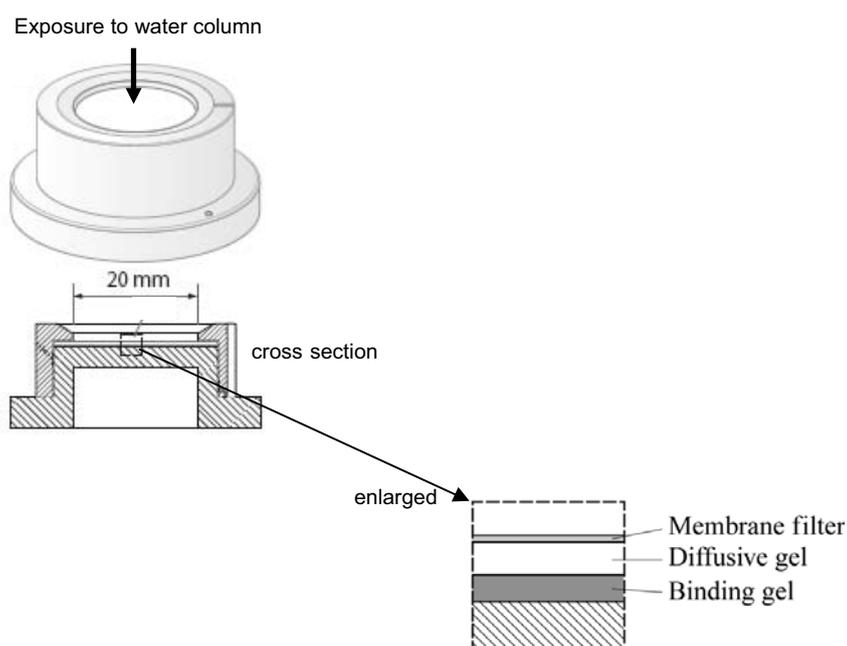


Figure C4 Housing and components of a DGT passive sampling device

Appendix C3 Flow measurement

The most relevant Australian standard for flow measurement of water bodies is AS 3778, parts 1 to 6—Measurement of water flow in open channels. This standard is also relevant to some types of flow measurement for point source discharges. The standard describes comprehensively the range of available methods for measurement. For wastewater discharges, AS 2360—Measurement of fluid flow in closed conduits may also be relevant. Important aspects of these two standards are discussed briefly below.

Methods for measuring water flow in open channels are mainly divided into velocity-area method, measuring structures, dilution method, slope-area method and cubature method. AS 3778.21 (2001) provides guidance on selecting the appropriate methods and explains uncertainties associated with each method.

Velocity-area methods are described in detail in AS 3778 (Part 3). The velocity-area methods are commonly used for estuaries and freshwater streams where no physical measuring structures exist. Some of the methods can also be adopted for measuring wastewater flow in open channels. Most common methods for instantaneous measurements include using velocity meters (stationary or on a boat) and timing a float travelling over a known distance (freshwater only). Continuous measurements can be made using ultrasonic (velocity of sound in water) meters and electromagnetic induction in buried coils.

Weirs, flumes or other physical structure work on the principle that volumetric flow rate is related to a known cross-sectional area or height before some fall. This type of method is often used for freshwater gauging stations and can be used for measuring wastewater flow in an open channel. Some type of water measuring device that needs to be calibrated is usually required for continuous measurement.

The dilution method involves the use of a tracer and sampling of waters to measure the concentration of the tracer where it has uniformly mixed across the cross-section of the waterway. This method of flow measurement is only applicable to freshwater streams. However, tracers are commonly used in estuarine and marine waters to study the dispersion of a wastewater release and to calibrate the hydrodynamics of water quality models.

Methods for measuring flow in closed conduits such as pipes are mainly divided into pressure differential methods, mass methods and volumetric methods. Calibration is essential for this method and strongly linked to the uncertainty of the measurement (see AS 2360.7.1/AS 2360.7.2).

Pressure differential methods are commonly used for measuring flow into plants such as sewage treatment plants and may be used to infer the discharge quantities where flow losses are minimal. Confidence in the flow measurement is strongly dependent on appropriate calibration and should be undertaken as per AS 2360.7.1.

The main types of volumetric methods include static and dynamic gauges, diverters and flow stabilisers. The most common volumetric method used for wastewater discharges is a flow stabiliser where a device such as a pump is used to ensure a stable flow-rate is supplied. If the flow is not continuous, the duration for which the water is flowing can be recorded to calculate total flow for a known period.

Regardless of the method used, it is important that overall uncertainty in the flow measurement is known or calculated. Refer to AS 3778.2.4 for estimation of uncertainty of a flow-rate measurement in open channels and AS 2360.7.1 and AS 2360.7.2 for assessment of uncertainty in calibration and use of flow measurement devices for closed conduits and the specific subsections of AS 2360 for the method adopted.

Appendix C4 Sampling water quality in temporary waters

Temporary waters predominantly occur within arid and semi-arid regions in Australia and are by nature highly variable systems. Temporary waters include:

- **intermittent waters:** areas that are predictably inundated each year, but whose duration of water retention may vary
- **ephemeral waters:** areas that only contain water after irregular rainfall or flow events.

Before any sampling of temporary waters begins, thorough consideration should be given to all the environmental and discharge factors presented below. Regional departmental officers are advised to consult with the Queensland Department of Environment and Resource Management Environmental Sciences division while others are urged to seek advice from environmental consultants experienced in developing sampling programs for temporary waters.

C4.1 Sampling the receiving environment

Due to the highly variable nature of receiving environments in arid and semi-arid areas, there is no standard set of sampling techniques. Choosing the correct approach will depend on a variety of factors, which include the:

- stage of the hydrocycle (flowing, pooling or dry)
- amount of vegetation in the catchment
- underlying geology of the waterways
- amount of biological activity
- location along the catchment (sink, shallow flowing, etc.)
- proximity of sensitive areas or areas of special significance
- variations in the intensity of evapo-concentration
- accessibility to potential sampling locations.

Ideally, there should be a temporal as well as a spatial component to the sampling of temporary waters. Sampling should be distributed evenly along the catchment and through time to get a clear indication of water quality.

C4.2 Sampling release waters

Certain considerations need to be taken when sampling temporary water receiving environments after a discharge or release has occurred. Due to the temporary nature of the flow in these water bodies, there is the potential for environmental harm to occur:

- with the resumption of flow, where active ecosystems located downstream of the discharge point are subjected to a pulse exposure to contaminants
- with the cessation of flow, where the concentration of contaminants within remnant pools begins to increase due to the effects of evapo-concentration.

Historical releases during dry phases may have resulted in the accumulation of contaminants in the sediments. With the resumption of flow (either due to rainfall, wastewater release or other cause), these contaminants can be remobilised and may cause environmental harm to ecosystems located downstream. The level of environmental harm (if any) is dependent on the concentration of the contaminants and the level of dilution afforded by the flow. This is discussed in greater detail in section C4.3.1 below.

Sampling of temporary waters at or downstream of the release point should always be accompanied by reference site sampling. Additionally, wherever possible, sampling should take place at multiple points within both the receiving and the reference environments so that suspect or outlier data can be recognised.

C4.3 What to sample

There are three main approaches to establishing water quality in temporary waters, namely:

- surface waters
- sediment
- biological assessment.

A brief outline of each of these approaches is presented below. Further guidance to each of these can be found in ANZECC/ARMCANZ (2000).

C4.3.1 Surface waters

The sampling of temporary waters is usually event-based, occurring upon resumption of rainfall during the flood stage of the hydrocycle or release/overflow of waters from an industry. It may take the form of manual grab samples of surface waters, or be performed by remote automatic samplers that trigger sampling at a particular water level or at pre-determined intervals. To ensure adequate monitoring of contaminants, water samples should also be collected as the drying phase of the hydrocycle progresses. Protecting the ecosystem in temporary waters is usually easier during high flow events due to the effects of dilution. However, when flow diminishes, evapo-concentration of contaminants in surface waters can occur, thereby potentially heightening the effects of exposure on components of the ecosystem. It is during the drying phase that many of the ecosystem components are in their reproductive stages. Even in the 'dry' state there is an array of live organisms in the sediments, often in desiccation-resistant life stages ready to repopulate the surface waters when the waters return.

It is recommended that the Queensland AusRivAS methodology be adopted when sampling non-permanent waterways (see section 4.1).

It should be noted that the initial flush of water after dry periods will be very likely to give a skewed assessment of water quality. The first flush that occurs immediately after rainfall may be more damaging (poorer water quality) than the subsequent flow; however, this pulse is typically only short lived and is unlikely to harm encysted or dormant stream fauna.

There are two scenarios that are likely to be encountered where temporary waters exist. If the receiving environment is:

- an ephemeral or temporary waterway without pools, or temporary or permanent water bodies of ecological significance for many kilometres downstream, any live biota still existing within the boundaries of the watercourse will most likely be in a dormant stage below the sediment surface. Consequently, there will be minimal exposure to the first flush of water that enters that watercourse. Hence sampling of remnant water that will harbour and support the emergent biota will be much more ecologically relevant
- an ephemeral or temporary waterway with pools, or temporary or permanent water bodies of ecological significance located downstream, and is likely to be impacted by first flush water flows, permanent or recently established water bodies will most likely harbour active life stages of biota. These will be vulnerable to the effects of a pulse exposure of contaminants associated with first flush waters. In this case, sampling of the first flush water and sampling of the residing water in the permanent/semi-permanent water body (post-exposure) would be warranted.

Due to the variability in flows, it can be useful to incorporate automatic samplers for sampling temporary waters. See section 3.1.2 on using automatic samplers.

C4.3.2 Sediments

Water quality should be measured directly and quantified wherever possible; however, this is seldom possible in arid environments. It is more likely that samples will need to be taken during the dry stage of the hydrocycle. Sampling may have to rely partially or entirely on historical deposition of contaminants in the sediment of dry river beds.

Contaminants in sediment samples can be extracted in the laboratory to estimate their potential bioavailability.

Some of the problems inherent in relying on sediment quality are that:

- the relationship of sediment quality to actual water quality is often uncertain, making extrapolation of data difficult
- only sediment bound contaminants will be measured
- sediment is typically heterogeneous and so care must be taken in ensuring appropriate replication and/or composite sampling.

For further sampling information, refer to AS/NZS 5667.12:1999 Guidance on Sampling Bottom Sediments.

C4.3.3 Biological assessment

Biological assessment can be a valuable way to establish changes in water quality. This usually involves long-term monitoring of assemblages of organisms both at the impacted and reference sites. Biological monitoring can give an early indication of reduction in water quality.

Guidance on selecting the best approach and the associated methodologies of each can be found in Section 8.1 of ANZECC/ARMCANZ (2000). Some of the approaches to biological assessment are:

- direct toxicity assessment
- seed propagule banks
- aquatic plants (algae and macrophytes)
- monitoring of hyporheic and epigeal fauna.

Some of these biological approaches may require specialist localised knowledge of taxa, and assistance from the appropriate experts may be difficult to procure.

For further guidance, Smith et al (2004) have produced a valuable review of the benefits and flaws inherent in various sampling methodologies in evaluating the impacts of mining in arid and semi-arid regions of Australia.

Further information on applying the ANZECC/ARMCANZ (2000) guidelines to sampling results for temporary waters have been addressed in Batley et al (2003), A Guide to the Application of ANZECC/ARMCANZ Water Quality Guidelines in the Minerals Industry. This publication also provides some extra advice on sampling strategies for temporary waters.

Appendix C5 Bulk natural water and sediment collection for direct toxicity assessment (DTA)

Direct toxicity assessment (DTA) is a useful tool for characterising the combined toxicity of contaminants in a mixture. The toxicological effects of chemicals in combination can be quite different from the effect of each chemical in isolation. By comparing DTA results with the actual or estimated load of contaminants in a discharge, it is possible to develop a range of predictive conditions and potential effects on biota for specific discharge events.

A limitation of DTAs is that it may be difficult to obtain test species that are ecologically relevant (i.e. present) in the catchment being sampled. In such cases, the relevance of DTA results to field situations may be limited due to different sensitivity between species. Nonetheless, the relative toxicity of the discharge to 'standard test organisms' can still be very useful in quantifying the environmental risk posed by the activity.

DTAs can be conducted on bulk water samples or extracts from sediments. Contact the analyst to obtain detailed advice on how to collect samples for DTA before collection.

When collecting bulk receiving environment water samples for the purpose of diluting effluent to be used in DTAs, collect the appropriate volume of water according to the testing laboratory's advice, which should include:

- bottle type
- field storage requirements
- instruction on any preservatives to be used
- instruction on sample security
- instructions for transport.

If the required information is unobtainable prior to collection, follow the guidance provided in this manual.

It is a requirement that physicochemical parameters (pH, conductivity, temperature, ammonia, dissolved oxygen, turbidity and suspended solids) be measured (in the field wherever possible) at the time of collection in accordance with the instructions in this manual, and then again prior to conducting any dilution of the effluent to be tested for the DTA. There may be a requirement for additional parameters to be tested both in the field and prior to using the collected water for effluent dilutions where the time for transport and use of the receiving environment water in the bioassays exceeds 24 hours. Seek advice on this from the department (who will assess this requirement on a case-by-case basis).

Further information on the use of DTA in water quality assessment can also be found in the review by Smith et al (2004), and in the ANZECC/ARMCANZZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

Appendix C6 Contact details for laboratories

Despatch to: Name and organisation street address	Notify: Name telephone and fax numbers email address	Other contacts: Name telephone and fax numbers email address
<i>Physico-chemical analysis—water, sediment, vegetation and animal samples</i>		
<i>Microbiological analysis— water, sediment, vegetation and animal samples</i>		
<i>Pathological/toxicological examination—vegetation and animal samples</i>		

Appendix C7 Units and concentrations

When taking readings from field instruments and test kits, and in interpreting data from sample analysis relative to guideline thresholds and limits in licences and permits, a variety of equivalent and non-equivalent units may be encountered. Take care with units and be consistent in recording readings and interpreting data. To reduce the risk of errors, using standard units of measurement is preferable to generic terms such as 'parts per million'.

Concentrations may be written in symbols using a variety of forms, for example milligrams per litre as $\mu\text{g/L}$ or as $\mu\text{g.L}^{-1}$ both of which are equivalent.

Standard units and their abbreviations

Kilogram	kg	10^3	Parts per thousand	g/kg	mg/g	g/L	mg/mL	$\mu\text{g}/\mu\text{L}$	
Gram	g	1	Parts per million	ppm	mg/kg	$\mu\text{g/g}$	mg/L	$\mu\text{g/mL}$	ng/ μL
Milligram	mg	10^{-3}	Parts per billion	ppb	$\mu\text{g/kg}$	ng/g	$\mu\text{g/L}$	ng/mL	pg/ μL
Microgram	μg	10^{-6}	Parts per trillion	ppt	ng/kg	pg/g	ng/L	pg/mL	fg/ μL
Nanogram	ng	10^{-9}	Parts per quadrillion	ppq	pg/kg	fg/g	pg/L	fg/mL	ag/ μL
Picogram	pg	10^{-12}							
Femtogram	fg	10^{-15}							
Attogram	ag	10^{-18}							

Note particularly that units used to express results by field instruments and test kits are not necessarily consistent with those used in compliance requirements or guideline documents, e.g. phosphate as phosphate (PO_4) is not the same as phosphate as phosphorus (P), similarly, nitrate as nitrate (NO_3) is not the same as nitrate as nitrogen (N), and ammonia as ammonium (NH_4) is not the same as ammonia as nitrogen (N). Use the conversion factors listed below.

Conversion factors for concentrations of N and P compounds

1 mg/L of nitrate (NO₃) as nitrogen (N) = 4.43 mg/L of nitrate as nitrate.

To convert: mg(N)/L to mg(nitrate)/L multiply by 4.43
 mg(nitrate)/L to mg(N)/L divide by 4.43

1 mg/L of nitrite (NO₂) as nitrogen (N) = 3.29 mg/L of nitrite as nitrite

To convert: mg(N)/L to mg(nitrite)/L multiply by 3.29
 mg(nitrite)/L to mg(N)/L divide by 3.29

1 mg/L of ammonia (NH₃) as nitrogen (N) = 1.21 mg/L of ammonia as ammonia

To convert: mg(N)/L to mg(ammonia)/L multiply by 1.21
 mg(ammonia)/L to mg(N)/L divide by 1.21

1 mg/L of ammonium (NH₄) as nitrogen (N) = 1.29 mg/L of ammonium as ammonium

To convert: mg(N)/L to mg(ammonium)/L multiply by 1.29
 mg(ammonium)/L to mg(N)/L divide by 1.29

1 mg/L of phosphate (PO₄) as phosphorus (P) = 3.066 mg/L of phosphate as phosphate

To convert: mg(P)/L to mg(ammonium)/L multiply by 3.066
 mg(ammonium)/L to mg(P)/L divide by 3.066

Molar units and their abbreviations

Concentrations may also be expressed in molar units (M). A mole is 6.022×10^{23} particles (of nitrogen, or ammonia, or phosphorus, etc.). A mole of anything contains the same number of items.

A molar concentration is the number of moles in a litre of solution, for example, a 1M solution of ammonia as nitrogen (N) contains 14 grams of nitrogen (N) in a litre of solution (14 gN/L).

Using the standard units table above it follows that a 1 mM solution of ammonia contains 0.014 gN/L, and a 1 μ M solution of ammonia contains 0.014 mgN/L.

Conversion factors for concentrations in molar units

Ammonia – N and Nitrate – N and Nitrite – N

1M ammonia (or nitrate or nitrite) as nitrogen (N) = 14 gN/L,
therefore 1.0 mgN/L ammonia (or nitrate or nitrite) = 71.4 μ M

To convert: mgN/L to μ M multiply by 71.4
 μ M to mgN/L divide by 71.4

Urea – N

1M urea as nitrogen (N) = 28 gN/L,
therefore 1.0 mgN/L = 35.7 μ M

To convert: mgN/L to μ M multiply by 35.7
 μ M to mgN/L divide by 35.7

Phosphate – P

1M phosphate as phosphorus (P) = 31 gP/L,
therefore 1.0 mgP/L = 32.3 μ M

To convert: mgP/L to μ M multiply by 32.3
 μ M to mgP/L divide by 32.3

Silicon – Si and SiO₂

To convert: SiO₂ to Si multiply by 0.4674

1M silica (Si) = 28.1 gSi/L,
therefore 1.0 mgSi/L = 35.6 μ M

To convert: mgSi/L to μ M multiply by 35.6
 μ M to mgN/L divide by 35.6

Conductivity units and their abbreviations

The unit of measurement for conductivity is siemens (S) per unit of length. A siemen is the reciprocal of the unit of electrical resistance, the ohm (Ω).

Some common EC unit expressions used for reporting conductivity are:

- microsiemens per centimetre ($\mu\text{S}/\text{cm}$ or $\mu\text{S}\cdot\text{cm}^{-1}$)
- millisiemens per centimetre (mS/cm or $\text{mS}\cdot\text{cm}^{-1}$)
- decisiemens per metre (dS/m or $\text{dS}\cdot\text{m}^{-1}$)
- millisiemens per metre (mS/m or $\text{mS}\cdot\text{m}^{-1}$).

The SI unit is mS/m . Equivalence relationships among these units include:

- $1 \text{ dS}/\text{m} = 1 \text{ mS}/\text{cm} = 100 \text{ mS}/\text{m} = 1000 \mu\text{S}/\text{cm}$
- $1 \text{ mS}/\text{m} = 10 \mu\text{S}/\text{cm}$

Appendix C8 Sample containers and preservation methods

IMPORTANT: Use section 3.3 to interpret these tables correctly.

Table C8.1 Alphabetic list of water quality characteristics covered in this manual

Parameter	Quick reference
Acidity and alkalinity	
Adsorbable organic halide (AOX)	
Aluminium	See 'metals'
Ammonia	See 'nutrients'
Anionic surfactants	See 'surfactants, anionic'
Arsenic	See 'metals'
Barium	See 'metals'
Biochemical oxygen demand (BOD)	
Boron	
Bromide	
Cadmium	See 'metals'
Calcium	See 'metals'
Chemical oxygen demand (cod)	
Chloride	
Chlorine, free	
Chlorine, free residual	See 'chlorine, free'
Chlorine, total	
Chlorophylls	
Chromium	See 'metals': separate entries for 'hexavalent' and 'total' forms
Cobalt	See 'metals'
Colour	
Conductivity	
Copper	See 'metals'
Cyanide	
Dissolved oxygen	
Electrical conductivity	See 'conductivity'
<i>Enterococci</i>	See 'bacteria'

Parameter	Quick reference
<i>Escherichia coli</i> and thermotolerant coliforms	See 'bacteria'
Faecal coliforms	This term has been superseded by 'thermotolerant coliforms'
Fluoride	
Hardness	See 'metals'—'calcium', and follow instructions under that heading
Herbicides	See 'herbicides and pesticides'
Hydrocarbons, petroleum	
Iodide	
Iron	See 'metals'
Lead	See 'metals'
Lignins and tannins	
Magnesium	See 'metals'
Manganese	See 'metals'
Mercury	See 'metals'
Molybdenum	See 'metals'
Nickel	See 'metals'
Nitrate	See 'nutrients'
Nitrite	See 'nutrients'
Nitrogen, oxidised	See 'nutrients': 'oxidised nitrogen' is the sum of nitrate and nitrite
Nitrogen, total	See 'nutrients'
Nitrogen, total kjeldahl	See 'nutrients'
Non-ionic surfactants	See 'surfactants, non-ionic'
Oil and grease	
Organotins (e.g. TBT)	
Oxygen, dissolved	See 'dissolved oxygen'
Pesticides	See 'herbicides and pesticides'
pH value	
Phosphorus, dissolved	See 'nutrients'
Phosphorus, total	See 'nutrients'
Polychlorinated biphenyls (PCB)	

Parameter	Quick reference
Polynuclear aromatic hydrocarbons (PAH)	
Potassium	See 'metals'
Selenium	See 'metals'
Silver	See 'metals'
Sodium	See 'metals'
Solids, dissolved	
Solids, suspended	
Sulphate	
Sulphide	
Surfactants, anionic	
Surfactants, non-ionic	
Suspended solids	See 'solids, suspended'
Thermotolerant coliforms	See 'bacteria'
Total dissolved solids	See 'solids, dissolved'
Trihalomethanes and haloacetic acids	
Turbidity	
Uranium	See 'metals'
Vanadium	See 'metals'
Zinc	See 'metals'

When a parameter is not identified in this manual, contact the analyst for proper collection techniques.

Table C8.2 Water samples—containers and preservation methods

Quality characteristic (water samples)	Container code (as above)			Filling method and/or sample filtering (if any)	Preservative to add [†]	How much: (a) OR (b)		Storage conditions [§]	Rec. max. holding period [†]	Other instructions
	V	W	M			(a) Mass or volume	(b) to pH shown			
Acid t y and a ka n t y	250	D	P	F c o n t a i n e r e x c u d e a r	None	—	—	Refrigerate	24 hours	Analyse in the field if practicable (consult analyst about procedure)
Adsorbab e organ c ha de (AOX)	1000	A	G	F c o n t a i n e r e x c u d e a r	Nitric acid	—	1-2	Refrigerate in the dark	3 days	Transport sample promptly to laboratory so that analysis can be started as soon as practicable
Bacter a <i>Escherichia coli</i> and thermotolerant bacter a Enterococ	200	See note [2]	G or P	—	—	—	—	Refrigerate	Max mum 24 hours see note [3]	—
Biochem ca oxygen demand (BOD)	1000	W	G or P	F c o n t a i n e r e x c u d e a r	None	—	—	Refrigerate in the dark	24 hours	Check with the laboratory on suitable arrival time
Boron	100	D	P	F c o n t a i n e r e x c u d e a r	None	—	—	—	1 month	—
Bromide	100	D	P	—	None	—	—	Refrigerate in the dark	1 month	—
Chem ca oxygen demand (COD) (use 1 of the 2 methods)	100	A	G or P	F c o n t a i n e r e x c u d e a r	Sulphuric acid	—	1-2	Refrigerate	7 days	—
Chem ca oxygen demand (COD) (use 1 of the 2 methods)	100	A	G or P	F c o n t a i n e r e x c u d e a r	Sulphuric acid	—	1-2	Freeze	1 month	—

Container codes: V, Volume: Typical sample volume, mL (see note [1]); W, Washing: A = Acid, D = Detergent, S = Solvent, W = Water, M, Material: G = Borosilicate Glass, P = Plastic (examples: Polyethylene, PTFE, PET, polypropylene or similar); [†] Except where specifically stated otherwise, put sample in container first, THEN add the preservative/s. [§] Refrigerate = cool to 1-4°C; Freeze = freeze to -20°C; [†] Denotes recommended maximum time from collection in the field to analysis in the laboratory.

Chloride	100	D	P	—	None	—	—	—	—	Keep sample out of direct sunlight	1 month	—
Chloride, free	100	D	P	—	None	—	—	—	—	Keep sample out of direct sunlight	5 min	Determine immediately on site
Chloride, total	100	D	P	—	None	—	—	—	—	Keep sample out of direct sunlight	5 min	Determine immediately on site
Chlorophyll (use 1 of the 2 methods)	See note [4]	—	—	See note [4]—keep filter paper (filtered quds not required for tests)	None	—	—	—	—	Refrigerate in the dark	24 hours	Sample must be transported in the dark
Chlorophyll (use 1 of the 2 methods)	1000	D	G or P	—	—	—	—	—	—	Wrap for defter paper in a um in um fo and freeze in the dark	1 month	—
Codour	500	D	P	—	None	—	—	—	—	Refrigerate in the dark	48 hours	—
Conductivity (use 1 of the 2 methods)	100	W	P	F container completely to exclude air	None	—	—	—	—	Refrigerate	24 hours	Determine status on site if possible
Conductivity (use 1 of the 2 methods)	100	W	P	F container completely to exclude air	None	—	—	—	—	Refrigerate	1 month	—
Cyanide, Total see note [5]	500	W	P	—	Sodium hydroxide solution (see caution*)	—	=>12	—	—	Refrigerate in the dark	24 hours	*Caution: this procedure can create etha HCN gas
Dissolved oxygen (DO) (use 1 of the 2 methods)	300	W	G	—	None	—	—	—	—	—	—	Determine status on site
Dissolved oxygen (DO) (use 1 of the 2 methods)	300	W	G	—	Winkler solution	—	—	—	—	Store in the dark	24 hours	—
Furide	200	D	P	—	None	—	—	—	—	—	1 month	PTFE (poly-tetrafluoroethylene) containers are unsuitable
Herbicides and pesticides:	1000	S	G*	Do not pre-rinse container with sample material. Do not completely fill container (leave headspace of approx. 1-2 cm depth)	Sodium thiophosphate; see note [6]	—	—	—	—	Refrigerate in the dark	7 days	* Lid of sample container must have insert of a um in um or PTFE (poly-tetrafluoroethylene). Protect sample from light

Herbicides and pesticides: Carbamates pyrethrins synthetic pyrethroids organophosphorus and inorganic pesticides	1000	S	G*	Do not pre-rinse container with sample material. Do not completely fill sample container (leave headspace of approx. 1-2 cm depth)	Sodium phosphate: see note [6]	80 mg per sample	—	Refrigerate	7 days	* Lid of sample container must have insert of aluminum or PTFE (polytetrafluoroethylene)
Hydrocarbons, petroleum	1000	S	G	Do not pre-rinse container with sample material. Fill bottle completely with sample (no headspace)	Sulfuric acid	—	1-2	Refrigerate	1 month	—
Iodine	500	D	P	—	None	—	—	Refrigerate in the dark	1 month	—
Lignins and tannins	250	W	G	—	None	—	—	Refrigerate	7 days	—
Metals — calcium or magnesium (use 1 of the 2 methods)	250	A	P	Fill container completely with excudate	Nitric acid	—	1-2	—	1 month	—
Metals Method 1	250	A	P	Fill container completely with excudate	None; see note [7]	—	—	—	7 days	—
Metals — calcium or magnesium (use 1 of the 2 methods) Method 2	100	A	P	—	None	—	—	Refrigerate	24 hours	—

Metals —mercury	250	A	G	For 'd sso ved' form, f ter on site; see note [9]	N tr c ac d and Potass um d chromate 50 mg/mL	— 5 mL per 250 mL sample; or more. (See right-hand column)	1-2	—	1 month	If sample wastes or contaminated waters, more potassium dichromate may be needed: • If sample is nitrate or a pale color, add 5 mL of preservative shoud turn the distinct color. If the color appears but then fades, more preservative is needed; so add a further 5 mL. Repeat if necessary. • If sample is nitrate or a dark color, it may be difficult to determine whether enough preservative has been added. Discuss with the analyst before sampling for practical reasons. Both preservation steps are required
Metals —potassium or sodium (use 1 of the 2 methods)	100	W	P	—	None	—	—	—	1 month	—
Metals Method 1 —potassium or sodium (use 1 of the 2 methods)	250	A	P		N tr c ac d	—	1-2	—	1 month	Permits measurement with other metals
Metals Method 2 —others: Aluminum, arsenic, barium, cadmium, chromium—total (hexavalent + trivalent), cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium, silver, uranium see note [8]	250	A	P	For 'd sso ved' form, f ter on site; see note [9]	N tr c ac d	—	1-2	—	1 month	—

Nutr ents: – Ammon a (use 1 of the 2 methods) Method 1	100	W	P	F ter on ste: see note [9]	None	—	—	Refr gerate	24 hours	Store n area free of contaminat on (ammon a vapour may permeate the wa s of containers even if made of high density polyethylene)
Nutr ents: – Ammon a (use 1 of the 2 methods) Method 2	100	W	P	F ter on ste: see note [9]	None	—	—	Freeze	1 month	Store n area free of contaminat on (ammon a vapour may permeate the wa s of containers even if made of high density polyethylene)
Nutr ents: – N trate (use 1 of the 2 methods) Method 1	100	W	P	Unfiltered sample	None	—	—	Refr gerate	24 hours	—
Nutr ents: – N trate (use 1 of the 2 methods) Method 2	100	W	P	F ter on ste: see note [9]	None	—	—	Freeze	1 month	—
Nutr ents: NITRITE (use 1 of the 2 methods) Method 1	100	W	P	—	None	—	—	—	24 hours	Have sample analysed as soon as possible after collection
Nutr ents: – Nitrite (use 1 of the 2 methods) Method 1	100	W	P	—	None	—	—	Freeze	48 hours	—
Nutr ents: – Nitrite (use 1 of the 2 methods) Method 2	100	W	P	—	None	—	—	Refr gerate	24 hours	—
Nutr ents: – Nitrogen, Total Kjeldahl (TKN) or Total (TN) (use 1 of the 2 methods) Method 1	250	W	P	—	None	—	—	Freeze	1 month	—
Nutr ents: – Nitrogen, Total Kjeldahl (TKN) or Total (TN) (use 1 of the 2 methods) Method 2	250	W	P	—	None	—	—	Freeze	1 month	—

Nutr ents: —phosphorus (d sso ved) use 1 of the 2 methods)	100	W	P	F ter on site; see note [9]	None	—	—	Refr gerate	24 hours	—
Method 1										
Nutr ents: —phosphorus (d sso ved) use 1 of the 2 methods)	100	W	P	F ter on site; see note [9]	None	—	—	Freeze	1 month	—
Method 2										
Nutr ents: —phosphorus (total) (use 1 of the 2 methods)	250	W	P	—	None	—	—	Refr gerate	24 hours	—
Method 1										
Nutr ents: —phosphorus (total) (use 1 of the 2 methods)	250	W	P	—	None	—	—	Freeze	1 month	—
Method 2										
O and grease	1000	S	G	Do not pre-r ise conta ner wth samp e materia. F bott e comp ete y w th samp e (no head space)	Su phur c acid	—	1-2	Refr gerate	1 month	—
Method 2										
Organot ns (e.g. TBT)	1000	S	G	—	None	—	—	Refr gerate	7 days	* L d of samp e conta ner must have nsert of a um n um or PTFE (po y-tetrafl uorethy ene). Protect samp e from ght
pH	100	D	P	—	None	—	—	Refr gerate	6 hours	Determ ne n s tu or on site f pract cab e
Po ych or rated b pheny s (PCB)	1000	S	G*	Do not pre-r ise conta ner wth samp e materia. Do not comp ete y f samp e conta ner (eave head space of approx. 1-2 cm depth)	Sod um th osu phate; see note [6]	80 mg per L samp e	—	Refr gerate n the dark	7 days	* L d of samp e conta ner must have nsert of a um n um or PTFE (po y-tetrafl uorethy ene)
Po ynucear aromatic hydrocarbons (PAH)	1000	S	G	Do not pre-r ise conta ner wth samp e materia. Do not comp ete y f samp e conta ner (eave head space of approx. 1-2 cm depth)	Sod um th osu phate; see note [6]	80 mg per L samp e	—	Refr gerate n the dark	7 days	—

So ds, d sso ved	1000	D	P	F	conta ner comp ete y to exc ude ar	None	—	—	Refr gerate	24 hours	—
So ds, Suspended	1000	D	P	—	—	None	—	—	Refr gerate	24 hours	—
Su phate	200	W	P	—	—	None	—	—	Refr gerate	7 days	—
Su ph de	500	D	P	—	—	Z nc acetate (10% so ut on)	2 mL per 500 mL sampe	—	Refr gerate	7 days	—
Surfactanis an on c	500	[10]	G	—	—	Su phur c ac d	—	1-2	Refr gerate	48 hours	G assware must not have been washed w th detergent prev ous y
Surfactanis, non- on c	500	[10]	G	—	—	Forma dehyde	25 mL per L sampe	—	Refr gerate	1 month	G assware must not have been washed w th detergent prev ous y
Tr ha omethanes and ha oacet c ac ds (use 1 of the 3 methods)	200	S	G*	F	conta ner comp ete y to exc ude ar	Ascorb c ac d, or	0.125 g per 200 mL sampe	—	—	14 days	*G ass v a w th cap hav ng PTFE-faced septum
Method 1											
Tr ha omethanes and ha oacet c ac ds (use 1 of the 3 methods)	200	S	G*	F	conta ner comp ete y to exc ude ar	Sod um th osu phate: see note [6], or	16 mg per 200 mL sampe	—	—	14 days	*G ass v a w th cap hav ng PTFE-faced septum
Method 2											
Tr ha omethanes and ha oacet c ac ds (use 1 of the 3 methods)	200	S	G*	F	conta ner comp ete y to exc ude ar	Ammon um ch or de	0.2g per 200 mL sampe	—	—	14 days	*G ass v a w th cap hav ng PTFE-faced septum
Method 3											
Turb d ty	100	D	P	—	—	None	—	—	—	24 hours	If pract cab e, determ ne n s tu or on ste

Table C8.3 Sediment samples – containers and preservation methods

Container codes: V, Volume; Typ ca samp e vo urne, mL (see note 1); W, Washing; A = Acid; D = Detergent; S = So vent; W = Water; M, Material; G = Boros cate Glass; P = P astic (exampl es: PTFE, polyethylene, PET, polypropylene or sm ar) [S] Refrigerate = cool to -14°C; Freeze = freeze to -20°C. [†] Denotes recommended maximum time from collection to the field to analysis in the laboratory.

Quality characteristic (SEDIMENT SAMPLES)	Container code (as above)			Filling method	Preservative to add	Preservation procedure			Storage conditions [S]	Rec. max. holding period [†]	Other instructions
	V	W	M			How much: (a) OR (b) (a) Mass or Volume	(b) to pH shown	Refrigerate			
Metals see note [11] (use 1 of the 2 methods)	375	A	G	—	None	—	—	—	—	7 days	—
METALS see note [11] (use 1 of the 2 methods)	Z pock pastic bag	Method 1		—	None	—	—	Freeze	—	1 month	—
		Method 2									
Organot ns (e.g. TBT)	375	S	G	—	None	—	—	Refrigerate	—	7 days	—
		S	G								
Pesticides and herbicides See note [12]	375	S	G	—	None	—	—	Refrigerate	—	7 days	—
Semi-volatile organics Total organic carbon (TOC); see note [12] (use 1 of the 2 methods)	375	S	G	—	None	—	—	Refrigerate	—	7 days	—
		S	G								
Total organic carbon (TOC); see note [12] (use 1 of the 2 methods)	Z pock pastic bag	Method 1		—	None	—	—	Freeze	—	1 month	—
		Method 2									

Note [1] The volume shown is a typical volume for a single determination. The actual volume needed depends on many factors. If practical, discuss with the analytical laboratory before sampling.

Note [2] Sterilisers are required as specified in AS/NZS 2031 2001. For samples from chlorinated sources, these must contain sodium hypochlorite before sampling. The concentration must be such as to produce a concentration of at least 100 mg/mL in the sample. Where bottles are prepared by the laboratory, they should be supplied ready containing the required amount of sodium hypochlorite. Sodium hypochlorite neutralises chlorine, thus preventing further bacterial effects on organisms in the water during transport.

Note [3] AS/NZS 2031 2001 indicates that incubation should commence within six hours of collection; under exceptional circumstances this may be extended to a maximum of 24 hours. The analyst should attach a note to the test report stating the time interval between sample collection and testing.

Note [4] Filter the sample and submit the filter paper (along with the particulate matter accumulated on it) to the analyst. Filter the sample in the field using vacuum filtration equipment. Filter the sample through a fine glass fibre filter (Whatman GF/C or equivalent). The vacuum applied across the filter should be no more than 40 cm of mercury, to avoid possible rupture of cells and consequent release of chlorophyll. The volume of sample needed will depend on the concentration of particulate matter present; a typical volume to filter is 1000 mL, but for samples with high loads, the filter can become clogged before the volume has passed through. **You must record the volume that has actually passed through the filter, and give this information to the analyst with the sample.** Filters and collected particulates must not be touched with fingers and a sampling hand rig apparatus must be kept free of acids as this causes degradation of chlorophyll. Place filter paper in a container that excludes light (for example, a small tube completely wrapped in a minimum for transport to analyst).

Note [5] When requesting analysis, specify which form you require to be determined.

Note [6] Preservative is needed on your sample especially chlorinated. Preservative should be in the bottle prior to filtering with sample.

Note [7] Second method (no preservative) can be used on your sample if: [a] of pH = < 8 and low carbonate content; and [b] drawn solely for determination of calcium, magnesium or hardness.

Note [8] When collecting a sample for determination of chromium (VI), it is suggested that you also collect a sample for determination of total chromium and submit both for analysis. This allows the laboratory to perform the standard test for total chromium first; then, if none is detected, it need not carry out the more complex test for hexavalent (VI) chromium.

Note [9] Filter sample in the field, through 0.45 µm polyethersulfone filter, preferably using fully enclosed pressure filtering equipment, such as syringe (50 mL) with 0.45 µm syringe filter. For turbid samples a glass fibre pre-filter should also be used to make filtering easier.

Note [10] Containers to be methanated according with AS 5667.1:1998.

Note [11] You must specify which metals are to be determined in the sample.

Note [12] If analyses required for total organic carbon (TOC) as well as for pesticides and herbicides, the same sample will suffice for both analyses.

Appendix C9 Fluvial sediment sampling using P 61 sediment samplers and Helley–Smith bedload samplers

C9.1 Skills/competency and experience

Staff skills, training and experience records should be kept up to date. Skills/competency ideal for this method include:

- all members of the sampling party having a current Senior First Aid certificate
- at least one member of the sampling party having had previous training and experience in the use of this method.

During sampling, not all samples retrieved are acceptable. For example, water samples that are contaminated with bedload must not be sent for suspended sediment analysis as they are not representative. Therefore, experimentation may be required to get an idea of the stream condition before taking samples. The whole sampling exercise demands skill, experience and patience and it is highly recommended that a trial run be conducted prior to the wet season for the following reasons:

- ensure that all equipment is operational
- fine tune and improve the data collection exercise
- identify possible problems and seek solutions
- reinforce the tasks to be carried out by each crew member
- provide hands on training for any new crew member.

C9.2 Equipment

Equipment specific to this method include:

- Helley-Smith bedload sampler with sample weighting system
- P 61 suspended sediment sampler with current meter
- ADCP in conjunction with a modified van Dorn sampler
- See Box C9.1 for further equipment requirements.

Two different sediment samplers are involved, one for the bedload sediment (Helley-Smith) and the other for the suspended sediment (P 61). The bedload weighing system is another piece of equipment required and is used in conjunction with the bedload sampler for determining the transport rate. This section details the operation of the Helley-Smith bedload sampler, P 61 suspended sediment sampler and the bedload weighing system. The latter is used in conjunction with the Helley-Smith to determine the bedload transport rate.

Sampler location on boats:

P 61 on the starboard side (right) and the bedload sampler on the port side (left).

BOX C9.1 Equipment requirements for fluvial sediment sampling	
Description	Quantity
Bedload sampling	
Bedload sampler	1
Sampling bags (minimum)	5
Bags for storage of samples	10*
Bedload weighing system	1
Bucket for submerged weighing (20 litres)	1
Wire to attached sampling bag to load cell	1
Stop watch	1
Battery 12V 5.7AH	2
Pencil	4
Screw driver for attaching sampling bags (if sampler not modified)	1
Standard (existing) winch	1
Suspended sediment sampling	
Suspended sediment sampler	1
Sampling bottles (minimum)	24
Plastic bottles for storage of samples	100*
Battery pack (if required)	1
Spare fuse for battery pack (if required)	3
Spare nozzle	2
Modified hanger bar	1
C2 connector	1
Modified powered winch	1
Thermometer	1
Other Items	
Data recording sheets (minimum)	12
12V truck batteries and battery charger	2
Generator	1
Trolley or wheelbarrow (if required)	1
Crane (if necessary)	1
Chain for securing crane to bridge	1
Safety vests	3
Safety cones	4
Flashing light	1
Tomahawk or wire cutters (for cutting four core cable)	1
Large container for storing samples	2

* depending on the number of samples to be collected

C9.3 Method

Sediment sampling involves not only the collection of samples but other related parameters as well. Samples/measurements to be taken are listed as follows:

- point velocity measurement at every location where suspended sediment sample is obtained
- suspended sediment sample
- bedload sample
- timing for each sediment sample (in seconds)
- submerged weight of each bedload sample
- water temperature.

All suspended sediment and bedload samples are to be sent to the Queensland Health Forensic Scientific Services (QHFSS) (or other approved laboratory) for analysis.

C9.3.1 When to measure

Sediments are mainly transported and deposited during flood events. The load is known to be higher during the rising limb than the recession, the rising limb being associated with the removal of stored sediments in the stream or the initial flush of mobile sediment from the land surface, particularly after a severe drought. Stream velocities, and thus sediment transport rates, are also usually higher for a given water level during the rising limb, than during the falling limb.

It is recommended that at least two sets of data be obtained at each sampling site for a flood event, one on the rising limb and the other on the recession limb. Ideally, the measurements should be taken during the period close to the maximum discharge. Figure C9.1 illustrates the two possible starting times, A and B.

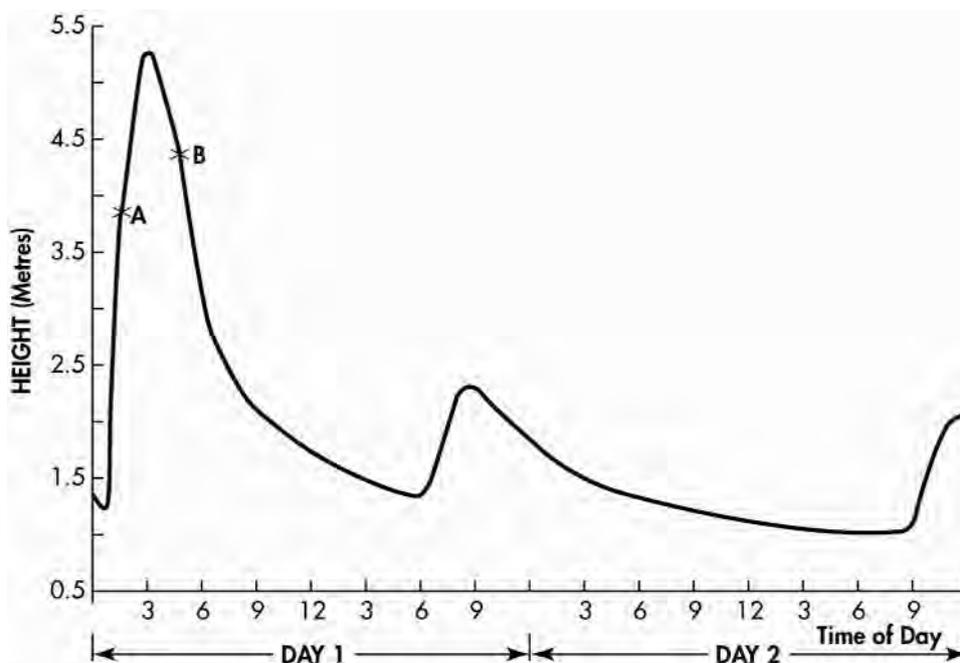


Figure C9.1 Possible starting times (A and B) for sampling (for short duration floods)

In most cases, however, the selection of the starting times is very much dependent upon when the hydrographic team arrives and the time required to set up the equipment, particularly in a catchment of quick response. Figure C9.2 shows the period T, where the measurements can be taken.

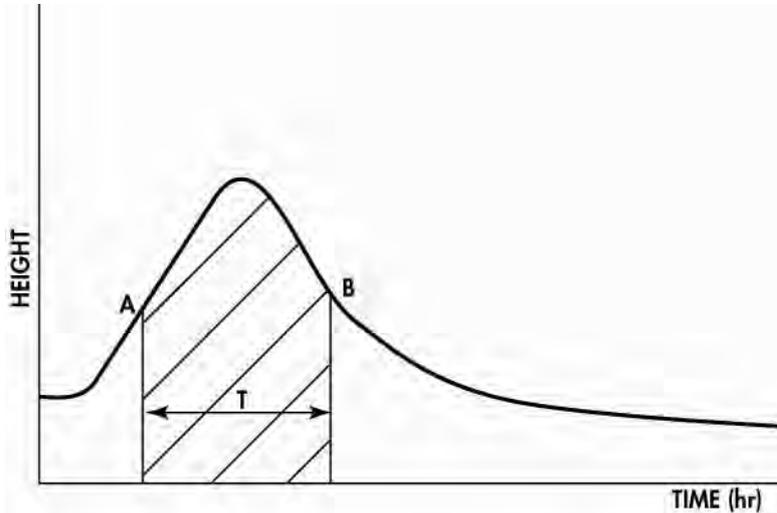


Figure C9.2 Period (T) where samplings should be conducted

Measurements should cease when it takes a long time to collect the bedload (e.g. greater than about 10 minutes). For floods of longer duration (e.g. two or more days), advantage should be taken to collect more than two sets of data. In this case the selection of the starting times for sampling can be better decided. Figure C9.3 presents the possible starting times, A to D, for four sets of sediment sampling.

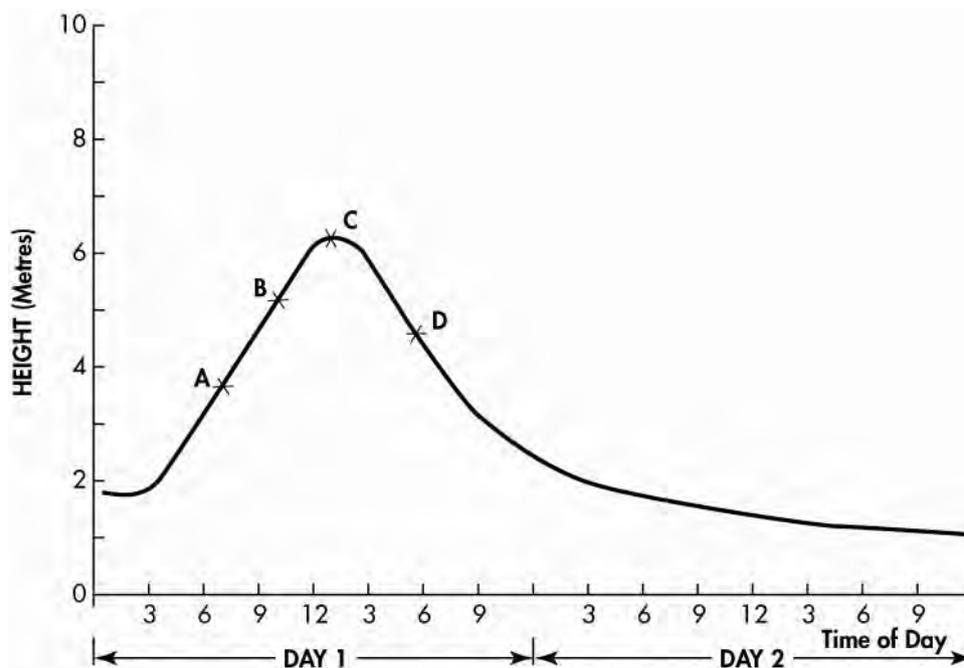


Figure C9.3 Possible starting times for sampling (for long duration floods)

C9.3.2 Selecting verticals for sampling

The number of verticals required in a cross-section for sediment sampling is dependent upon the width, discharge distribution, accuracy sought, as well as the concentration variation across the river at the time of sampling. The location of each vertical is normally chosen based on:

- equally spaced verticals—with this method, the channel width at the water surface is divided into sections of equal width corresponding to the number of verticals required. This is a relatively easy method to use as the discharge need not be known prior
- strips of equal discharge—in this method, verticals are arranged according to the distribution of water discharge across the section. Each sampling vertical represents approximately equal portions of discharge. It is, however, a more involved process as the discharge must be computed prior to the sampling work
- consideration of the transverse distribution of sediment concentration—another method of selecting the verticals is to consider the transverse distribution of sediment concentration. In zones of large concentration variation, verticals are placed closer together whereas a lesser number of verticals is used on the floodplain.

Recommendation: Location of verticals should be established before sampling for a possible range of flow depths to avoid additional workload in the field. Consult with the Project Manager.

C9.3.2.1 Flow confined within main channel

Figure C9.4 shows an example of a selection of five equally spaced verticals (or six equal segments) across the stream. Where operationally possible, the distance between each vertical should not be more than 50 metres). This will, however, be stream/site-specific.

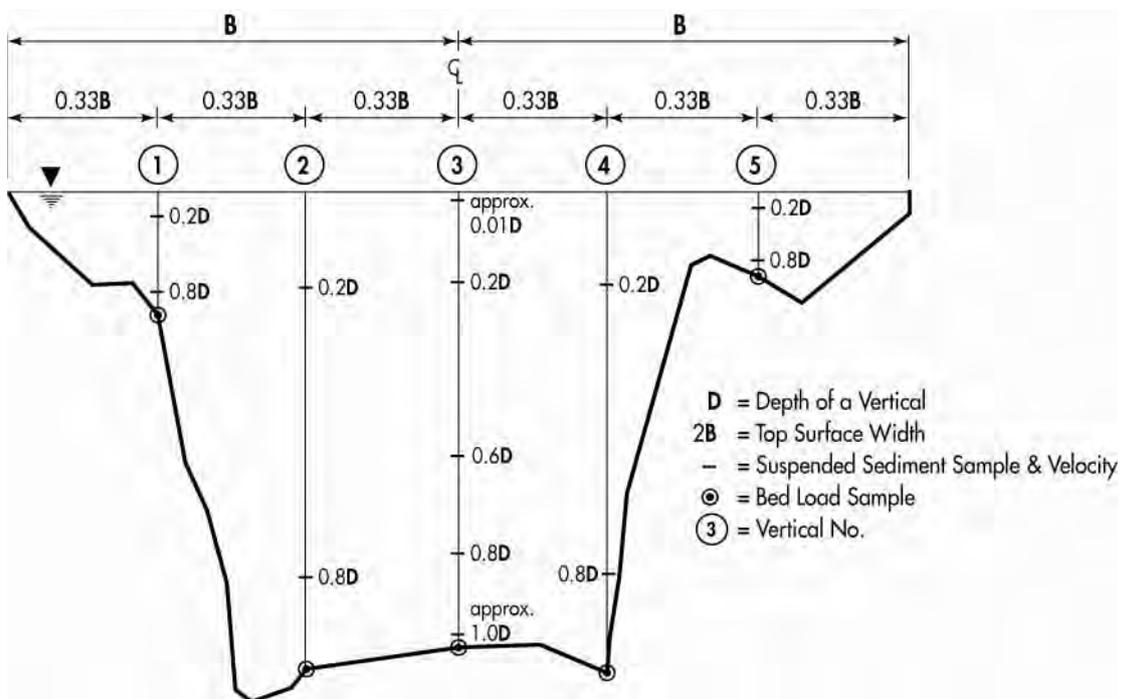


Figure C9.4 Location of sampling points (flow confined within main channel)

NOTE: for ADCP measurements, the distance from the bottom and top differs due to back scatter noise.

C9.3.2.2 Over bank flow

In the event of significant over bank flows, more verticals should be placed in the main channel and less over the floodplain. Figure C9.5 presents an example where the main channel is divided into four equal portions and one vertical is placed in the middle of the floodplain.

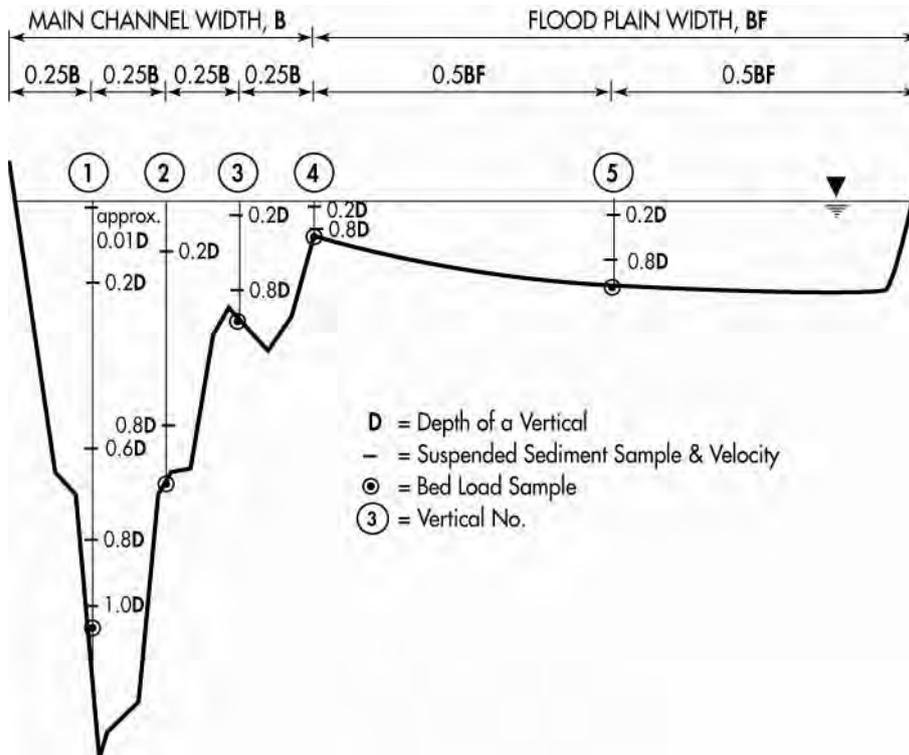


Figure C9.5 Location of sampling points (significant over bank flow)

NOTE: for ADCP measurements, the distance from the bottom and top differs due to back scatter noise.

However, the selection of the verticals at some sites may differ from the above to meet specific program objectives and advice should be sought from the Project Manager. To minimise the time required for completing a set of sediment measurements (and also possible confusion), the sampling should be carried out as a separate exercise to the stream gauging. The latter requires a larger number of verticals.

C9.3.3 Sampling methods for suspended sediments

There are two methods commonly used for sampling of suspended sediment, namely depth and point integration:

- **Depth integration**—in depth integration, the water–sediment mixture is taken continuously while the sampler is moving at a constant transit rate throughout a vertical. However, this method is limited to a depth of 4.5 m only for round trip sampling or 9 m for single trip. Furthermore, the transit rate of lowering or raising should be kept constant and should not exceed four-tenths of the mean velocity of a vertical. This condition must be adhered to for reliable results.
- **Point integration**—point integrated sampling involves an accumulation of water sediment mixture that is representative of the mean concentration at any selected point in a stream, over a short period of time. There is at least one selected point in a vertical.

Recommendation: In view of the operational difficulty and the depth constraint for the depth integration method, the more robust point integration method is recommended.

The number of sampling points in a vertical should vary according to the depth of the stream and the size of sediment in suspension. Commonly used methods are the one, two, three and five point methods. Their relative depths (measured from the water surface) are shown in Figures C9.4 and C9.5. More points selected would imply a longer duration of sampling (which may be counter productive) and result in higher costs for laboratory analyses. Hence the accuracy desired has to be balanced against cost and time.

Recommendation: Locations of the sampling points are recommended as follows:

Flow confined within the main channel

The middle vertical has five points at relative depths of 0.0, 0.2, 0.6, 0.8 and 1.0 The rest of the verticals are taken at relative depths of 0.2 and 0.8 (Figure C9.4).

Over bank flow

The five point sample is preferably taken in the deepest part of the main channel. For the rest of the verticals, samplings are taken at relative depths of 0.2 and 0.8 (Figure C9.5).

C9.4 Equipment use

C9.4.1 Acoustic Doppler current profiler

The acoustic Doppler current profiler (ADCP) is a standard instrument used in the collection of stream flow data. During this process, backscatter information from suspended sediment particles is also collected. This backscatter data can be used in the calculation of sediment loads (as water quality samples are collected in conjunction with each ADCP run). However, several points need to be considered before collecting point sediment samples with a P 61 sampler when using the ADCP:

- Blanking distance (blank after transmit)—the same transducer is used to receive the acoustic energy after transmitting a pulse. A short time (or a short sound travel distance) must pass before receiving is possible. This delay is called the blanking distance, and it allows the ADCP to ring down and become acoustically quiet before receiving the return signal. For the 600 kHz and 1200 kHz Rio Grande ADCPs, this distance is 25 cm.
- Near zone distance—there is also a shallow layer of water near the bottom for which the data is not used to compute discharge. When the ADCP sends out an acoustic pulse, a small amount of energy is transmitted in side lobes rather than in the direction of the ADCP beam. Side lobe reflection from the bottom can interfere with the water echoes. This gives erroneous velocities for the water near the bottom. WinRiver II does not use data in the region that may be affected. The ADCP has beams oriented at 20 degrees from the vertical, and the thickness of the side lobe layer is 6 per cent of the distance from the transducers to the bottom (see Figure C9.6).
- Edge estimates—as the name suggests, the flow for the edges is estimated using a power fit method of the data collected near the edge. In most cases for the collection of velocity data for load calculation this would not be an issue.

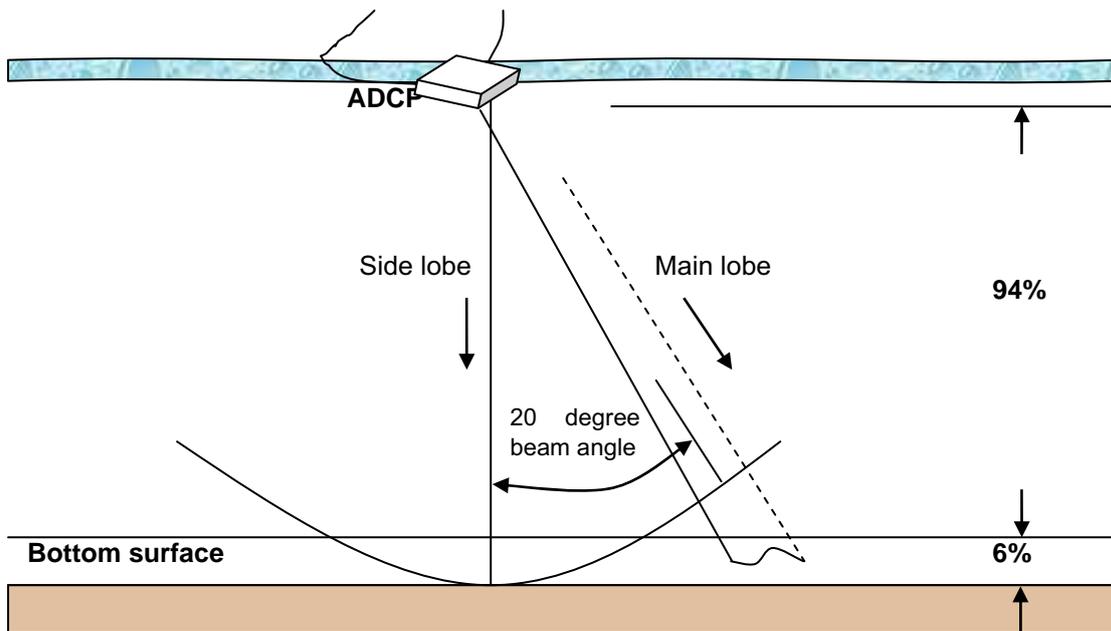


Figure C9.6 Side lobes

Source: Adapted from WinRiver diagram

Due to the methods outlined in Section C5.2, there can be issues due to the effects mentioned above; therefore, some considerations to these effects are required, i.e. modification to the location of the samples (shown in Figure C9.7) to allow for velocities to be extracted from the ADCP data. The operator should be able to quickly calculate the depths required from the output from WinRiver in the field, as the depth at which the ADCP is located (mounted on the boat) and the depth of the water are the influencing factors. The changes required are minimal and any major errors should occur due to the changes in the depth of sample; however, this would require verification before implementation. A detailed operational procedure on ADCP/Sediview applications is to be developed for approval as a standard method.

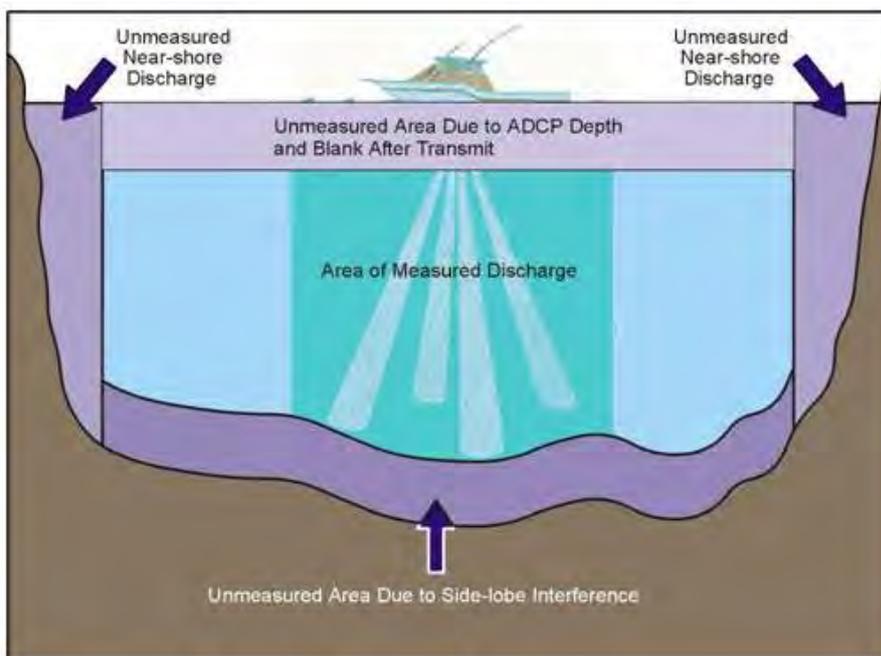


Figure C9.7 Unmeasured regions in the water column

C9.4.2 Helley-Smith bedload sampler

Various types of bedload sampling equipment have been developed and used throughout the world. The Helley-Smith, a pressure difference type, is most commonly used overseas. This sampler is used for bedload sampling (see Figure C9.8). It has an intake nozzle which measures 76 mm by 76 mm. The unit weighs about 48 kg (105 lb), is constructed of a welded stainless steel assembly and has a stabiliser tail assembly. Bedload is caught in a polyester mono filament bag with a mesh opening of 0.2 mm which will not absorb water.

The sampler is best suited for sampling sediments in the range of 0.5 mm to 16 mm, which is appropriate for a large number of alluvial streams in Queensland. Larger sediments will need to be sampled with a larger sized nozzle (152 mm). The sampler is calibrated in a laboratory to determine its efficiency coefficient, defined as the ratio of the trapped sediment to that actually moved as bedload per unit of time. For the range of applications over medium to coarse sand and gravel bed (0.5 mm to 16 mm), the efficiency is close to 100 per cent for flow velocity of less than 3 m/second.



Figure C9.8 Helley-Smith bedload sampler (labelled A) and P 61 suspended sediment sampler (labelled B)

Sampler assembly

1. Remove the bedload sampler from the storage box.
2. Suspend the sampler in the water and adjust the suspension bracket so that the sampler (tail heavy) is at an angle of approximately 25 degrees from the horizontal. To achieve this, release the locking screws and move the sliding collar as an adjustment. Lock the screws and ensure that the suspension bracket is vertical.
3. To reduce the amount of time for set up on site, this step should have already been performed during the trial run prior to the actual measurement.
4. Place the sample bag, with seam uppermost, to the rear of the nozzle.
5. Place an elastic band on the sample bag in the location groove around the nozzle.
6. Slide the metal band over the elastic band, ensuring that the locating pins on the sides are in the secure position for a snug fit.

7. Secure the bag by pulling the clip into a locking position. The metal band and clip arrangement is a modification made to the original equipment for improving handling procedure in the field (original equipment has four clamps which can only be released by a screwdriver—a slow and frustrating job on a boat with a good chance of losing the screws holding the clamps).
8. Connect the hook to the eye at the rear of the sample bag.
9. Connect the C1 connector to the sliding collar.

Sampling

1. Locate the sampling vertical position determined previously.
2. Lower the sampler carefully to the stream bed. When the tail makes contact, slowly lower the nozzle until it is sitting on the bed and start the stop watch; then record the sampler depth. **Care should be taken not to dig the nozzle into the stream bed.**
3. Collect the sample over a period long enough to give a decent sample (which will depend on the local velocity and bedload particle size). Raise the sampler immediately when the time expires.
4. Retrieve the sample bag. This task is easier to perform if the sampler is hauled into the boat.
5. Ensure that the sample bag is not filled by more than 40 per cent, else discard the sample and repeat the exercise with a reduced duration of sampling.
6. Weigh the wet sample, fully submerged in water and record its weight in grams (g).
7. **For samples that require laboratory particle size analysis (PSA), transfer the contents into another container. Ensure correct labelling and record the sample number.**
8. Discard the material from the sample and wash out the sample bag.
9. Record other details as required in the data recording sheet.
10. Assemble the sample bag and repeat sampling.
11. It is recommended that two or three readings be taken at each location. If uncertain or results differ markedly, an additional sample is justified.

Dismantling the sampler

1. Remove the sample bag from the sampler for storage.
2. Ensure the lower clamp screws and clamps are secured to prevent loss or damage in the storage box. For recently modified samplers, ensure that the steel band is properly stored.
3. Return the sampler to the storage box for transportation.

For further procedures on sampling with the Helley-Smith bedload sampler refer to the Hydrological Services Operating instructions for bedload sampler model BLS-30 and model BLS-48

C9.4.3 Bedload weighting system

This system is used to measure the submerged weight of the bedload sample. If the sediment sampling is carried out from a boat, it is highly desirable that the weighing be done on the boat itself, rather than saving the samples for weighing later while on land. When weighing is carried out immediately, the hydrographer is aware of the quality of the data and can make an informed decision as to whether another sample should be collected to improve reliability of the results.

Sampler operation

1. Remove the weighing system from the Peli-case container.
2. Assemble the weighing system (refer to schematic in Figure C9.9):
 - a. Connect the twisted pair wires between the back panel of the digital readout and the battery (e.g. 12V 5.7 AH Sonnenschein).
 - b. Plug the cable from the load cell into the rear panel of the digital readout.
 - c. Attach the two hooks to either end of the load cell.
 - d. Hang one end of the hook to a bar (or a rigid frame).
 - e. Switch on the digital readout and wait for about 10 seconds for unit to stabilise.
3. Ensure that the readout is set to register in g (not lbs), else press the 'weight selection' key.
4. Hang another empty sampling bag (for bedload) on the hook and totally immerse the bag into a weighing bucket part full of water (e.g. 20 L).
5. Zero the digital readout and remove the empty bag.
6. **You may need to provide a length of wire so that the sampling bag can be adjusted to allow for full immersion. Recently supplied bags are fitted with hanger lips for direct attachment to the load cell hook.**
7. Weigh the collected sample bag and its bedload fully immersed in the bucket of water. Place the bag gently onto the load cell, taking care not to snag the hook instantaneously. Record the weight in g.
8. If the boat is rocking or high wind conditions prevail, press the 'Autohold' (second blue button at the bottom of the readout) for 2 seconds. The 'Held' bar will flash on the indicator. The display will then search for a steady weight to lock onto. To turn off this mode, press the 'Autohold' for another 2 seconds.
9. An overflow occurs for weight in excess of 7000 g. This should not occur under normal operating conditions where the sediments consist of sand and gravel.

WARNING: Do not overstress the load cell by the amount indicated in the manual (20 kg).

10. Remove the sampling bag and sediments from the weighing assembly, discard the contents and thoroughly wash out the sampling bag.
11. The digital indicator weighing assembly does not need to be switched off if constantly in use, else repeat steps 4 and 5. Carry a spare battery for the weighing assembly.
12. Re-attach the emptied and washed sampling bag to the bedload sampler and repeat the exercise.

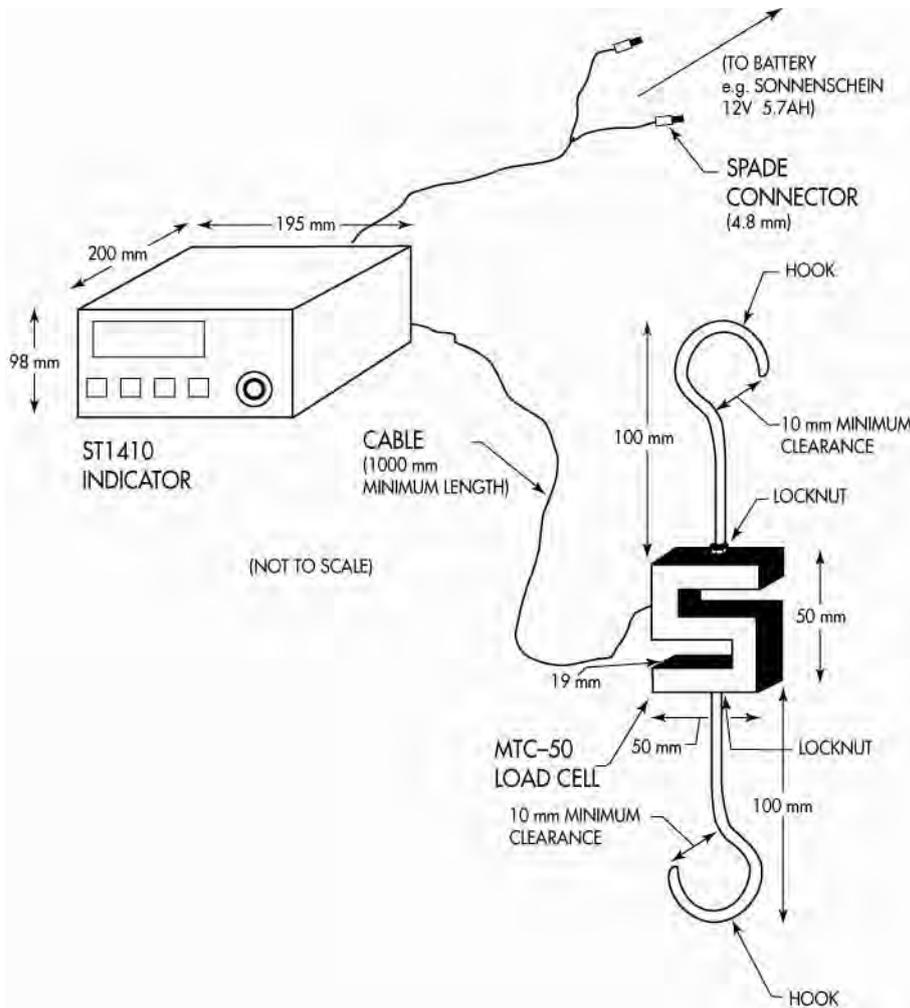


Figure C9.9 Schematic of bedload weighing system

In the past, all bedload samples were analysed in the laboratory for their dry weights. However, a weighing technique, based on the work by Carey (1984), is available whereby the submerged weight can be converted to the dry weight from the knowledge of the specific gravity of the bedload material. The relationship is given by:

$$W_d = [SG/(SG - 1)]W_s$$

where :

W_d = dry weight

SG = specific gravity

W_s = submerged weight

For quartz material, the SG is equal to 2.65, and hence:

$$W_d = 1.606 W_s$$

A major advantage of this technique is that the weighing can be conducted in the field, thereby eliminating the time consuming exercise and costs involved in saving all the samples for laboratory analyses. Only samples that require particle sizing are kept and this represents only a very small quantity. This technique allows more samples to be collected and weighed at no additional costs, and hence improves the reliability of the data.

If the sediment sampling is carried out from a boat, it is highly desirable that the weighing be done on the boat itself, rather than saving the samples for weighing later on land. When weighing is carried out immediately, the hydrographer is aware of the quality of the data and can make an informed decision as to whether another sample should be collected to improve the reliability of the results.

This system was specifically designed for submerged weighing with the desired accuracy.

C9.4.4 P 61 sampler and current meter

The purpose of a suspended sediment sampler is to obtain a representative 'discrete' sample that is representative of the water-sediment mixture in a stream in the vicinity of the sampler. As such, the device is carefully constructed to satisfy several design criteria and it is also calibrated.

Integrating samplers collect a sample over a period of time to average out concentration fluctuations. The P 61 point integrating sampler for suspended sediment is the most common sampler employed in several countries and is used in this method (Figure C9.8). Developed by the US Geological Survey, the P 61 weighs about 48 kg, has a streamlined body and is cast in bronze with tail fins for orientation with the flow.

A solenoid activated valve opens and closes the nozzle during sampling. The water-sediment mixture enters the sampler into the container through the nozzle as air is exhausted through the air-exhaust opening. As such, the sampler should not be overfilled as the desired flow rates will not be attained and the sample will become contaminated by the flow circulating in through the nozzle and out through the exhaust opening.

Sampler assembly

1. Remove the P 61 from the transport container.
2. Connect the hanger bar to the P 61.
3. Assemble the current meter above the P 61 and lock it into position; then measure and record the distances between the current meter centreline and 1, the bottom of the P 61 (e.g. 0.42 m) and 2, and the P 61 intake nozzle centreline (e.g. 0.32 m).
4. Attach the C2 connector to the top end of the hanger bar.
5. There will be two cables dangling from the C2 connector. Plug one of the cables to the current meter. The other cable plugs into the head of the P 61. A locking lever ensures that the plug is secured.
6. On the winch end there will be four cables. Plug two cables to the readout unit of the current meter, while the remaining cables are connected to the battery pack.
7. Artificially rotate the current meter propeller and to confirm that a readout is registered, else interchange the cables. The cables should, however, be marked as 'Meter' or 'Battery' for easy identification.

8. Test the operation of the solenoid valve by holding the switch to the 'charge' position on the battery pack, until the meter registers a reading of about 48 V. Press the switch to the 'sample' position. A click on the P 61 indicates that the valve is operational.

Possible problems at step 8

The solenoid valve may be seized due to deposits formed from prolonged storage. Connect the power supply directly to the sampler, apply power, and strike the side of the sampler head with a rubber or wooden mallet. Never strike the nozzle.

Another reason for failure could be due to a blown fuse in the battery pack. Open the top of the battery cover and the fuse is located on the circuit board just beneath the cover (see Figure C9.10).

Check to see the fuse is operational. If not, change the fuse and replace the cover.

These additional 'repair type' jobs are not desirable during the flood event, thus reinforcing the point that the equipment should be well maintained and a trial run carried out prior to the wet season.

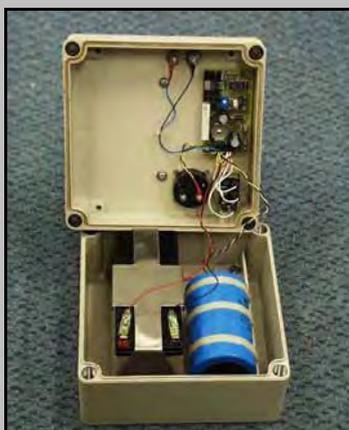


Figure C9.10 Battery pack showing fuse location

9. Open the head and insert the appropriate P 61 sampling bottle (cap removed) with the aluminium adaptor into the body of the P 61. Close the head slowly but firmly to ensure that it snaps into position. It's most convenient to have 13 pre-numbered P 61 sampling bottles which are capped after sampling, and then decanted into laboratory sample bottles back on the bank after each gauging.
10. The sampler is now ready. Take note of the horizontal distance between the sampler and the centre line of the boat.

Sampling (point integration)

1. Locate the sampling vertical.
2. Lower the sampler to the streambed to determine the depth of flow.
3. Raise the current meter to the appropriate position for velocity measurement.
4. Record the point velocity to enable determination of sample duration.
5. Raise (or lower) the P 61 by an appropriate distance to the previous position occupied by the current meter.

6. Press the switch on the battery pack to the 'sample' position for the desired sampling duration.
7. Release the switch on the battery box and hoist the sampler into the boat.
8. Open the head gently, ensuring that the head is always inclined upwards by at least 30 degrees to prevent spillage of the sample.
9. Remove the sample bottle with care.

NOTE: The 500 mL bottle must not be greater than 2/3 full (or 333 ml). If overfilled, discard the sample and repeat the suspended sediment sample collection with a shorter time period. The recommended volume is between 200 and 300 mL. Both levels should be marked on all sampling bottles prior to the event.

NOTE: Sampling time is dependent on stream velocity, so experimentations may be necessary at the start, or devise a local relationship between sampling time and current meter revs (e.g. 3000/C31 Prop 1 Revs).

10. Label the analysis bottle with the water quality field analysis number. Decant the sample into the analysis bottle for the laboratory or, if necessary, another container (e.g. 1 L bottle). This container can be decanted later to the analysis bottle on return to shore. This step isn't necessary during sampling if 13 pre-numbered P 61 sampling bottles are used.
11. Replace the sample bottle in the P 61 and close the head.
12. Move to the next sampling position in the vertical and repeat sampling steps 2 to 12 until all points in a vertical are completed.
13. Move to the next vertical, ensuring that the bedload sampling for the vertical has also been completed.
14. Repeat the process from steps 2 to 14 until all verticals for the cross-section have been sampled.
15. Obtain the temperature of the water (2 m from the bank) if no normal suit of samples are being obtained during the sample run.
16. Back at the bank, decant any samples remaining in P 61 sampling bottles into labelled laboratory sample bottles.

Special care for P 61 samplers

The following care should be taken with the P 61 sampler:

- Handle the nozzle with care; if bent or burred, this will contribute to sampling error.
- Never submerge a sampler without a sample bottle in the body.
- Try not to overfill the sample bottle; otherwise water can flow back through the air exhaust opening into the head.
- Disassemble the head and clean (and dry) all parts after use to prevent the solenoid valve from seizure during storage.

C9.5 Equipment maintenance

Sediment sampling presents a more complex exercise compared to the normal velocity measurements as:

- heavier equipment is involved
- the existing winch and cable arrangement has to be modified to accommodate the 4-core cable
- more tasks need to be performed by the hydrographic team.

To ensure a successful program, all equipment needs to be operational and it is vital to maintain it in a good state of repair. A bench test of all equipment is a prerequisite, including assembling the equipment on a boat, crane or vehicle. Other checks are also required such as:

- operation of the bedload sampler
- operation of the suspended sediment sampler
- sampling bags and bottles are in good condition
- accuracy and operation of the bedload weighing system
- modified winches are operational
- connector and hanger bar are in working condition
- battery pack for the suspended sediment sampler is operational
- modifications made to the boat, crane, etc. are in working condition.

C9.6 Sample handling

C9.6.1 Bedload samples

One sample is to be kept for each data set (i.e. one for every field sheet). This sample, from the deepest part of the channel, is sent to the laboratory for sieve analysis. To assist in the identification of the samples, each sample bag is labelled with the field water quality analysis number using a permanent marker. Details of the sample are completed on the field sheet.

C9.6.2 Suspended sediment samples

The top and bottom suspended sediment samples from the deepest point are analysed for particle size analysis and sediment concentration. The remaining three suspended samples from the deepest point and the other verticals are to be sent for sediment concentration type analysis. The quantity of suspended sediment samples requiring labelling is therefore greater than the bedload samples.

C9.7 Quality assurance

Complete and accurate completion of field sheets is necessary.

Control all possibility of sample contamination. Refer to Part B of this manual.

C9.8 References

AS/NZS 5667.11:1998, Water quality—Sampling: Guidance on sampling of groundwaters, Standards Australia.

Carey, W.P. (1984) A field guide for weighted bed load samples, Water Resources Bulletin, American Water Resources Association, Vol 20, No. 2.

Teledyne Technologies website <www.rdinstruments.com> site last accessed 7 April 2009.

Wong, W.T., Alexander, D.G. and Eades G., Proceedings from the sediment sampling workshop, October 1992.

Appendix C10 Sampling procedures for suspended solids and nutrients—application of water sampling technique

NOTE: The procedure in this appendix includes the triple-rinsing of sample containment bottles with site water prior to taking the sample. This is NOT appropriate when taking samples using specially-prepared bottles such as acid-washed or solvent-washed bottles. Nor is it appropriate if the sample bottles are supplied with the sample preservative already in the bottle (rinsing would lose the preservative). If a bottle for sample containment is supplied pre-cleaned by the analysing laboratory, no useful purpose is served by rinsing it on site. Although it is best practice to use specially-cleaned bottles supplied by the analysing laboratory for sample containment, new bottles, not specifically prepared may be used for sampling nutrients and suspended solids, and in this circumstance, triple-rinsing is appropriate.

C10.1 Background for sampling procedures

Sampling involves the collection of a water sample directly into a suitable sampling container (direct collection) or collection into a temporary sampling container (intermediate container) with subsequent transfer into recommended bottles for storage. Appropriate containers and preservation methods are necessary to avoid risks of contamination of the sample and/or losses of analytes of interest during storage and transit prior to analysis. Details of appropriate sample containers and preservation methods are given in Appendix C8.

When sub-sampling from an intermediate container or when multiple sub-samples are drawn from a single sample, it is important to ensure the sample is homogenous prior to sub-sampling. The use of a sample splitting device (such as a churn splitter or similar) is recommended to achieve this.

There are a number of ways that samples can be collected and the choice of method will be determined by the analyte/s of interest, sampling objectives, and site specific conditions. Equipment used for intermediate and direct sample collection can include the following:

1. an extendable rod and bottle holder that allows for the sample bottle to be manually filled from the stream at a distance away from a stream bank (see section 3.1.1)
2. United States Geological Survey type isometric depth sampling equipment and/or a rope and weighted discrete sampling vessel (e.g. van Dorn sampler) for sampling from bridges, boats or overpasses
3. an automated pumping sampler (see section 3.1.2 Automatic Samplers) allows samples to be pumped from a point in stream to an intermediate sample containers (some refrigerated) for collection. Samplers can be triggered remotely or at pre-specified times or river heights
4. rising stage samplers (RSS) allow samples to be collected from a range of water depths with sample bottles filled as the river level rises during a flow event. Samples can only be collected on the rise of a flow event and are retrieved after the river level has receded (see section 3.1.1).

The choice of sampling equipment is largely dependent on the purpose for which the data is collected. Refer to section 2.1 for guidance on when and where to sample when applying these methods.

When collecting samples using any of these methods it is necessary to prevent contamination of samples (see section 3.5.1.).

Guidance on methods of sample collection provided below is of a general nature. As there are many different types of isometric samplers and van-Dorn like vessels, automatic, and rising-stage samplers available, methods may need to be modified slightly. In such cases, manufacturer instructions should be used for guidance. For all methods, once samples are collected, samples should be preserved and stored in bottles and as appropriate for each analyte of interest (see Appendix C8) and as guided by program objectives.

C10.2 Manual sampling procedures

Where it has been deemed appropriate and safe to collect a discrete unit of water, a sample may be collected manually using an extendable pole sampler or an isokinetic, discrete depth sampler if appropriate.

C10.2.1 Sampling using extendable pole sampler

1. Remove the lid from the 1 L sample bottle and attach the bottle to the end of a sampling rod.
2. Extend the sampling rod into the main flow of the stream. Submerge the bottle to a depth of at least 0.3 m, keeping the mouth end pointing down.
3. Whilst submerged, rotate the sampling rod 180 degrees to bring the mouth of the bottle facing up, and allow the bottle to fill with water; and retrieve bottle.
- 4* Replace the lid and shake the bottle ensuring the inside of the bottle and the lid come into contact with the liquid. Discard the rinse liquid downstream of where you are sampling. Be sure to keep hands away from the mouth of the bottle and the underside of the lid.
- 5* Repeat steps 3 to 4 so that the sample bottle and its lid are rinsed **twice** with stream water then proceed to step 6.
- 6* Repeat step 1 to 3 to fill the bottle. Replace the lid and tighten. If sample requires freezing, ensure you leave 10–20 per cent space free.

*These additional steps (bottle rinsing) only appropriate if specifically cleaned bottles are not being used to collect samples.

C10.2.2 Manual sampling using isokinetic and discrete depth samplers

For methods to operate sampling for specific isokinetic samplers and van-Dorn like vessels, see manufacturer's instructions.

1. Lower the sampling device into the main flow of the stream to a depth of at least 0.3 m.
2. Whilst submerged, trigger the opening/closing device as per manufacturer instructions and allow the bottle to fill with water.
3. Remove the device from the water and agitate to resuspend solid material.
4. Open device and pour into storage bottle in a smooth and constant movement keeping materials in suspension.
5. Replace the lid on storage bottle and shake the bottle ensuring the inside of the bottle and the lid come into contact with the liquid.
6. Discard the liquid downstream of where you are sampling.
7. Repeat steps 4 to 6 so that sample device and storage bottle and its lid are rinsed **twice** with stream water, discard remaining water downstream.
8. Lower the sampling device into the main flow of the stream. Submerge the device to a depth of at least 0.3 m.

9. Whilst submerged, trigger the opening/closing device as per manufacturer instructions and allow the bottle to fill with water.
10. Remove the device from the water and agitate to resuspend solid material.
11. Open device and pour into storage bottle in a smooth and constant movement keeping materials in suspension.
12. Fill storage bottle, replace the lid and tighten. If sample requires freezing, ensure you leave 10–20 per cent space free



Figure C10.1 Van Dorn sampler

C10.3 Automatic sampling procedures

Automatic samplers should be loaded with sample containers that are prepared using the necessary methods to avoid risks of contamination of the sample and/or losses of analytes of interest during storage and transit prior to analysis. Details of appropriate sample containers and preparation and preservation techniques are given in Appendix C8.

For guidance on sample bottle installation and sampler operation please refer to manufacturer instructions.

C10.3.1 Processing samples from automatic pumping samplers

1. Place lids on auto-sampler (intermediate) bottles whilst in the carousel.
2. Remove auto-sampler bottles individually in a sequential order from the auto-sampler carousel (Figure C15).
3. For each auto-sampler (intermediate) bottle follow steps 4 to 7.
4. Shake sample vigorously to resuspend settled material.
5. Remove lid from auto-sampler bottle and rinse storage sample bottle by carefully decanting a small amount of sample into the storage bottle. Shake and ensure the inside of the storage bottle and its lid comes into contact with the liquid then discard rinse water.
6. Repeat this process so that the bottle and its lid are rinsed **twice** with sample water.
7. Replace the lid on auto-sampler bottle and again shake vigorously to resuspended settled sediment then quickly decant sample into sample bottle for storage.



Figure C10.2 Removing samples from the auto-sampler

C10.3.2 Processing samples from rising stage samplers

For guidance on sample bottle installation and sampler operation please refer to manufacturer instructions. Note that the sample inflow assembly of rising stage samplers require rinsing prior to use.

Once river levels have receded enough to allow safe access to the rising stage sampler proceed with sample collection.

1. Remove the in-flow assembly of one bottle from the rising stage sampler, starting from the top and secure sample bottle with a clean, dry lid; if the sample bottle used is an intermediate container please follow steps 4 to 7 in C10.3.1.
2. Label the sample bottle clearly indicating what its position in the rising stage sampler. Start numbering from the bottom up as this is the order in which the bottles filled in (i.e. number in the reverse order to the order of removal).

C10.2 Sampling procedures for filtered nutrients

For any of the sampling methods above, the following steps should be followed when collecting filtered nutrient samples.

1. Refer to instructions for sample collection above. Once sample has been collected:
2. From the sample bottle take up 10 mL in a 60 mL syringe then fully extend the plunger and shake liquid to rinse the syringe ensuring all the inside surface comes into contact with the sample. Expel the water from the syringe downstream from the area where you are working. Repeat to rinse the syringe **twice**.
3. Completely fill the syringe with sample water from sample bottle and attach a filter (and pre-filter if required) to the end of the syringe as shown below (Figure 7a,b).
4. Discard the first 2 mL of the sample water pushed through the filters as a filter rinse (where possible) and then continue pushing another 10 mL of the water sample into the sample bottle.
5. Replace the lid on storage bottle and shake to rinse bottle and its lid. Repeat so that the storage bottle and its lid are rinsed with filtered sample water **twice**.



(a)



(b)



(c)

Figure C10.3 Attaching the pre-filter (a) and filter (b) to the syringe and filtering sample into bottle 'E' (c)

6. Remove filter and fill the syringe completely to 60 mL with sample water from sampling bottle, re-attach filter and use this to fill appropriate storage bottle (Figure 7c). If this becomes difficult, change the filter and/or pre-filter making sure you rinse at least 2 mL of sample water through them before filtering the water into the storage bottle again to the required analysis volume. Make sure to leave at least 10–20 per cent free space for water expansion. Secure the lid and store sample according to appropriate preservation techniques for later analysis.

PART D Sampling bio-indicators of water quality and environmental health

4.1 Macro-invertebrate sampling and assessment

This methodology is based on the Queensland AusRivAS (Australian River Assessment System).

4.1.1 Introduction to AusRivAS

The structure of plant and animal communities of rivers can give us a far more accurate picture of the condition or health of our waterways than measuring water quality parameters alone. Of these biological communities, macroinvertebrates (i.e. animals without backbones and large enough to be seen with the naked eye, e.g. prawns, shrimps, crayfish, snails, mussels and insects such as dragonflies, damselflies and mayflies) are most widely used because they are abundant and diverse, and are sensitive to changes in water quality, flow regime and habitat conditions. Impacts on these animals are relatively long lasting and can be detected for some time after the impact occurs. Impacts on a waterway can be varied: chemical spills, riparian vegetation removal, sand and gravel extraction, or stock access. All of these things can upset the balance, e.g. a chemical spill might kill a large proportion of the macroinvertebrate community, which is a major component of the diet of some fish, and consequently the fish population affected.

The AusRivAS (Australian River Assessment Scheme) model protocol (Simpson et al. 1997) adapts the River Invertebrate Prediction and Classification Scheme (RIVPACS) methods applied by Wright et al. (1984), Moss et al. (1987), Marchant et al. (1994) and aspects of protocols developed by Chessman (1995). This approach to assessing river health was adopted by the National River Health Program (NRHP—comprising the Monitoring River Health Initiative (MRHI) and First National Assessment of River Health (FNARH)). It allows rapid sampling methods to be used for the development of predictive models for macroinvertebrate communities within each state/territory, using a 'reference' site database. Comparisons may then be made between predicted and observed taxonomic compositions of macroinvertebrate communities in different habitats at a site in order to indicate the presence and magnitude of an impact on the site's ecological health. This approach can assess biological responses to changes in water quality and/or habitat condition in rivers and can be integrated with the existing network of physico-chemical water quality monitoring sites.

The actual protocol used (e.g. sampling design, number of sites, subsampling, replication, frequency of sampling, etc.) should be based on the objectives of the monitoring or assessment program. The AusRivAS protocol outlined below is meant for broad scale monitoring (e.g. catchment or regional basis). For smaller scale and specific issues, other methods using control and replicate sites (such as BACIP and multivariate equivalents) may be more appropriate (see Underwood 1993; ANZECC 2000).

The development of a standardised tool such as AusRivAS for broad scale bioassessment is dependent on three factors:

- use of the same biota
- use of the same approach to sampling and sample processing
- use of the same analytical methods for model development and use.

The data can also be analysed in different ways and used for other purposes such as impact assessments, condition and trend reporting, biodiversity and biogeographic studies.

It should be noted that this protocol is for use only in freshwater reaches of rivers and not for use in estuaries or tidal reaches of lowland rivers. Although the general approach may be valid, substantial additional work must be performed prior to its adoption in estuarine and marine conditions.

4.1.2 Sampling program

Important note:

The sampling program described below was followed by the former Department of Natural Resources and Water (NRW) (now incorporated into the Department of Environment and Resource Management—DERM) in developing the AusRivAS predictive models for Queensland rivers. Anyone intending to utilise the models for assessing riverine sites must follow this procedure. Data can then be input into the models run by DERM. Those not intending to use the DERM models but still interested in developing and implementing a broad scale biological monitoring and assessment program for their streams and rivers can also follow this procedure. The advantage of doing so is that a standard method is followed which would permit direct temporal and spatial comparisons of data, and allow sites to be compared with existing MRHI and FNARH reference and test sites.

4.1.3 Site selection

Reference and test sites in Queensland were initially selected for the MRHI program using protocols outlined in the River Bioassessment Manual (Davies 1994). Reference sites were those 'least disturbed' sites sampled for the production of a database used in the construction of predictive bioassessment models (e.g. RIVPACS of Wright et al. 1984). Test sites were those identified to be of importance in assessing the condition of a river known or perceived to be experiencing an impact from water quality or habitat degradation. These protocols were adapted by QNR&W into a list of criteria to which each site was subjected. Table 4.1 lists the 10 selection criteria currently used to determine whether sites are in reference condition.

The input of additional information from outside sources may potentially result in modifications to these assessments. This method will provide a better characterisation of the sites based on numerical categorisation bringing the assessments into line with other programs undertaken by QNR&W. Each criterion relates to an aspect of human activity that impacts on freshwater ecosystems, where impact is defined as a 'change from natural condition'. Each criterion is given a score according to the following categories:

1. very major impact
2. major impact
3. moderate impact
4. minor impact
5. indiscernible impact.

Table 4.1 Selection criteria used to determine eligibility for reference site status

No.	Reference condition selection criteria
1	Influence of intensive agriculture upstream.* Intensive agriculture is that which involves irrigation, widespread soil disturbance, use of agrochemicals and pine plantations. Dry-land grazing does not fall into this category.
2	Influence of major extractive industry (current or historical) upstream.* This includes mines, quarries and sand/gravel extraction.
3	Influence of major urban area upstream. This will be relative to population size, river size and distance between the site and the impact.
4	Influence of significant point-source waste water discharge upstream.* Exceptions can be made for small discharges into large rivers.
5	Influence of dam or major weir.* Sites within the ponded area of impoundments also fail. Sites failing this criterion automatically fail the overall assessment.
6	Influence of alteration to seasonal flow regime. This may be due to abstraction or regulation further upstream than the coverage by criterion 5. Includes either an increase or decrease in seasonal flow.
7	Influence of alteration to riparian zone. Riparian vegetation should be intact and dominated by native species.
8	Influence of erosion and damage by stock on riparian zone and banks. Stock damage to the stream bed may be included in this category.
9	Influence of major geomorphological change on stream channel. Geomorphological change includes bank slumping, shallowing, braiding and unnatural aggradation or degradation.
10	Influence of alteration to instream conditions and habitats. This may be due to excessive algal and macrophyte growth, by sedimentation and siltation, by reduction in habitat diversity by drowning or drying out of habitats (e.g. riffles) or by direct access.

* Note: the level of impact at a site will generally decrease with the distance from the source of impact

Sites are assessed using the total score for the 10 criteria. Currently, those sites that have a total greater than 44 are deemed to be reference sites. Sites that are given a score of 1, 2 or 3 for criterion 5 (no dam or major weir upstream) cannot be reference sites.

4.1.4 Sampling frequency

Any program that attempts to standardise sampling protocols across Australia must take into account the occurrence of rivers encompassing a wide range of predictability and seasonality in river hydrology, life histories of biota and river habitat types. Whether a strong seasonality occurs or not, a minimum number of samples must be taken over time to allow collection of adequate macroinvertebrate taxa information for reference site classification.

The overall aim of the sampling protocol is to ensure that the broadest range of biota are captured at a site by sampling a number of habitats and on a number of occasions. To ensure standardisation and compatibility of data sets, the following protocol was followed for all sites, whether reference or test sites.

The sampling protocol for Queensland rivers and streams requires a minimum of two sample sets in one year. These are sampled on a 'seasonal' basis from October to December (early wet—when flow has been established for at least four weeks) and May to July (late wet—recessional baseflows when flow had declined to a sampleable level, without significant flood peaks). The early wet samples are identified as 'spring' samples; the late wet as 'autumn' samples.

For the model development, each site was sampled twice in one year and the data from the two sample sets were used separately to develop seasonal models, and combined to develop an annual model.

4.1.5 Habitats sampled

Each reach of a stream may have several habitats. If a habitat accounts for more than 10 per cent of the stream reach then it should be considered for sampling. The predominant habitat types are identified at each site and appropriate ones sampled separately. In Queensland, only two habitats are sampled, an edge sample and a bed sample. The first choice of bed habitat is a riffle; failing this a rocky bed is sampled and, finally, a sandy bed. Ensure that the type of bed sampled is recorded on the field sheet.

Separate sampling of distinct habitat types is prescribed because each habitat has a potentially distinct fauna. The performance of the predictive models will therefore not be confounded by differences in habitat availability between sites and times. AusRivAS models have been developed for edge and pool habitats in Queensland for autumn and spring seasons, as well as a combined season annual model. Riffle models may be developed in the future.

In Queensland, the habitats most likely to be encountered are as follows.

4.1.5.1 Riffle

This is a reach of relatively steep, shallow (less than 0.3 m), fast flowing (more than 0.2 m/s) and broken water over stony beds (see Figure 4.1).



Figure 4.1 Riffle habitats

4.1.5.2 Run

A run is a reach of relatively deep and fast flowing, unbroken water over a sandy, stony or rocky bed (see Figure 4.2). These are features of streams during a flood event, below dams where riffles have been 'drowned' or in steep gradient streams flowing through gorges. Under normal flow conditions, it is best to avoid sampling this type of reach. However, pools and riffles may become runs during flood events (e.g. in April) and it may be necessary to sample the area. If possible, delay sampling until flow recedes.



Figure 4.2 Run habitat

4.1.5.3 Pool bed

Pool bed habitats are zones of relatively deep, stationary or very slow flowing water over silty, sandy, stony or rocky beds. This habitat occurs in the main channel and should not be confused with backwaters, which occur as indentations of the bank. Waterholes are generally pools with silty/sandy beds while pools with rocky/gravel beds are often found in steep areas. The velocity will indicate whether it is a pool or run. The classification factor is the bed type, i.e. sandy/silty beds and rocky/gravel beds (see Figure 4.3).



Figure 4.3 Sandy bed and rocky bed habitats

4.1.5.4 Edge/backwater

Edges (or banks and underbank areas) are along the bank where there is little or no current and extend to approximately 0.5 m from the bank. There may be some terrestrial vegetation (e.g. paragrass, sedges) or tree roots, or the area may be bare (e.g. waterholes in drier areas). A backwater is a zone where the bank indents and a pool of water forms away from the main channel (e.g. ox-bow, off-cut channel). The backwater may have a circular or back flow, and a silty bed with accumulated plant litter (leaves, twigs. etc.) (See Figure 4.4).



Figure 4.4 Edge habitats

4.1.5.5 Macrophytes

Macrophyte habitats are areas where emergent, submergent and floating macrophytes or aquatic plants are present and can occur in slow to fast flowing areas. Macrophytes that you are likely to encounter include milfoil (*Myriophyllum* spp.), hornwort (*Ceratophyllum demersum*), waterfern (*Azolla* spp.), salvinia (*Salvinia molesta*), duckweed, water thyme (*Hydrilla verticillata*), water primrose (*Ludwigia* spp.), water hyacinth (*Eichhornia crassipes*), waterlilies (*Nymphaea* spp.), pondweeds (*Potamogeton* spp.) and ribbonweed (*Vallisneria* spp.). These areas are designated on the field data sheet as 'macrophytes' (see Figure 4.5). Although reference and some test site sampling has been done, it is not envisaged that a model will be developed for this habitat. Therefore, this habitat is no longer sampled as part of the AusRivAS approach, although it may still be sampled for other purposes, e.g. nutrient enrichment studies and flow assessments.



Figure 4.5 Macrophyte habitats

4.1.6 Preparing for a field trip

Before embarking on a field trip, some preparation is needed. Appendix H1 and Figures 4.6 and D4.7 outline a list of the equipment needed for macroinvertebrate sampling.



Figure 4.6 Monitoring and sampling gear



Figure 4.7 Monitoring and bug picking gear

4.1.7 Field sheets

Prior to water or macroinvertebrate sampling, information must be recorded on field sheets about the site. This includes information about the whole reach (100 m section of the river), the habitats sampled, and the surrounding terrestrial environment. There are four types of field sheets used by DERM to record information about a site:

- Queensland Site Information Sheet (Appendix H2)
- Water Quality Sampling Field Sheet (Appendix H3)
- Habitat Assessment Field Sheet (Appendix H5)
- Task Sheet (Appendix H6).

Note: All DERM field sheets contain common essential information:

- **Site number:** All sites are allocated a site number, based on the catchment and subcatchment and whether it is a hydrographic gauging station or a 'miscellaneous' site. These numbers contain seven alphanumeric characters: the first three numbers indicate which catchment the sites are in (e.g. 136); the fourth digit, the subcatchment; and the final three, the site. For example, a site with the site code 136017B shows that this site is in the Burnett River catchment (136), within the 0 subcatchment, and the site number within this subcatchment is 17B. Sites with a letter as the final character indicates that these sites have or have had a flow gauging station nearby

- **Site name:** describes where the site is on the river, e.g. Burnett River at Gayndah Flume.

4.1.8 Water quality sampling

All water quality measurements and water samples are required to be collected upstream of the biological sampling area and of the water sample collector. They should be taken from a representative section of the stream, slightly flowing if possible, at a depth of 10–20 cm. Care must be taken to avoid sampling too close to the edge and too close to aquatic plants. Field alkalinity measurements are taken using a titration kit (Figure 4.6). Appropriately calibrated meters are needed to measure temperature, conductivity, dissolved oxygen, pH and turbidity (Figure 4.7). The results are recorded on the Water Quality Sampling Field Sheet (Appendix H3).

The water quality samples are collected in prepared bottles, details completed on the sample bottles, samples preserved correctly, external paperwork completed and samples cross-referenced on the Water Quality Sampling Field Sheet. DERM routinely collects two water samples: one for major ions analysis and one for nutrient analysis (nitrogen and phosphorus). Refer to Part B of this manual for appropriate sampling methodology.

4.1.9 Biological sampling

4.1.9.1 General considerations

Sampling should not be conducted when streams are in flood unless the impact of flood is being investigated. If, during the scheduled sampling period, sites are consistently in flood, sampling should resume 4–6 weeks after floods have subsided. The study site is a 100 m length of stream (50 m upstream and 50 m downstream of the point of entry).

All macroinvertebrate samples should be collected with a standard 250 µm mesh dip net. Recommended dimensions are a triangular 250 mm x 250 mm x 250 mm opening and 50–75 cm depth, and with a 1–1.5 m aluminium handle. The net should be checked for damage prior to a sampling trip and washed thoroughly after sampling each habitat to remove animals left from previous sampling. Sample a total distance of 10 m, covering a variety of velocities, if possible, and different examples of the habitat. (Nets are available from the Australian Centre for Tropical Freshwater Research, James Cook University.)

4.1.9.2 Sampling the habitats

Sampling the riffle

While holding the net downstream with its mouth facing the sampling area, disturb the substratum by digging the foot well into the stones and turning them over. Turn and rub stones by hand to dislodge organisms. Continue this process working upstream over a total distance of 10 m, covering both the fastest and slowest flowing sections of the riffle. Do not include material from macrophytes and/or wood debris located in the riffle. It may be necessary to collect the sample from more than one riffle if the first riffle is less than 10 m in length.

Sampling the pool/bed:

Disturb the substratum by kicking with your feet. If the stream is flowing, hold the net downstream with the mouth facing the disturbed area. If there is no discharge you will have to use a short sweeping action with the net while stirring up the bed. The suspended benthic animals are captured as the net sweeps through the cloud of suspended matter.

Note: Silty/sandy beds—preferably select an area with plant litter (not macrophytes) rather than an area of clean sand.

Note: Rocky/gravel beds—if the rocks are too large to kick over without damaging your foot, wash about 10 rocks of a range of sizes, scrubbing gently with the hands or a light brush into the net. Leave the rocks out of the water to allow cryptic specimens to emerge. These can then be hand picked. Be careful, as leaving the rocks in the sun for too long will dry out and kill the animals. Again, avoid areas where macrophytes are present.

Sampling the edge

Locate an edge area with little or no current or aquatic vegetation (stands of paragrass are acceptable as edge habitat). An alcove or backwater with abundant benthic leaf litter is preferable. Suitable areas include fine organic/silt deposits and/or trailing vegetation and are often indicated by the presence of surface-dwelling insects. In waterholes you may have no choice but to sample the bare edges, perhaps with some tree roots. Using short upward sweeping movements at right angles to the bank, sample a total bank length of 10 m. Stir up the bottom while doing so, ensuring that benthic animals are suspended and then caught when sweeping through the cloud of suspended material. There may be aquatic plants (macrophytes) along the banks and in backwaters. Avoid sampling these areas.

Sampling the macrophytes:

Locate an area with dense aquatic vegetation (if present). Vigorously sweep the net within the aquatic vegetation over a length of 10 m. Aim to sample the upper, middle and lower portions of the plants. A combination of short lateral sweeps with vertical lifts will aid in dislodging and catching suspended organisms. (This habitat was not modelled for AusRivAS.)

4.1.9.3 Picking the sample

Nationally, two methods are used for collecting organisms: field picking and laboratory picking. The choice of which method to adopt will be influenced by considerations of the objective of the study, precision required, time, cost and balance of effort in the field versus laboratory. Either method may be used, although it is preferable to maintain the same technique for all sites. For Queensland, the field picking option has been adopted as the preferred standard method.

Field picking is considered to be more subjective. However, with sufficient training, care and objectivity, it does provide a cost-effective alternative to laboratory picking.

Field picking:

Treat samples from each habitat separately unless it is part of the project design to have composite samples. It is recommended that the sample is initially separated into two fractions (the small organic and substrate material and large rocks and leaf litter) using a 1 cm panning sieve (cheap aluminium ones are available from local camping stores). Sort through these fractions, a small amount at a time, retaining the residue for QA/QC requirements (see below). Work progressively through the sample, replacing picked material with remaining parts of the sample as picking progresses.

Half fill a vial with 70 per cent alcohol (methylated spirits). Ensure the container you use is large enough. If the animals you collect take up more than 30 per cent of the volume, use a larger container. Use alcohol stable vials to avoid vial cracking and sample loss.

Pick for a minimum of 30 minutes, using tweezers and pipettes, and record the total abundance using a hand held counter.

Collect only 10 of any one type (family and, in some cases, order) of animal. If you are not sure of the identity, then collect all of the uncertain ones. At least 30 midge larvae (Chironomidae) should be collected to ensure adequate representation of the sub-families.

At the start of your field pick, the common and abundant taxa should be picked for about the first five minutes. After that, the major picking effort should be directed at finding the less common, inconspicuous taxa. After 10 minutes no more common taxa should be picked unless it is suspected that a particular common form contains more than one family, or it was a common taxon overlooked initially.

If you get 200 animals (about 10 of each type plus at least 30 Chironomidae) then stop at the end of this 30 minute period. If, at the end of the 30 minutes, you have not collected 200 animals then you should collect for a further 10 minutes. If any new taxa are found in those 10 minutes, extend the picking time by another 10 minutes. Follow this procedure until either no new taxa are found, 200 animals have been collected or 60 minutes have been spent on picking. Note the picking time on the field sheet.

Particular care should be taken to search for the groups that can be commonly missed when live sorting (cryptic taxa):

- | | |
|---------------------------------|--|
| Corbiculidae (juveniles) | Oligochaeta (including broken fragments) |
| Chironomidae (larvae and pupae) | Elmidae (larvae) |
| Empididae (larvae) | Hydrophilidae (larvae and adults) |
| Hydroptilidae (larvae) | Simuliidae (larvae) |
| Ceratopogonidae (larvae) | |

If it is a really poor sample (i.e. urban tributary or sandy stream) with very few animals in total, then stop at 60 minutes. Make it clear on the field sheet that it was a poor quality site or sample and why that is so. A poor sample may also result from a bad collection, e.g. a sample taken during high flows over areas which were dry a few days before.

If it is raining or cold, or conditions of poor light exist due to cloud cover or approaching twilight, the sample must be taken back to the vehicle, motel, camp, etc. for sorting undercover and with improved light conditions.

Ensure a completed label is placed in the vial noting the project name, site number and name, sampling date, habitat sampled, sample collector and picker and any relevant notes (see Figure 4.8).

Remove some of the diluted alcohol in the vial using a mesh-covered syringe and replace with fresh 70 per cent alcohol. Fill to top and ensure the lid is tightly screwed on.

RIVER BIOASSESSMENT PROGRAM	
Project Name: _____	Date: ____ / ____ / ____
Site Name: _____	
Site No: []	Habitat: _____
Collector: _____	Picker: _____
Collecting Method: _____	
Picking Method: _____	

Figure 4.8 Label for picked sample

Laboratory picking:

The entire sample is preserved in the field using 70 per cent methylated spirits, a completed label included and the sample adequately stored for transport to the laboratory. Large plastic screw-top jars or heavy-duty plastic bags stored in a polydrum are suitable containers.

4.1.9.4 Field picking quality assurance/quality control (QA/QC)

The residues of 10 per cent of all samples taken in the field are retained for analysis. The entire residue is preserved in the field using 70 per cent methylated spirits, a completed label included and the sample adequately stored for transport to the laboratory. Half of these samples are put aside for external analysis; the other half are subsampled and 10 per cent of each sample are analysed by the unit's staff. The data is analysed, compared to the sample picked in the field, and reports written.

4.1.9.5 Handy tips for field picking

Use waterproof paper for field sheets.

Only use pencil to fill in field sheets and sample labels; ink and felt tip pens smudge and run.

Some macroinvertebrate groups are fairly cryptic, i.e. difficult to detect, particularly in the first 15–30 minutes after collection. To counteract this phenomenon and ensure that you pick a representative sample from the habitat, it is suggested that all the habitats be sampled before picking begins.

Remember to label each sample as you put it into the tray or bucket. The first sample will then have had sufficient time to rest and the animals will have become more active and easier to see (although not necessarily easier to pick). With labels:

- place them inside the vial
- preferably, DO NOT use gummed (stick on) labels
- if you have to use gummed labels, DO NOT remove the backing paper (the animals stick to the label and are irretrievable).

Buckets are always useful—to carry rinsing water, to put your rock collection in, and to split your sample if it is too big. Ensure that you take at least two per person, preferably more. A couple of buckets with lids are also useful if samples need to be transported before picking.

For safety reasons, at least two people should conduct the field sampling. Field time can be best utilised with one person conducting the macroinvertebrate and water quality sampling and the other filling out the field sheets. Once the samples are collected, these can be live picked in the field by both persons to save time.

4.1.10 Laboratory macroinvertebrate sample processing

It is recommended that a registration system be set up for all samples collected. A standard form is recommended for this purpose. These sheets should be filled out for all samples within 24 hours of return from field trips. Cross-checking should be performed so that samples recorded on field sheets are present, labels are accurate and legible and bottles filled with preservative. Labels should have the site name, location code, habitat, sampling method, collector's name, picker's name and date on them (Figure 4.8).

All registration sheets should be filed appropriately and samples stored in labelled lidded containers (to minimise evaporation) in an approved fire-proof storage area. Each box should contain a logical group of samples to facilitate sample identification and handling.

Software for sample registration and archiving should enable integration with the sample database (see below).

4.1.10.1 Sample identification and enumeration

4.1.10.1.1 Field-picked samples

Ensure adequate ventilation in the workplace. Rinse the sample with gently running water through a 250 µm sieve. Flush the sieve contents into a large petri dish with water from a squeeze bottle. Always use water when working with the sample. When finished, replace the water with preservative.

Place the petri dish under a stereomicroscope which is correctly adjusted for your vision and work posture (refer to manufacturer's instructions). Use a vial of suitable size to take the collection of specimens in the petri dish with label inserted. The label should have the following information: collection number, location code, site name, collection date, habitat, sample identifier and the identification date (Figure 4.8). Use pencil or alcohol-proof ink to fill in details. Half fill the vial with 70 per cent ethanol.

A dedicated tally sheet (Appendix H7) should be developed for recording the identities and numbers of all taxa in a sample. The sheet should allow listing of the taxonomic key used for identification for each family, the person making the identification, the site, date and sample code.

Organisms are identified to family level with the exception of lower Phyla (Porifera, Nematoda, Nemertea, etc.) Oligochaetes (freshwater worms), Acarina (mites), and microcrustacea (Ostracoda, Copepoda, Cladocera) for which family level identification is optional (it may improve resolution but is time consuming). Chironomids should be identified to sub-family level. Appendix H8 lists the keys used by DERM.

Select specimens and follow the appropriate taxonomic keys to family level. If uncertain about the identity obtain a second opinion from a colleague/local specialist. If a new family is suspected or other significant issues arise in taxonomic identification, contact the relevant national taxonomic specialist.

Identify each specimen, place in the vial and mark the tally sheet. When all specimens have been counted, record the total tally for each taxon. Place the vial, filled with preservative, in an evaporation-proof container (e.g. a large screw-top glass jar) in a suitable storage location.

Transfer the collected data to an electronic spreadsheet or database. At the completion of the sample series, the database should be cross-checked against the data sheets to ensure that there are no transcription errors.

All sorted collections should be archived, preferably lodged with a regional or state/territory museum, so that any future taxonomic revisions or more detailed identifications can be conducted if required. The relevant museum staff should be consulted well in advance of submission of specimens.

4.1.10.1.2 Fully preserved samples

Tip the preserved sample into a series of 10 mm and 250 mm sieves and thoroughly wash the sample. If there are large coarse fractions (sticks, leaves, etc.) wash these over the sieves and place them into a sorting tray. Examine these coarse fractions preferably using a magnifying glass, for approximately 10 minutes, ensuring that any macroinvertebrates attached to the coarse fractions are collected. Note: keep an eye out for stick and leaf-cased Trichoptera.

Evenly distribute the remaining smaller fractions from the sieves into a subsampler. The subsampler used and recommended by DERM is a modified Marchant subsampler (Marchant, 1989) (see Figure 4.9). This subsampler contains 100 circular cells, each 3.5 cm in diameter x 3.5 cm deep. Fill the subsampler until the water level reaches the top of the cells, secure the lid, and rotate vigorously in both directions until the sample is distributed throughout the cells. Using

a vacuum pump, subsample 10 per cent (10 cells) of the whole sample, ensuring every 1 per cent (1 cell) of the subsample is stored in separate containers.

Sort and identify the subsamples in the procedure described above (see live picking), noting how many new taxa there are in every 1 per cent subsample sorted. If this procedure is used for internal QA/QC checks on field picking, only 10–15 organisms of each family are identified and recorded. However, if the subsampling is required for quantitative sampling, sort and identify all taxa from the subsamples.



Figure 4.9 Modified Marchant subsampler

The long-term aim in the development of this protocol is to further identify samples to genus and/or species level, in order to improve the predictive power of the resultant models. Thus a high emphasis should be placed on the development of a systematic and well designed data entry and sample archiving system. For certain objectives such as impact assessments, it is advisable to identify the animals to the lowest possible taxonomic level, preferably species, although, at present, AusRivAS models are available only for family level assessment. Identifications made at species/genus level can be converted into family level data and run through the models, but the converse is not possible without re-identification.

4.1.10.2 Laboratory identifications QA/QC

Internal QA/QC checks on laboratory identifications are performed on staff, by staff, on a regular basis. At each round of QA/QC, a person is assigned to analyse a sample identified by another. Samples identified during the previous fortnight are selected at random and re-identified. The resultant taxa lists are compared and discrepancies in identification checked by other staff in the unit. Any errors are discussed with the original identifier (both misidentifications and errors of enumeration) and a report prepared which is read and signed by all members that underwent the QA/QC check. Under NRHP guidelines, error rates greater than 10 per cent in identification and counting are not acceptable.

4.1.11 Database entry and software support

A dedicated database should be established to allow for entry, storage, checking and distribution of data and for manipulation of data for subsequent analysis. No specific software package is recommended, although consideration should be given to the ultimate size of the database, the need for ongoing addition of data as the protocol develops into a usable tool, and

compatibility with existing systems and software. The database must allow data files to be translated into ASCII format. Data can be entered by a standard spreadsheet (e.g. Excel) and exported to the database (e.g. ACCESS).

Anyone wishing to utilise the AusRivAS model must comply with data formatting indicated in the AusRivAS Manual (visit <www.ausrivas.canberra.edu.au> or Simpson et al. 1997). The appropriate predictor variables should also be considered. Appendix H9 lists the predictor variables used for the Queensland models.

4.1.11.1 Biological data

An appropriate data entry spreadsheet has been designed as recommended by Simpson et al. (1997). Enter all sample data into a unique file and all sets must match exactly. When data is entered it must be cross-checked against data entry sheets. Use the national taxonomic codes for all families (Appendix H10). Use of this coding will allow compatibility between data sets at the agency, state/territory and national levels and will greatly expedite comparisons and future taxonomic efforts.

4.1.11.2 Habitat data

Design a data entry spreadsheet. Perform all calculations to the raw data to conform with the data requirements for later analysis. Enter this processed data for a site into a unique file. Cross-check the data against field sheets. Use the same site code and the relevant date and sample coding to allow integration of habitat data with the biological samples for later statistical analysis.

4.2 Blue-green algae (cyanobacteria) sampling and assessment

4.2.1 Introduction to blue-green algae

Planktonic cyanobacteria, or blue-green algae, are a common, naturally occurring and integral component of many aquatic ecosystems. As such they often cause no obvious ecological problems. However, a small group of genera produce toxins (cyanotoxins) that have caused sporadic cases of animal poisoning, have been implicated in human hepatoenteritis, and have led to human fatalities.

Cyanobacteria pose a potential health risk through the consumption of water supplies contaminated by cyanotoxins, and through direct exposure to cyanotoxins during water-based recreational activities (i.e. skiing, bathing, wading, boating, etc.). Cyanotoxins have been isolated, identified, and characterised from a number of cyanobacterial taxa, and the ones reported from Australian freshwater to date are presented in Table 4.2.

To reduce the risks of adverse health impacts caused by cyanobacteria, it is essential to routinely monitor water supplies for their presence on a quantitative basis and, where necessary, test for the presence and concentration of their toxins.

Table 4.2 Potentially toxic cyanobacteria reported from Australian freshwaters

Toxic species	Cyanotoxin	Target organ
<i>Anabaena circinalis</i>	saxitoxins	nervous system
<i>Aphanizomenon ovalisporum</i>	cylindrospermopsin	liver
<i>Cylindrospermopsis raciborskii</i>	cylindrospermopsin	liver
<i>Microcystis aeruginosa</i>	microcystins	liver
<i>Nodularia spumigena</i>	nodularins	liver
<i>Nostoc cf. linkea</i>	unidentified	liver

4.2.2 Guidelines for assessing blue-green algae

The Australian Drinking Water Guidelines (NH&MRC/ARMCANZ 1996) currently provide guidance for one of the four major classes of cyanotoxins found in Australian freshwaters. The guidelines recommend that the concentration of total microcystins in drinking water not exceed $1.3 \mu\text{g L}^{-1}$ (expressed as microcystin-LR toxicity equivalents). Due to the lack of adequate data, no guideline values have been set for the other three classes of cyanotoxins. Given the presence of cyanotoxins other than microcystins in Queensland freshwaters, DERM recommends a conservative approach be adopted wherein a value of $1.0 \mu\text{g L}^{-1}$ is used for cylindrospermopsin and Paralytic Shellfish Poisons (PSPs) as an interim guidance level until sufficient data has been collected to allow for the development of individual guidelines for these two cyanotoxins.

The risk of adverse health effects through recreational contact in water containing cyanobacteria varies with the concentration of cyanobacteria and the nature of the activity. The risk is derived from contact with both the known cyanotoxins produced by the species listed in the World Health Organization (WHO) Guidelines (Table 4.3), as well as from a group of yet unidentified, non-specific compounds produced by cyanobacterial taxa which have been recorded as producing symptoms ranging from mild skin irritations to nausea, and pneumonia-like symptoms.

Table 4.3 WHO guidelines for safe practice in managing bathing waters which may produce or contain cyanobacterial cells (after Chorus & Bartram 1999)

Hazard status	Guidance level or situation	Health risks	Recommended action
High	Cyanobacterial scum formation in contact recreation areas or > 100 000 cells total cyanobacteria mL^{-1} or > $50 \mu\text{g L}^{-1}$ chlorophyll-a with dominance of cyanobacteria or > $12.5 \text{ mm}^3 \text{ L}^{-1}$ cyanobacterial biomass	Short-term adverse health outcomes such as skin irritations or gastrointestinal illness following contact or accidental ingestion Severe acute poisoning is possible in worst ingestion cases	Immediate action to prevent contact with scums Signs to indicate HIGH alert level—warning of danger for swimming and other water contact activities
Moderate	20 000–100 000 cells total cyanobacteria mL^{-1} or $10\text{--}50 \mu\text{g L}^{-1}$ chlorophyll-a with dominance of cyanobacteria or $2.5\text{--}12.5 \text{ mm}^3 \text{ L}^{-1}$ cyanobacterial biomass	Short-term adverse health outcomes, e.g. skin irritations, gastrointestinal illness, probably at low frequency	Signs to indicate MODERATE alert level—increased health risk for swimming and other water contact activities
Low	< 20 000 cells total cyanobacteria mL^{-1} or < $10 \mu\text{g L}^{-1}$ chlorophyll-a with dominance of cyanobacteria or < $2.5 \text{ mm}^3 \text{ L}^{-1}$ cyanobacterial biomass	Short-term adverse health outcomes unlikely	Cyanobacteria either absent or present at low levels—continue monitoring

The provisional guidelines for cyanobacteria in bathing water as adopted by DERM are presented in Table 4.4. These guidelines are based on the WHO guidelines for safe practice in managing bathing waters which may produce or contain cyanobacterial cells (Chorus & Bartram 1999). Rather than providing a single threshold value, these guidelines are framed as a series of three guidelines, which reflect incremental severity and probability of adverse effects. These guidelines can be assessed using cell concentrations or cell biovolume concentrations. The later measure is preferred, as it takes into account the huge size range of cyanobacterial cells that occur in natural populations and recognises that the contribution of cyanobacterial cells to the hazard is proportional to their cell volume.

Cyanotoxins have also been demonstrated to pose serious adverse effects on mammals, birds and fish and as such are being increasingly recognised as a potent stress and health hazard factor in aquatic ecosystems. Exposure of aquatic organisms may occur both orally by uptake of toxin-contaminating cells as food, or through the surface tissues of organisms submerged in water containing dissolved cyanotoxins. Despite a growing body of evidence on the ecological effects of these compounds, there are currently no accepted guidelines for cyanobacteria and their toxins relating to the protection of aquatic ecosystems.

Table 4.4 Outline of monitoring classes for national cyanobacterial sampling protocol (after Jones et al 2002). These are the provisional guidelines adopted by DERM.

Monitoring class	Recommended use category	General method description	Surety of results
A1	Public health surveillance of drinking water supplies. Condition and trend monitoring— high priority water bodies	Open water sampling from boat Detailed visual surveillance (for scums) High counting precision ($< 30\%$ counting error)	High to very high
A2	Public health surveillance of recreational water bodies. Condition and trend monitoring— moderate priority water bodies	Shoreline or bank sampling Detailed visual surveillance (for scums) High counting precision ($< 30\%$ counting error)	High
B1	Condition and trend monitoring— moderate priority water bodies	Open water sampling from boat Low to moderate counting precision ($> 30\%$ counting error)	Moderate to high
B2	Condition and trend monitoring— low priority water bodies. Community group monitoring	Shoreline or bank sampling Low to moderate counting precision ($> 30\%$ counting error)	Moderate
C	Public health surveillance for scum formation in bathing waters. Community group monitoring of cyanobacterial growth	Visual surveillance only	High (for scum surveillance only) Low

4.2.2.1 Storage classification

A national approach to cyanobacterial monitoring taking into account the varying needs and objectives of government agencies, councils, community groups, and members of the public was developed with the creation of a Draft National Protocol for the Monitoring of Cyanobacteria and their Toxins in Surface Waters (Jones et al 2002). It recognised a number of monitoring classes which decrease in effort and cost, and therefore precision and certainty of monitoring and analysis outcome, from that termed 'class A1' monitoring, to that termed 'class C' monitoring.

The scheme is three tiered, with each tier providing a different level of sampling and analytical precision, and overall certainty of monitoring outcome. Storage operators should determine the appropriate sampling regime based on this monitoring class classification system. A summary of the monitoring classes is given in Table 4.4.

4.2.3 Monitoring sites

Buoyant cyanobacteria tend to accumulate near or at the shoreline at the down wind or down stream end of reservoirs or river reaches. Therefore, for high priority public health surveillance monitoring, 'depth integrated', open water sampling is preferred. The selection of sampling sites will depend on a number of factors including prevailing winds, the position of stream inflows and the proximity to potential nutrient input sites. Open water sampling provides, in general, a better representation of the true or average cyanobacterial population of the water body. Open water or mid-stream sampling is normally carried out by operations staff working from a boat. For drinking water supplies, sampling the appropriate depth next to, or from the water off-take tower, is desirable.

In general, one open water site in the vicinity of each recreational area, and one sampling site at the water supply off-take tower, should give adequate coverage for both the water supply and recreational use health issues posed by cyanobacteria. It is desirable that both sites are marked with a buoy or similar device to ensure that sampling occurs in exactly the same area, no matter who samples.

4.2.4 Equipment required for algae sampling

The following equipment is required for the sampling of algae:

- integrated hose-pipe sampler—5 m length of 2.5 cm diameter plastic tubing with a weighted collar at one end (see Figure 4.10)
- a cord attached to the hose and boat
- a rubber stopper to fit one end of the tubing
- a bucket
- Lugol's iodine preservative solution
- 200 mL amber Polyethylene terephthalate (PET) plastic bottle and lid.

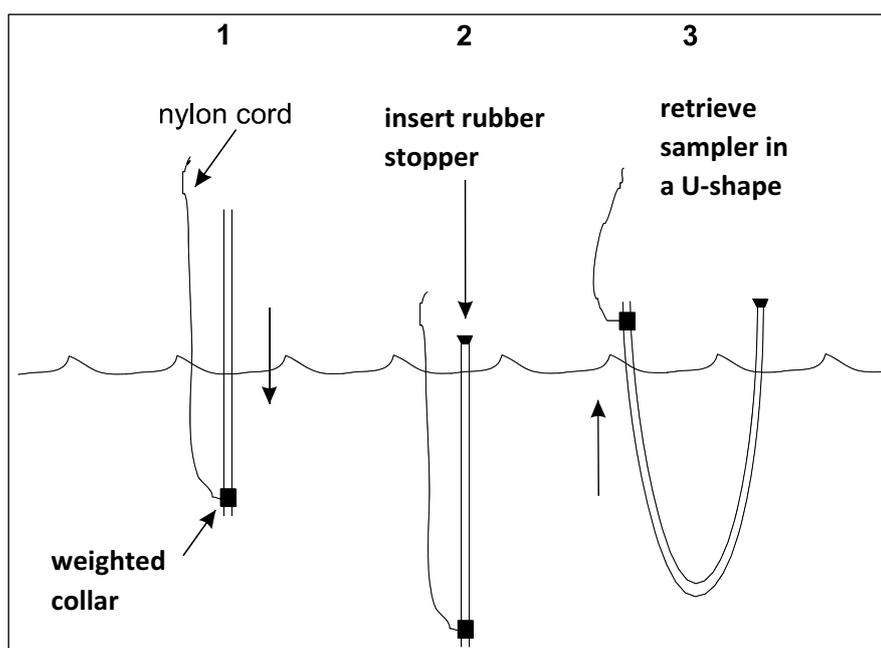


Figure D4.10 Procedure for use of the integrated hose-pipe sampler

4.2.5 Sample collection

In order to obtain a representative sample for species identification and cell count over the surface depth range, each water sample should be collected at the clearly marked sampling point using the 5 m long, 2.5 cm diameter integrated hose-pipe sampler (Figure 4.10). Sampling should be carried out in the middle of the day, preferably about 1 pm.

The procedure for collecting the sample with a hose-pipe sampler is as follows:

- Attach a cord from the boat to one end of the hose-pipe to prevent accidental loss of the equipment.
- Rinse the sampler by rapidly dropping the weighted end of the hose-pipe vertically into the water to a depth of approximately 5 m while holding the hose-pipe at the top end, and then returning the hose-pipe to the boat without inserting the rubber stopper.
- Again, while holding the hose-pipe sampler at the top end, rapidly drop the weighted end of the hose-pipe vertically into the water to a depth of approximately 5 m. This time, insert the rubber stopper into the top end of the hose-pipe after it reaches its full depth of immersion.
- Pull the bottom end of the hose-pipe to the surface using the cord, so that the tube is in a U-shape (see Figure 4.10).
- Lower the weighted end of the hose-pipe into a clean bucket and remove the rubber stopper. Ensure that the entire contents of the hose-pipe are emptied into the bucket. Mix the contents of the bucket and then transfer part of the contents into a 200 mL amber PET plastic bottle, leaving a 25 mm gap at the top of the bottle. The remainder of the contents of the bucket may be discarded.

Algal scums should not be included in the water sample for routine identification and enumeration; however, if they are present, a note should be taken indicating their nature and extent. This is particularly important in bathing or water recreation areas. Additional scum samples can be collected and submitted for qualitative analysis if extensive.

NOTE: Blue-green algae can cause skin irritation. If sampling from an area that has a high level of blue-green algae, minimise your contact with the water during sampling by wearing appropriate dress, in particular gloves. Normal hygiene precautions such as washing off any splashes and washing hands before eating or drinking should be observed at all times. When not in use, the hose-pipe sampler and bucket should be kept clean and stored in a dark shed or cupboard.

4.2.5.1 Sample storage and preservation

To ensure the sample remains in a condition suitable for identification and enumeration, a sufficient volume of Lugol's iodine preservative solution should be added to the sample to render the sample a colour resembling weak tea (i.e. 1.0 mL Lugol's iodine solution to 200 mL sample). Once Lugol's is added to the sample, it requires no additional treatment prior to analysis (e.g. chilling etc.). Lugol's iodine solution is made by mixing 20 g of KI with 200 mL of distilled water, and then dissolving 10 g of pure iodine in this solution. Glacial acetic acid (20 g) is added a few days before use. The solution must be stored in the dark in a glass bottle and remains effective for at least 12 months.

4.2.5.2 Sampling for cyanotoxin analysis

Cyanotoxin analysis will generally be required in one of the following circumstances:

- Action Level 1 status (i.e. more than 2000 cells mL⁻¹) predominated by *Microcystis aeruginosa*, or when concentrations of other potentially toxic taxa (see Table 4.2) exceed 15 000 cells mL⁻¹

- Action Level 2 status where numbers of a cyanobacterial taxa not previously recorded as toxic exceed 100 000 cells mL⁻¹ (recommended toxicity analysis by mouse bioassay or comparative method).

Samples for toxin analysis should be collected using the 5 m integrated hose-pipe sampler (as described in Section 4.2.5) and a 2 L chilled sample sent to the laboratory for analysis (see Appendix C6 for laboratory contact details).

In Australia, and internationally, guidelines for cyanotoxins in drinking water supplies are being set based on the concentration of toxins in water (µg toxin L⁻¹). Hence it is recommended that for those cyanobacterial species where the toxins are well known and characterised, i.e. *Anabaena circinalis*, *Aphanizomenon ovalisporum*, *Cylindrospermopsis raciborskii* and *Microcystis aeruginosa*, routine analysis of toxins should be carried out by high performance liquid chromatography (HPLC). HPLC analysis enables the exact concentration of individual toxins in cyanobacterial samples to be quantified, with toxin concentration reported either in terms of the mass of toxin per unit mass of cyanobacteria, or mass of toxin per litre of water. Mouse bioassay should only be used if taxa other than the ones listed above are suspected of producing toxin.

4.2.5.3 Sampling frequency

Monitoring class A1 and A2 storages are recommended to be sampled on a fortnightly basis, until the total blue-green algae cell count exceeds 2000 cells mL⁻¹, after which they should be sampled weekly. Sampling can return to fortnightly after cell numbers fall below 2000 cells mL⁻¹. Ideally, sampling frequency should be determined on a storage by storage basis using historical records of blue-green algal dynamics.

4.2.5.4 Sample analysis and reporting

4.2.5.4.1 Analysis precision

A suitably qualified laboratory with appropriate quality systems in place should conduct the sample analysis. When requesting the analysis it is important to state the minimum precision required of the analysis both in respect of the identification (i.e. genus or species level) and enumeration (provides the level of confidence in the result). The precision associated with the analysis of samples is directly related to the amount of analytical effort with respect to the laboratory equipment, counting effort and therefore time and staff expertise. Therefore, there is likely to be a higher cost associated with higher levels of precision. For A and B monitoring classes, it is recommended that the minimum taxonomic precision be at the genus level with species identification essential for potentially toxic species (see Table 4.2).

The counting precision is an estimation of the error associated with the estimation of abundance. It is defined as the ratio of the standard error to the mean (expressed as a percentage) for replicated counts and assumes a Poisson distribution of counting units in the counting chamber (Laslett et al 1988). The precision (counting error) can be calculated from the total number of units (n) using the formula derived by Laslett et al (1998):

$$\text{Counting error } (\pm \%) = 100 \times \sqrt{\frac{2}{\pi}}$$

Therefore the more units counted, the lower the counting error. A summary of counting errors based on this formula is shown in Table 4.5 The minimum acceptable level of precision for public health monitoring is ± 30 per cent. It is also recommended that a minimum precision of ± 30 per cent be specified for potentially toxic species.

Table 4.5 Minimum counting error after Laslett et al (1998)

Total units counted	Counting error (\pm %)
1	140
2	100
4	75
8	50
13	40
23	30
50	20
200	10

4.2.5.4.2 Sample analysis

Sample analysis is conducted by examining a subsample under a microscope and systematically identifying and counting algal units. Specialised counting chambers of a known volume are used in conjunction with a grid system to enable examination of a known area of the chamber, and corresponding volume of sample. The two most commonly used chambers are the Sedgwick–Rafter chamber and the Lund Cell. Both are used with an upright microscope. Both are similar in that they contain a fixed volume of sample; however, the Sedgwick-Rafter chamber is etched with a calibrated grid of 50 × 20 equal sized squares (1 mm²), whereas the Lund Cell is unmarked and is used in conjunction with a Whipple Grid, which is inserted in the microscope eyepiece.

There is no Australian standard for the analysis of planktonic microalgae; subsequently, laboratories will vary slightly with respect to their preferred method. An Australian ‘benchmark’ or recommended approach for the enumeration of cyanobacteria is given in Jones et al (2002), based on the Phytoplankton Methods Manual for Australian Freshwaters (Hötzel & Croome 1999). A generic method for the identification and enumeration of planktonic microalgae using a Sedgwick-Rafter chamber based on the benchmark approach is given in Appendix H11 as an example.

4.5.4.2.3 Reporting

Phytoplankton density is a concentration measure and should be reported as cells per millilitre. Algal biomass can also be reported as cell biovolume, which takes into account the contribution of species based on their relative size. Cell biovolume is measured by calculating an average volume for each species using formulae for geometrical shapes closest to the cell’s shape. The average volume for each species is then multiplied by the cell count for the species and all the products summed to gain a biovolume per sample in mm³ per litre. Advice on developing a cell biovolume method can be found in APHA (1992) and Hillebrand et al (1999). Cell biovolume measurements are recommended for the calculation of recreation hazard risk after the WHO guidelines in Table 4.3.

4.2.6 Contingency plan framework for blue-green algae response

Contingency plans provide an action framework that specifies appropriate management actions in response to blue-green algal cell level thresholds. While the Queensland Water Quality Task Force created a generic action framework in 1993 (see Table 4.6), agencies operating storages are encouraged to develop site-specific contingency plans to address their particular situation.

An action level framework is a monitoring and management action sequence that water treatment operators and storage managers can use to provide a graduated response to the onset and progress of a cyanobacterial bloom. The managerial response model presented as a 'decision tree' in Figure 4.11 provides for the assessment of a potentially toxic cyanobacterial bloom, with appropriate actions and responses, through three 'threshold' stages. The action framework is based on the Australian National Alert Level scheme, and reflects recent developments in the risk assessment and monitoring of cyanobacteria released by the WHO (Chorus & Bartram 1999).

Table 4.6 Generic contingency plan framework

<p>Vigilance level</p> <p>Threshold definition: cyanobacterial cell numbers 500–2000 cells mL⁻¹</p>
<p>The vigilance level encompasses the early stages of bloom development, when cyanobacterial cells are first detected in unconcentrated lake or raw water samples.</p> <ul style="list-style-type: none"> • When vigilance level is exceeded, it is recommended to increase the sampling frequency to at least once a week, so that potentially rapid changes in cyanobacterial biomass can be monitored. • Visual inspection for algal scums or accumulations of all water intakes and water recreation areas should be conducted on at least a weekly basis.
<p>Action level 1</p> <p>Threshold definition: cyanobacterial cell numbers > 2000 cells mL⁻¹. Persistently high cyanobacterial cell numbers throughout the storage increasing or remaining high as per threshold definition</p>
<p>Action level 1 threshold (cyanobacterial cells > 2000 cells mL⁻¹) is derived from the WHO guideline for microcystin-LR and the highest recorded microcystin content for cyanobacterial cells. The threshold level assumes that the species present is a microcystin producer, where raw water microcystin concentration could exceed the WHO guideline value of 1 µg L⁻¹.</p> <ul style="list-style-type: none"> • If <i>Microcystis aeruginosa</i> is present at concentrations > 2000 cells mL⁻¹ or other known toxin producing taxa (see Table 4.2) at > 15 000 cells mL⁻¹, the conditions require a quantitative analysis of the concentration of cyanotoxin in the raw water supply, and an assessment of whether the water treatment processes available are effective in reducing toxin concentrations to acceptable levels. Ongoing analysis of algal toxins in the raw water is necessary if values exceed 1 µg L⁻¹. • Continue routine weekly monitoring of raw and treated water to ensure adequate removal of algal cells and toxins. • Implement use of alternative water supplies and consult health authorities if toxin concentrations in treated water exceed 1 µg L⁻¹. • Visual inspection of all recreation areas should be conducted prior to entering the water – bathers should avoid contact with cyanobacterial scums. See Table 4.3 for appropriate water recreational hazard status based on latest analysis results.
<p>Action level 2</p> <p>Threshold definition: cyanobacterial cell numbers > 100 000 cells mL⁻¹. Persistently high cyanobacterial cell numbers throughout the storage increasing or remaining high as per threshold definition</p>
<p>The threshold for action level 2 (cyanobacterial cells > 100 000 cells mL⁻¹) describes an established bloom with high biomass with the possibility of localised scums. Conditions in action level 2 are indicative of a significant increase in the risk of adverse health effects from the supply of water that is untreated or treated by an ineffective system or through primary contact water recreation or bathing activities.</p> <ul style="list-style-type: none"> • Maintain weekly or bi-weekly sampling (depending on the dominant cyanobacterial taxa present), including all sites and visual inspection of all water recreation areas for scum formation. Ensure warning signs indicate current recreation hazard status (see Table 4.3) or direct access to storage is restricted. • Implement use of alternative water supplies and consult health authorities if toxin concentrations in treated water exceed 1 µg L⁻¹.

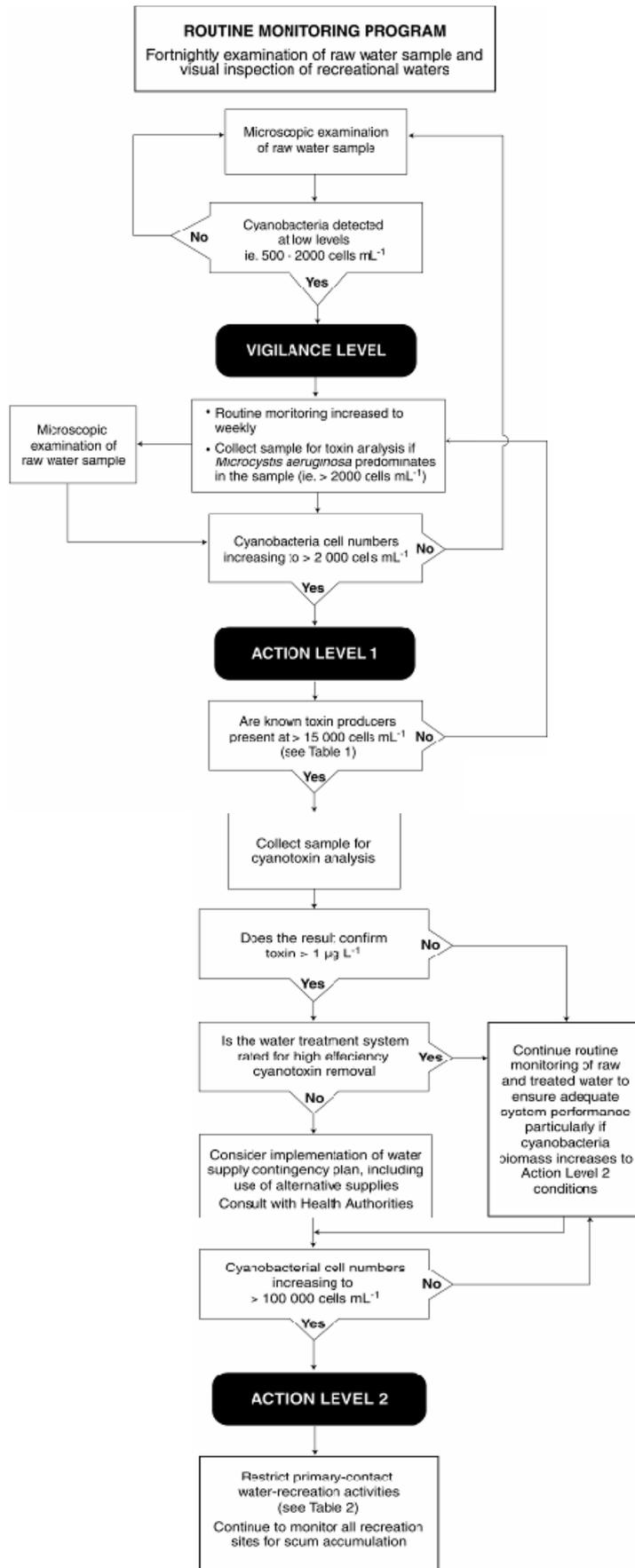


Figure 4.11 Decision tree incorporating the model action levels framework for monitoring and management of cyanobacteria in drinking and recreational waters

4.3 Sampling fish

4.3.1 General considerations

4.3.1.1 Permits and approvals

A general fisheries permit is required for all work that involves 'fish' as defined in Section 5 of the *Queensland Fisheries Act 1994*. Note that early life stages such as eggs, spat or spawn of fish are considered as fish under the Act. Before undertaking any work, ensure that a General Fisheries Permit is current and covers the work outlined in the methods of fish sampling planned.

Under the Queensland *Nature Conservation Act 1992* (NCA), prior approval from the appropriate DERM work unit is required to conduct activities involving protected wildlife and places.

Under the Queensland *Animal Care and Protection Act 2001*, approval from an Animal Ethics Committee (AEC) is required for the use of animals for scientific purposes. This includes sampling of fish for scientific purposes. It is a legal obligation to receive the approval from the AEC in writing before any project can commence.

Specific procedures used to process fish will depend on the project objectives. Fish should always be handled and processed in a timely and safe manner, as specified in the animal ethics code.

All noxious fish are to be destroyed and disposed of appropriately, and not returned to the water. Consult the Department of Employment, Economic Development and Innovation (DEEDI) for the latest information on policies and legislation regarding the release of noxious fish.

4.3.1.2 Recording fish sampling data

A fish sampling data sheet should be used to record field data. An example is at Figure 4.12.

4.3.1.3 Choice of sampling method

The available methods covered in this manual are:

- fishing using drift nets
- fishing using tow nets
- fishing using small seine nets
- fishing using long seine nets
- fishing using fyke nets
- fishing using cast nets
- fishing using gill nets
- baited trap fishing
- electrofishing.

4.3.2.2 Reference

Gilligan, D. & Schiller, C. (2003) Downstream transport of larval and juvenile fish in the Murray River. NSW Fisheries Final Report Series No. 50, NSW Fisheries, Narrandera.

4.3.3 Sampling fish using tow nets

4.3.3.1 Undertaking tow

Nets are attached to an aluminium frame and fixed to the front of the boat to minimise both boat and outboard effects on the sample (see Figure 4.13).

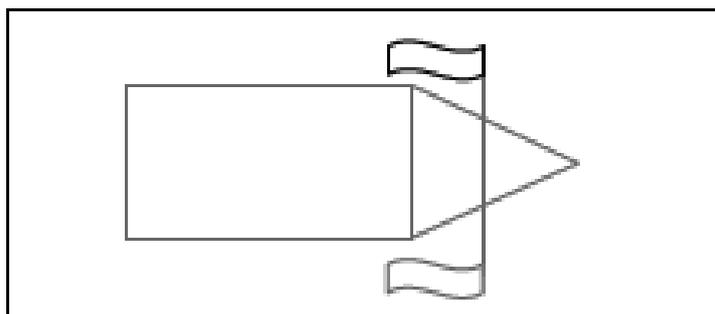


Figure 4.13 Boat with fixed aluminium net mount and attached nets

Depending on the project purpose, different sized mesh can be used. It is recommended that invertebrates are sampled using a 250 μm tow net, while fish larvae are sampled with a 500 μm net. Different nets can be fixed to the opposite side of the aluminium support mount.

Depending on the project purpose, tows can be stratified according to different habitat types (e.g. open water, timbered) and three replicate tows undertaken in each. Each tow should consist of a set distance and boat speed to allow for calculation of the volume of water sampled by the nets (e.g. 40 m tow, with the boat travelling at a constant speed throughout (0.75 m/s-1) (5000 L of water)). Alternatively, the tow can be timed (2, 5, 10 or 15 minutes depending on sample area and density of organisms) and the boat kept at a constant speed. Either way, GPS readings should be taken at the start and end of the tow.

4.3.3.2 Clearing nets

After the tow is completed, nets should be untied and brought back into the boat. One bucket should be filled with water to allow rinsing of any debris or animals into the base of the net. The contents of the net are then emptied into the sieve pair (i.e. coarse sieve overlying 250 μm sieve). Finer material should be gently rinsed through the coarse sieve and then the contents of the 250 μm sieve washed into a labelled vial for preservation. Samples will be preserved in vials using 90 per cent ethanol or methylated spirits and kept for later identification and enumeration in the laboratory.

4.3.4 Sampling fish using short seine nets

Seine nets primarily sample smaller fish, and larger fish are rarely encountered.

Seine nets are most effective when used in wade-able water that is no deeper than waist height.

Seine nets only sample fish that are close to the bank at the time of sampling, so will not capture species that prefer deeper water.

Very fast moving fish swim away from the net and therefore may not be sampled effectively when using this method.

It may be difficult, if not impossible, to use a short seine net in very fast flowing water.

Two people are required with one person holding each end of the net, preferably putting a foot through a foot hole in the bottom rope to assist in keeping the bottom of the net pulled taught and on the stream bed while dragging the seine through the water in order to prevent fish from escaping. The net will snag easily, so try to avoid areas of dense logs and branches.

Position one person close to the bank and the second person out in deeper water, then drag the net briskly through the water. The seine net is dragged perpendicular to the bank along a predefined length of stream (5 metres is a practical length to use). After covering this set distance, the person in deeper water should rapidly swing around to approach the bank and both people should then quickly drag the net towards the bank, through the shallows and out of the water (see Figure 4.14). Ensure that no gaps are created between the net and the streambed to prevent trapped animals from escaping underneath. If snags are encountered, stop dragging the net, free the net from the snag, and restart seining in a different stretch of stream. Speed is required when using the net; otherwise fish will easily swim clear. The seine net should be used at least three times at each site to ensure the sampling of all the different habitats available.

It is easiest to remove captured animals when the seine net is laid on the bank. The seine net should be thoroughly rinsed after all of the fish have been released.



Figure 4.14 A seine net hauled on to the bank, enabling the removal of trapped animals

4.3.4.1 Variation to method

A variation to this method is to seine upstream heading into a riffle, instead of seining towards the bank. Each person must then lift the edges of the net out of the water, so that the fish do not escape and carry the net towards the bank. This technique may be useful for catching species that often occur near riffles.

4.3.5 Sampling fish using long seine nets

4.3.5.1 Long seine fishing method

Long seine nets have coarse mesh; therefore, smaller fish such as *Hypseleotris* sp. are not usually sampled.

Seine nets are most effective when used in wadable water that is no deeper than waist height. See variation for deeper water at Section 4.3.5.2.

Long seine nets only sample fish that are present close to the bank at the time of sampling. Fish that only occur in deeper parts of the river may not be encountered.

Very fast moving fish may swim away from the net, and therefore may not be sampled sufficiently when using this method.

It may be difficult, if not impossible, to use a long seine net in very fast flowing water.

It takes two people to use a long seine net, one person in the water and the other person on the bank. The person on the bank holds the top and bottom rope of one end of the net. The person in the water holds the top rope of the other end of the net and puts their foot through a foot hold in the bottom rope of the net (this will assist dragging it through the water and prevent fish from escaping under the net). This person should then wade out from the bank pulling their end of the net until all of the net has been deployed into the water (see Figure 4.24). Then this person should 'loop' around towards the bank until they reach the starting point. This process should be carried out reasonably quickly; otherwise, fish will easily swim clear of the net. In flowing water ensure that the loop is started by pulling the net into the current.

Seine nets are most effective in areas where snags are not present. If snags are encountered, stop dragging the net, and free the net from the snag and restart seining in a different stretch of stream.

When the loop is complete, each person then holds the top and bottom end of their end of the net and together drag the net into the shallows and out of the water. Ensure that no gaps are created between the net and the stream bed, or else fish may escape underneath. If snags are encountered, stop dragging the net, and free the net from the snag if possible; then continue dragging the net in to shore.

It is easiest to remove fish when the seine net is laid on the bank. Rinse the seine net after all of the fish have been removed.



Figure 4.15 A long seine net being deployed from the bank



Figure 4.16 Fish being captured in the long seine net

NOTE: Long seine nets will snag easily, so ensure that the net will not be dragged around logs or branches that may be visible. If snags are unavoidable restart seining in a different stretch of stream. It is easiest to use a long seine net in slow flowing water, or in water that has stopped flowing. Backwaters may be suitable for sampling at sites with high flow.

4.3.5.2 Variation to method

Where the water is too deep to wade through, the technique can be varied so that a person holds one end of the long seine at the bank and the other end is looped around by boat. However, this is not ideal, as once the water is deeper than the depth of the net, fish can potentially escape by swimming underneath. It is not recommended to 'swim' the net out if deep water is encountered. This is a slow process and will result in a low catch as fish can easily escape. It is also potentially dangerous, as the net could wrap around the swimmer's legs, causing injury or drowning.

4.3.6 Sampling fish using fyke nets

4.3.6.1 Fyke net fishing method

Fyke netting is a passive method of sampling and therefore may result in some species not being sampled, rare species being common but poorly sampled, or rare species that move in schools appearing more abundant than they truly are (see Figures 4.25–4.32).

Using upstream facing fine-fyke nets during a flow event can result in the net filling with or being damaged by drifting debris. These nets should be monitored to ensure that damage is not occurring. Their use may be prohibited in areas where there are large amounts of debris.

Fyke nets are set facing downstream if the aim is to capture upstream migrating fish, or set facing upstream if the aim is to capture downstream migrating fish, drifting larvae or eggs. Net mesh size and the number of replicates should be based on the objectives of individual projects.

The nets are set at approximately 30 degrees to the bank with the wings angled out from the mouth of the net at approximately 45 degrees. The tail (cod-end) is either tied off to a tree, rock, or stake, or allowed to flow freely. A float should be placed inside the cod-end of the net and care taken to maintain an air-space so that capture of air-breathing animals (e.g. turtles) doesn't result in mortality. Once the cod-end is tied off, wade or drive the boat into deeper water with the remaining net, spreading out the inner hoops. Note that a fyke net does have a 'top' and 'bottom', with the top having floats attached to the wings and the bottom having weights

attached. Each wing should be stretched out separately (one toward the bank and one toward the deeper channel) and secured to a tree or stake. Floats on the top of the net will improve net visibility to ensure that any boats can avoid the net.

When checking the nets, pick up the first hoop. This hoop should be shaken, ensuring that any fish fall down into the next hoop. Each hoop should be shaken in turn, until all fish have been shaken down to the cod-end of the net. The tail can then be untied from its fixed position and carried to shore for sorting, or contents can be poured into a nally bin (partially filled with fresh water) in the boat.

The fyke net should be rinsed after netting has finished. Upon returning from a field trip, the nets should be thoroughly cleaned, freed of debris, hung out to dry, checked for holes and repaired if necessary before being stored.

4.3.6.2 Variation to method

Ethanol may be used in place of methylated spirits to preserve samples.



Figure 4.26 Setting a fyke net



Figure 4.27 A set fyke net



Figure 4.29 A set fyke net



Figure 4.30 Opening up the tail of the fyke net to identify the captured fish



Figure 4.32 Drying fyke nets

4.3.7 Sampling fish using cast nets

To start, make sure the net is free of tangles and debris, and then lay it on the ground in a horizontal line away from you (see Figure 4.33). Make a loop in the draw string of the net and place it around the wrist of your throwing arm.



Figure 4.33 Cast net

Commence measuring off approximately 1 m long loops of draw string and lay them into the palm of your hand until you get to the top of the net. Next, measure off one loop of net (for a 2 m net) and lay that too in the palm of your hand. For a net 2.4 m or larger you will need to make two loops of the net

At this point (see Figure 4.34), the palm of your hand should be holding the loops approximately level with your knee to lower thigh region. Now with your left hand, grab the bottom of the net, or leadline, and place it into the palm of your right hand (which is still holding the loops). The net is now divided equally in two, either side of your right wrist.



Figure 4.34 Cast net stage 1

With your left hand (see Figure 4.35) reach over to your right hand side (with the back of your hand facing away from you) and grab the right hand side of the lead line. Place the lead line in the cradle between your thumb and forefinger and walk your fingers along the 'inside' of the net and gather about 10 handfuls of net.



Figure 4.35 Cast net stage 2

Next, lift this gathered handful up and place it under your right hand thumb (see Figure 4.36).



Figure 4.36 Cast net stage 3

Now you must gather the left hand side of the net (see Figure 4.37) by grabbing the lead line again in your left hand and holding it in the cradle between your thumb and forefinger with the back of your hand facing away from you. Gather 10 handfuls along the 'outside' of the net and hold in your left hand.



Figure 4.37 Cast net stage 4

To cast, hold the net like you're holding a bullfighter's cape with your right arm fully extended and parallel to the ground. Your left arm should be parallel to your right, but slightly back and lower (see Figure 4.38). Your technique will determine the equal spread of the net.



Figure 4.38 Cast net stage 5

When you throw, your feet should be firmly apart for balance, and the left foot in front of the right. The casting action is more like a flicking of your arm from the right-hand side to your left shoulder, similar to a forehand tennis shot (see Figure 4.39).



Figure 4.39 Cast net stage 5

Release the net—both hands simultaneously—about a third of the way through the cast. When your net hits the water your right hand should have met your left shoulder.

Once the net sinks to the bottom, slowly pull the draw string in towards you. This will close the net and trap the specimens.

Next, carefully retrieve the net and proceed to remove your catch and place it in a container of water drawn from the immediate area.

To preserve the life of your cast net, remove any debris from the webbing and dunk it in a bucket of fresh tap water before storing it away. Avoid leaving it out in the sun for extended periods.

4.3.8 Sampling fish using gill nets

The site being sampled must be first investigated to determine suitability for this type of sampling, including risk from snagging up on rocks or snags due to current. This type of sampling is not recommended in very strong flows.

It is highly recommended to use a boat for deploying gill nets. Deployment is extremely difficult without a boat, and almost impossible in deep water. Gill nets should be tied to a fixed object on the bank, and set perpendicular to the bank in still or slow-flowing water, or increasingly angled downstream with increasing flow velocity (see Figure 4.41).

One person should be dedicated to manoeuvring the boat into position. This person must hold a recreational boat licence and be proficient in operation of this type of craft/motor under the field conditions.

One person should be responsible for tying off the net onto a fixed structure (using a suitable knot to be able to be untied under load), as well as deploying the net. A net weight should be attached to the bank end of the leadline to ensure that the net does not move. As the net is deployed, the person steering the boat should slowly reverse the boat away from where the net was tied diagonally out into the current. The last section of net to be deployed should be weighted on the leadline with an anchor to prevent movement. A float should be attached to the end of the net to make it visible to other boaters, along with a flashing light if visibility is poor or at night.

Nets should be positioned within a contiguous stretch of river, and distributed so that all nets are fished as independently as possible.

The amount of time that the nets are deployed should be relatively similar for each site sampled. At 45 minute intervals, the nets should be each checked and fish removed by the best technique that facilitates loss of scales and slime (a knife can be used to cut mesh if needed).

The fish may be measured (length), identified to species level, and/or checked for condition (lesions, ulcers, flesh samples taken), and fish species abundance may be recorded. This information should be recorded onto an appropriate field sheet (see Figure 4.19 for an example). All native fish are to be released, unless they cannot be identified. In this case, representative specimens may be preserved in methylated spirits, or on ice, and stored in a labelled plastic vial/jar for later identification. Rinse the gill net after all of the fish have been released. To dry the net, tie each end to a structure. Check the net often, as birds and other animals could possibly become tangled in the net.

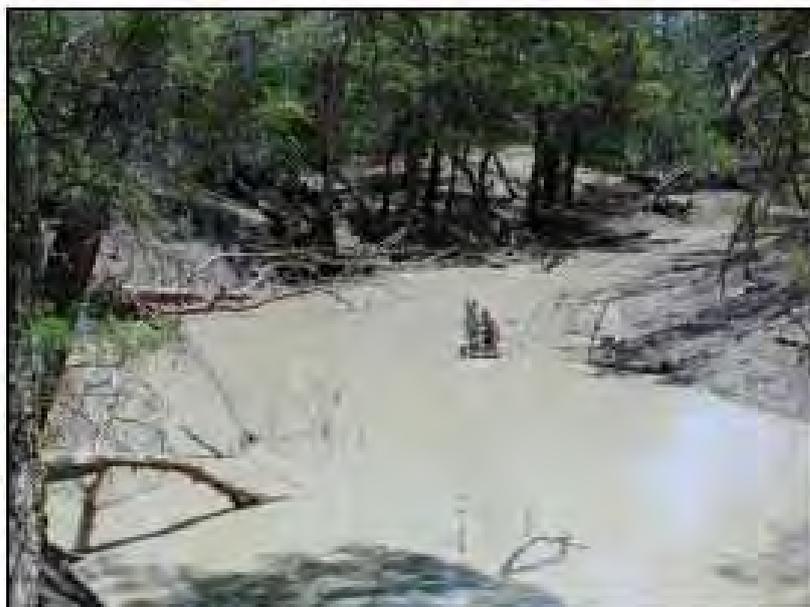


Figure 4.41 Setting a gill net that has been tied to one end to a snag

4.3.9 Baited trap fishing

Traps can come in a variety of shapes and sizes, but the most common trap is the 'funnel trap' variety (Department of Primary Industries and Fisheries, 2009). Traps can be baited or unbaited, and often a chemical light stick is added when the trap is deployed at night. Traps should be marked in accordance with permit or state fisheries legislation. Traps are mostly set from the bank, close to snags and other stream side vegetation, but they can also be set into mid stream habitats using a boat. Traps should be deployed for a standard time, into various stream habitats (including bare banks), which helps ensure the results are comparable through time. Upon retrieval, traps are emptied into a bucket of water and captured animals are processed accordingly.

4.3.10 Sampling fish using electrofishing

4.3.10.1 Electrofishing safety

In addition to general workplace health and safety considerations, there are specific hazards associated with the use of electrofishing equipment.

The following safety material is taken from the Australian Code of Electrofishing Practice. This code should be adhered to during any electrofishing activities.

4.3.10.1.1 All electrofishing

Rubber boots or waders, plus 1000V rated linesmen gloves must be worn by all electrofishing team members during operations.

Minimum of two persons are required per sampling party.

Staff training in the use of electrofishing equipment should be undertaken prior to sampling, with a senior person with more than 50 hours of electrofishing experience to be present.

Waders and long 1000V linesman gloves are to be worn when using electrofishing equipment.

Only fish nets with long (approximately 3 m for a boat) non-conductive handles are to be used for sampling.

Equipment should be regularly maintained.

No electrofishing should be undertaken within 50 m of another boat.

Electrofishing should not be conducted during wet weather or rough water conditions.

Polarized sunglasses should be worn when undertaking sampling.

4.3.10.1.2 Boat electrofishing

The boat driver must have a current boat licence and be sufficiently experienced with the size of boat being used and in the river or lake conditions present.

The boat must be adequately stable and have ample freeboard when fully loaded with gear, crew (and allow for fish catch).

Boat must be a minimum of 3.5 m long.

For boats under 4.0 m x 1.2 m, a crew of only two is allowed and maximum generator size is 5 kVA.

Anodes must be fixed to the bow and not capable of touching any part of the boat, and cables are to be channelled or clipped to boat sides to prevent tripping.

To reduce the risk of dip netter staff accidents, fixed or removable hand rails of at least 700 mm height must be fitted and non-skid flooring is recommended.

Non-slip flooring is required in the boat.

The drivers of electrofishing boats must use foot-operated deadman switches which must be operated simultaneously with boat netters, who must have either a one foot operated switch (several may be connected in parallel if more than one netter is used) or 'life-line' belt cord cut-out switches.

All lighting and ancillary electrical equipment must be extra-low voltage (less than 32VAC or less than 115VDC).

Large red DANGER warning signs must be displayed on each side of the boat.

Generators and control boxes must be fixed in position during operation.

4.3.10.1.3 Backpack electrofishing

Backpack units must meet IP 37 standards

Battery powered backpack units must use only fully sealed dry cells as a power source.

The backpack unit must incorporate a quick release harness, a deadman switch on the anode pole, and be fitted with a mercury tilt switch that cuts off power input from the battery or generator whenever the unit is tilted at more than a 45 degree angle. The tilt switch can have an automatic reset, although a manual button that can be reset by the operator is recommended. The unit must have an audible alarm when in use.

Backpack electrofishing is not recommended in water deeper than operator crotch depth.

If a backpack unit is operated from a boat, the cathode must be isolated from the boat hull. It is also recommended that two foot-pedal safety switches connected in series are incorporated.

Life jackets must be worn by backpacking crews in any dangerous situation where the water depth is greater than 0.5 m.

4.3.10.2 Electrofishing method

Backpack electrofishing is limited to water that is not deeper than the operator's crotch depth.

Boat electrofishing is limited to areas that are large enough for and accessible by boat.

The success of electrofishing is limited in highly turbid waters where dip netters find it difficult to see fish.

The location and number of shots will vary according to project requirements. The number of macrohabitats sampled (i.e. pool/run/riffle), and the number of microhabitats sampled within each macrohabitat (i.e. LWD/open water/smooth bank/complex bank), will be dependent on project requirements.

Whether sampling for targeted species or fish communities, shots should be as independent as possible.

Where possible, the location of each shot should be randomly selected at a site. These shots should not overlap, and adjacent shots should have a 10 m buffer between them.

The 'power-on' time of each shot will be project-specific; however, it must be standardised within a project. It is estimated that at least 120 seconds 'power-on' time should be achieved per shot.

Power settings do not need to be standardised, instead use the settings which maximise fish catch efficiency at each site.

4.3.10.2.1 Sampling for targeted specific species or complex habitats

Favoured habitats or areas of complex habitat (e.g. snags, root masses, undercut banks) can be specifically targeted during sampling. This type of sampling is aimed at maximising catch rather than providing a comparable 'across site' community survey. One example of applying this type of sampling is maximising the catch of golden perch for tag and release or otolith removal.

Given that time is not important to the targeted sampling approach, it is not essential to follow specific guidelines if catch per unit effort (CPUE) data are not required. However, if CPUE is to be calculated, the following guidelines should be utilised. Complex habitats should be selected and targeted, with the habitat type and total 'power-on' time spent in each habitat recorded on the data sheet. The time spent in individual habitats (see method below) will vary with success of fish catch and/or size of the complex habitat; however, keeping a record of total time is critical to the calculation of CPUE.

4.3.10.2.1.1 Backpack sampling

Electrofishing using a backpack unit is best for small, slower-flowing streams. A minimum of two people are needed, one to operate the electrofishing unit and one to collect specimens using a dip-net. Sampling should be conducted within at least 1 m of the selected habitat. Each shot should commence as the operator approaches the selected habitat, and continue while the operator walks around the habitat. A minimum distance of 3 m between habitat types should be employed to avoid influencing sampling at the next habitat.

For each complex habitat, the habitat type, total 'power-on' time and species details should be recorded.

Fish should be processed in a timely manner at the end of each complex habitat, and returned to the water.

4.3.10.2.1.2 Boat sampling

Teams will consist of a minimum of two people: one to operate the unit, and one to net specimens.

The boat should approach a complex habitat in such a way as to minimise access issues. Shots should commence while the boat approaches the habitat, continue while the boat is stationary or manoeuvring within the habitat, and while the boat exits the habitat, before the power is switched off. A minimum distance of approximately 5 m between sampled habitats should be employed to ensure that the previous shot does not influence the next sampled habitat.

For each complex habitat, the habitat type, total 'power-on' time and species details should be recorded. Fish should be processed in a timely manner, at regular intervals, and returned to the water.

4.3.10.2.2 Fish community sampling

Effort should be made to sample all habitats in approximate proportion to their occurrence at the site. Shots should be performed on alternate banks to cover all habitat types. Include mid-channel shots where necessary.

4.3.10.2.2.1 Backpack sampling

Electrofishing using a backpack unit is best for small, slower-flowing streams. A minimum of two people are needed, one to operate the electrofishing unit and one to collect specimens using a dip net.

The operator should attempt to thoroughly electrofish the shot area, moving in a zig-zag motion, starting from the bottom of the shot zone. The dip netter should stand downstream of the operator while dip netting fish. Nets can be set up at the upper and lower ends of a stream section to prevent movement of fish out of the sample area.

4.3.10.2.2.2 Boat sampling

Teams will consist of a minimum of two people: one to operate the unit, and one to net specimens.

Parallel runs with the boat travelling parallel to the bank can be carried out to capture mid-water and pelagic individuals.

Perpendicular runs can be carried out with the boat travelling perpendicular to the bank to capture individuals near the edge and associated habitats. At the completion of a shot, the details of captured fish should be recorded and the fish released.

4.3.10.3 Data collection

Note that when entering data into AQEIS, database field terminologies are specific. Each site requires a site number. If new site numbers are required they should only be allocated following consultation with hydrographic staff. Sample runs are multiple survey runs which are linked to a specific site on a day or within a specified date range (e.g. all shots conducted at site 123400 on 01/01/08). Samples are individual runs or shots within a sample run. AQEIS generates new sample numbers in the order of data entry but original run/shot numbers can also be retained. Specimens are the individual fish captured within a sample.

AQEIS also generates specimen numbers obtained within each sample in the order of data entry (i.e. commencing at 1 each time).

There are two EFISH sample properties templates in AQEIS, one each for boat and backpack electrofishing methods (both using Smith Root equipment). Any variables that are not collected in the field can simply be passed over when entering data. Additional variables or alternate templates can be added in by the AQEIS administrator if required. The included variables for boat fishing are shown below.

GPS Start Latitude (GDA94)	Max Sample Velocity (m/s)
GPS Start Longitude (GDA94)	Min Sample Velocity (m/s)
GPS End Latitude (GDA94)	Av Sample Velocity (m/s)
GPS End Longitude (GDA94)	Weather at Sample Time
Sample Length (from GPS)	Conductivity ($\mu\text{s}/\text{cm}$)
EFISH Start Time (time on)	EFISH Boat Current Mode
EFISH End Time (time off)	EFISH Boat Pulses per Second
Max Sample Depth (m)	EFISH Boat Voltage Range
Min Sample Depth (m)	EFISH Boat Percent of Range
Av Sample Depth (m)	

The template for backpack fishing is virtually the same, but the last four variables are replaced with EFISH backpack volts, EFISH backpack frequency and EFISH backpack duty cycle.

The EFISH specimen properties template in AQEIS contains the following variables.

Fish Species	
Fish Standard Length	Mm
Av Depth at which fish were caught	M
Otoliths Removed	No by default
Gonads Preserved	No by default
Stomach Contents Preserved	No by default
Fin Clips Preserved	No by default
Muscle Tissue Preserved	No by default

Variation to method

Additional habitat properties may also be recorded. Those found in AQEIS under the EFISH habitat properties template are as follows.

Efish Habitat Type (run/pool/rifle etc)	Efish Habitat % Macrophytes
Efish Habitat % O/head Canopy Cover	Efish Habitat % Filamentous Algae
Efish Habitat % Mud (<0.06mm)	Efish Habitat % Leaf Litter
Efish Habitat % Sand (0.06-2mm)	Efish Habitat % Overhanging Veg
Efish Habitat % F Gravel (2-16mm)	Efish Habitat % Emergent/Inundated Veg
Efish Habitat % C Gravel (16-32mm)	Efish Habitat % Root Mass
Efish Habitat % Pebble (32-64mm)	Efish Habitat % Undercut Banks
Efish Habitat % Cobble (64-128mm)	Efish Habitat % LWD
Efish Habitat % Boulder (128-512mm)	Efish Habitat % SWD
Efish Habitat % Bedrock (>512mm)	Efish Habitat % Bare

NOTE: 'EFISH' is attached to the variable names to distinguish them from existing variables relevant to other projects. 'EFISH' can also be used as a keyword when searching the database.

Project	Project Code (AQEIS)	Description of variation, rationale and any project specific variables

4.3.10.4 References

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Part E Preparation of aquatic animal tissues (fish and crustaceans) for veterinary laboratory examination

5.1 Reasons for sending aquatic animal tissues for veterinary laboratory examination

There are several reasons why aquatic animals associated with a fish kill, or other environmental health or aquaculture production problems, should be submitted to a diagnostic laboratory for examination:

- The clinical signs and gross lesions in aquatic animals may not indicate the particular disease, i.e. they are non-specific signs, and laboratory examinations are required to determine the actual cause of a disease and to then provide the diagnosis.
- A laboratory examination and laboratory testing is necessary in order to make a definitive or confirmed diagnosis in diseases where a provisional diagnosis has been made on history and clinical signs.
- It is not uncommon to have more than one agent or factor affecting aquatic animals at one time, e.g. a bacterium, a fungus and handling damage to the skin. Laboratory examinations aid the identification of primary and secondary aetiologies.
- An accurate diagnosis is often a complex process requiring the skills of several scientists who are available in the diagnostic laboratory system.
- Appropriate and responsible treatment and control of disease in aquatic animals depends on an accurate diagnosis. The negligent or unnecessary use of chemicals and antibiotics may result in chemical residues in aquaculture products for human consumption, unnecessary production costs, antibiotic resistant strains of bacteria and environmental damage.
- A wide range of environmental and/or husbandry factors influence the expression of disease, and diagnostic laboratory examinations may be required to determine the significance of infectious agents in a disease.

Many diseases in aquatic animals are a result of a complicated interaction between the animal, the environment and a pathogen or disease agent (bacteria, fungi, parasite, virus and toxins). Environmental factors (temperature, salinity, etc.) act as triggers in these situations allowing a pathogen (disease producing organism) to cause disease where it might normally be harmless (see Figure 5.1).

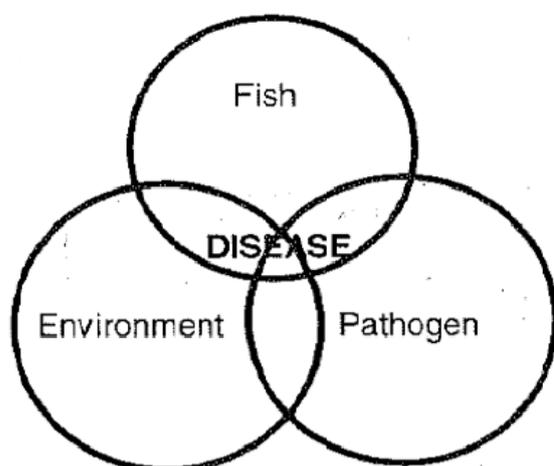


Figure 5.1 Disease results from the interaction of animals with environmental factors and disease organisms

Environmental factors that are involved in contributing to disease outbreaks—for example, low pH, low dissolved oxygen concentrations, pesticides and high suspended solid concentrations—can also directly affect the health of aquatic animals. This type of disease is often described as non-infectious disease.

As a consequence, it is important to determine the role and significance of both the environmental factors and the pathogens. The 'history' of the disease outbreak, site investigations and laboratory examinations are all necessary to really understand how the aquatic animals become sick.

The best way to control or prevent a disease may be the manipulation of the environmental factor(s) that make the aquatic animal susceptible to an infectious disease.

In any disease investigation, the following are needed:

- a history or details of the events leading up to and associated with the disease outbreak. This should include water quality, source of animal, stocking density, distribution of mortalities by pond or age group, feed type, and so on
- samples of both 'sick' and 'healthy' animals
- other samples may also be necessary, e.g. water, algae and feed.

5.2 Collecting finfish specimens for diagnostic laboratory examination

The best samples to send to the laboratory are live finfish. Live specimens are best as they enable the pathologist to see the clinical signs, prepare gill and skin smears and are suitable for all laboratory tests (histology, bacteriology, parasitology, virology, biochemistry and toxicology).

Because finfish are in an aquatic environment and carry bacteria on the gills and in their gut, there is a rapid breakdown of tissue and decomposition after death. In most cases aquatic animals that are found dead may be of little value for veterinary laboratory examination.

5.2.1 Sampling live finfish

Select a minimum of six live, sick fish with clinical signs typical of the problem. Select six normal fish for comparison. A sample from each pond, cage, tank or aquarium, or each age class or species affected in the disease outbreak should be provided. Place each group in a separate and labelled container.

Transport the live specimens to the laboratory in oxygen filled plastic bags or aerated transport tanks.

5.2.2 Sampling and preparing fixed finfish specimens

Use only live finfish for fixation (fish that are found already dead are of little value for veterinary diagnosis).

Painlessly kill the finfish in an anaesthetic solution or by cutting the spinal cord behind the head.

A complete external and internal examination of the finfish should be done and the findings recorded on the specimen advice sheet to the laboratory.

Microscopic examination of wet preparations made from skin and gill smear for external parasites is essential as these parasites will leave the fish after it is placed in the fixative.

- Larval finfish: preserve 25 to 50 individuals intact

- Small finfish (less than 4 cm in length): cut open the abdominal cavity, move the swim bladder and visceral mass away from the caudal kidney, and place in fixative
- Large finfish (more than 4 cm in length): the individual organs should be removed, sectioned and placed in fixative. Tissues to sample include the gills, heart, liver, spleen, head kidney, caudal kidney, digestive tract (intestine), eye, skin, muscle, brain, swim bladder and any other organ or tissue with lesions. Tissue pieces should be about 15 x 15 mm and no thicker than 8 mm.

Place the tissues in chilled fixative if possible. There must be at least 10 times more fixative volume than tissue volume. After 24 to 48 hours, the fixed tissues can be wrapped in fixative-moistened paper towels, placed in two sealed plastic bags and sent to the laboratory.

The fixatives used include 10 per cent formal saline (for marine specimens), 10 per cent buffered neutral formalin (for fresh and brackish water specimens), and Bouin's solution (has the advantage of rapid preservation).

NOTE: Fixed specimens are only suitable for pathology and histopathology (not chemical analysis).

5.2.3 Freshly killed finfish on ice

Fish on ice are only of use for bacteriology, virology and toxicology. If you submit freshly killed fish on ice, they must be accompanied by a submission of fixed specimens.

Finfish are painlessly killed with an anaesthetic, wrapped and sealed in a plastic bag, and placed in an excess of crushed ice.

The delay between sampling the finfish and arrival at the laboratory should be no longer than 24 hours.

NOTE: Freshly killed finfish on ice are only suitable for bacteriology and internal parasite examination, although they can be used for virology, toxicology and histopathology if necessary.

5.2.4 Frozen finfish

These specimens are only suitable for toxicology and virology. Specific suspect toxin(s) (e.g. pesticides) need to be nominated before laboratory analysis will be done.

5.2.5 Fixatives and anaesthetics

Have plenty of fixative on hand, as you need at least 10 times the volume of fixative for each volume of tissue or finfish.

5.2.5.1 Fixatives

10 per cent formal saline (for marine specimens):

- formalin (37–40 per cent w/v formaldehyde solution)—100 mL
- saline solution (0.73 per cent, 73 gm salt per 10 L water)—900 mL

(Saline solution may be replaced with seawater for marine finfish.)

NOTE: formalin is a skin and respiratory irritant, and care must be taken when using it.

10 per cent buffered neutral formalin (for fresh and brackish water specimens):

- formalin (37–40 per cent w/v formaldehyde solution)—100 mL
- tap or distilled water—900 mL

- disodium hydrogen phosphate $\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$ —6.5 grams
- sodium dihydrogen phosphate $\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$ —4.5 grams

NOTE: formalin is a skin and respiratory irritant, and care must be taken when using it.

Bouin's solution:

- saturated aqueous picric acid—750 mL
- formalin (37–40% w/v formaldehyde solution)—250 mL
- glacial acetic acid—50 mL

NOTE: Specimens must be transferred from Bouin's solution to 70 per cent ethanol (ethyl alcohol) after 24 hours. Store tissues in 70 per cent ethanol.

NOTE: Dry picric acid is explosive. Use extreme care with storage and handling.

Davidson's solution:

- glacial acetic acid—115 mL
- formalin (37–40 per cent w/v formaldehyde solution)—220 mL
- 95 per cent ethyl alcohol (ethanol)—330 mL
- tap or distilled water—335 mL

NOTE: Once specimens have been fixed in Davidson's solution for 24 to 72 hours they must be transferred to 50–70 per cent ethanol. The fixed tissue is then stored in 50–70 per cent ethanol.

5.2.5.2 Anaesthetics for euthanasia

MS 222 (Tricaine methanesulphonate; ethyl m-aminobenzoate; 3-aminobenzoic acid ethyl ester) 1 gram per litre of water. This concentration is lethal in 5 to 10 minutes.

Benzocaine (Ethyl p-aminobenzoate; 4-aminobenzoic acid ethyl ester):

- Benzocaine is not soluble in water and a concentrated stock solution should be made up.
- Dissolve 50 grams of benzocaine in 500 mL of 95 per cent ethanol (100g/L). If stored in a dark bottle the stock solution will keep for at least a year.

NOTE: 10 mL of benzocaine stock solution per litre of water (10/L) is lethal in 5 to 10 minutes.

Benzocaine is less expensive to use than MS 222.

AQUI-S (2-methoxy-4-propenyl phenol)

A two stage process is suggested when using AQUI-S for anaesthesia and humane death:

- Stage 1: use 25 to 30 ppm to induce heavy sedation (i.e. no gill movement, no cough reflex on forced extension of the operculum)
- Stage 2: humanely kill the fish by pithing.

NOTE: All chemical anaesthetics must be prescribed by a veterinarian for use in food fish.

5.2.6 Basic anatomy of finfish

Actual details of finfish anatomy may vary from species to species. The generalised diagrams and the photographs given below indicate the general location of organs (see Figures 5.2 and 5.3).

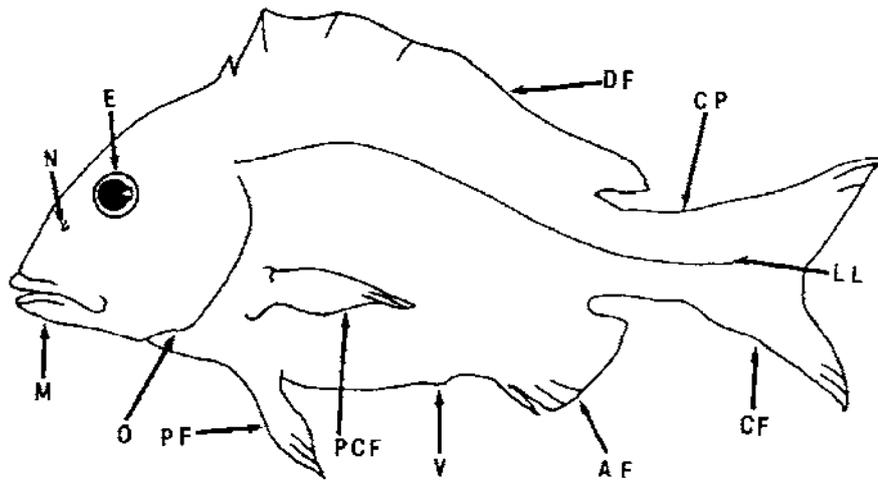


Figure 5.2 External anatomy of a finfish.

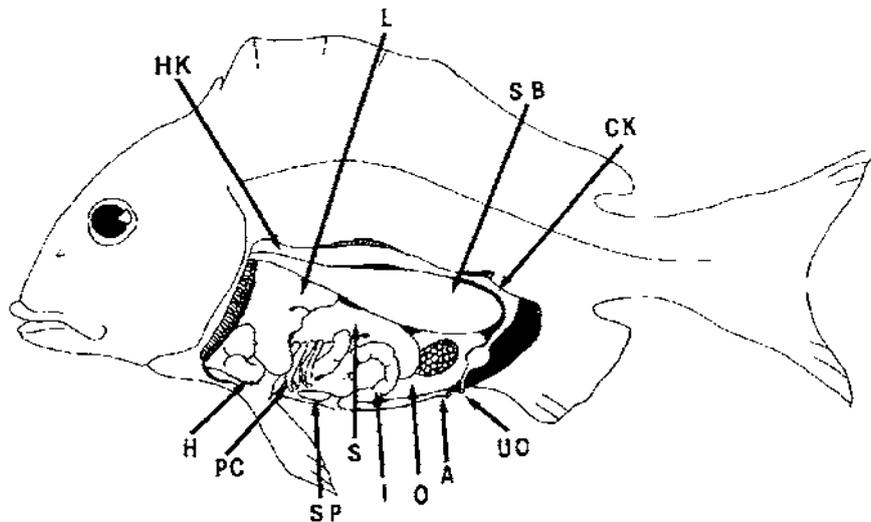


Figure 5.3 Internal anatomy of a finfish.

5.2.7 Gill and skin smears and wet mounts

Microscopic examination of mucus and surface cells from skin and gill scrapings is the best way to find external parasites. External parasites will fall off or leave the host during transport, after death or after fixation, so it is important that only freshly dead finfish are used for preparation of smears. Smears should be examined before specimen fixation.

5.2.7.1 Method for preparing gill smears and wet mounts for finfish

- Painlessly kill the fish by cutting the spinal cord behind the head.
- Remove a gill arch, place on a clean glass microscope slide and gently scrape mucus off the gill filaments with a clean scalpel blade onto the clean glass microscope slide (see Figure 5.4 (3)).

- Gently scrape the skin, particularly areas at the base of pectoral and pelvic fins, with a clean scalpel blade and place the mucus on a clean glass microscope slide. Scales should not be removed when preparing skin smears (scrape in the direction of the scales) (Figure 5.4 (4)).
- Add a drop of water that the fish were swimming in and gently mix (see Figure 5.5).
- Cover with a cover slip (Figure 5.5). Try and avoid trapping air bubbles.
- Examine under a microscope using a low-power objective (either 10x or 20x). Examine smears as soon as possible as the movement of living parasites greatly aids detection. Do not let the wet preparation smear dry out, as the parasites will die quickly.

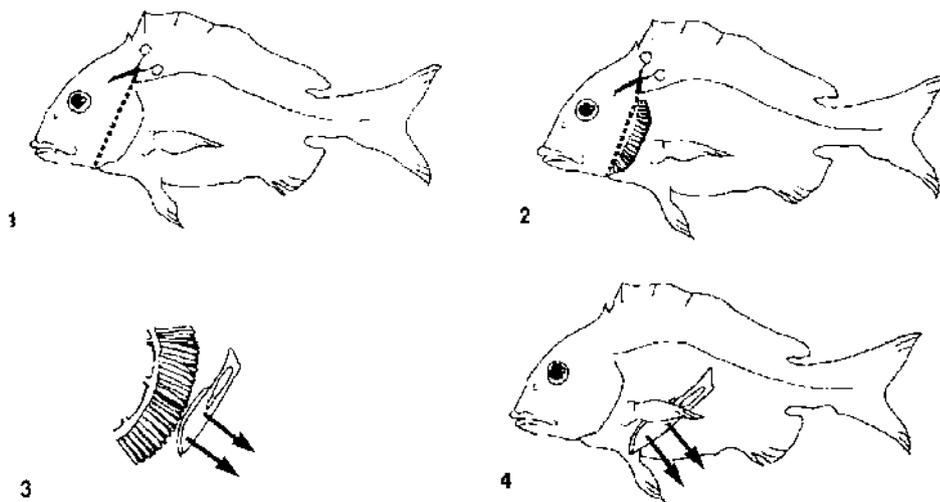


Figure 5.4 Preparing a skin and gill smear

5.2.7.2 Important points concerning smears and wet mounts

Any cysts or nodular structures found during external or internal examination can be removed, squashed or teased apart, wet mounted and examined in the same way that gill/skin smears are prepared.

At times it can be useful to cut off entire gill filaments and wet mount them for microscopic examination. Again, external parasites will be apparent and some indication of gill damage is seen by studying the filament and lamellar structure. In the case of bacterial gill disease, bacteria and areas of hyperplasia and necrosis will be seen.

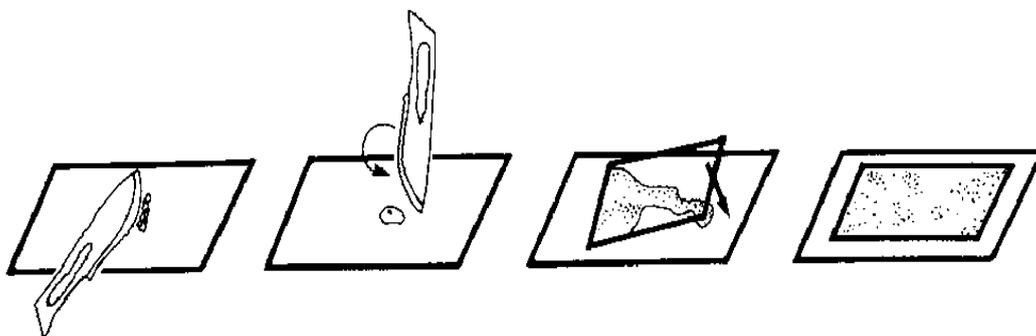


Figure 5.5 Preparing a skin and gill smear

5.2.8 Finfish dissection

The basic method of finfish dissection involves three or four cuts (see Figure 5.6):

1. Lay the fish flat on one side with the dorsal fin facing away from you.
2. Lift the operculum (gill cover) and cut it off being careful not to damage the gills (cut 1).
3. Make a small cut with scissors or a scalpel blade just in front of the anus (vent) to open the abdominal cavity. Avoid cutting the lower intestine or damaging any abdominal organs when you do this.
4. With blunt ended scissors, cut along the ventral midline forward from the small cut to between the jaw (cut 2).
5. Remove the flap of skin covering the abdominal cavity by cutting from the small cut upwards and forwards (cut 3). The heart and all the abdominal organs should be exposed for examination and removal (see Figures 5.7 and 5.8).
6. If the brain is to be examined, remove the top of the head with several shallow slices using a scalpel blade, cutting from just behind the eyes towards the front (cut 4). Alternatively, the whole head can be removed; place the cut end down and make the slice downwards towards the dissection board. This can be done if the fish is young and the skull is not too hard. In older fish, bone cutters or saws will need to be used.

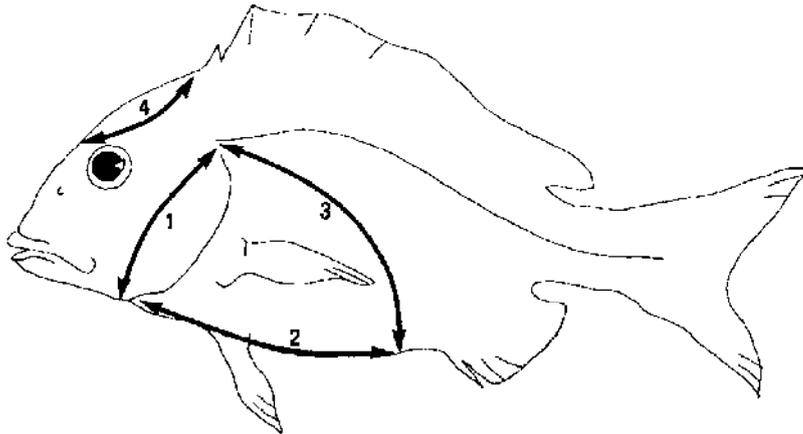


Figure 5.6 Partial dissection of a finfish using four cuts

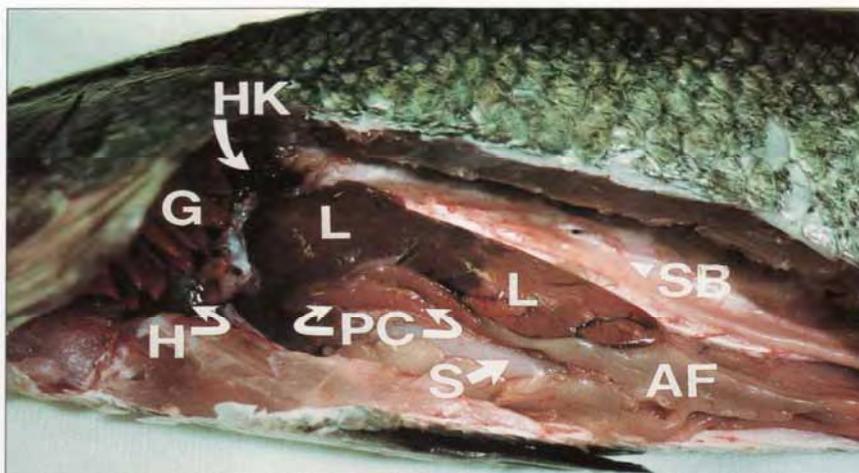


Figure 5.7 The internal anatomy of a dissected finfish. AF = abdominal fat, G = gills, H = heart, HK = head kidney, L = liver, PC = pyloric caecae, S = stomach, SB = swim bladder

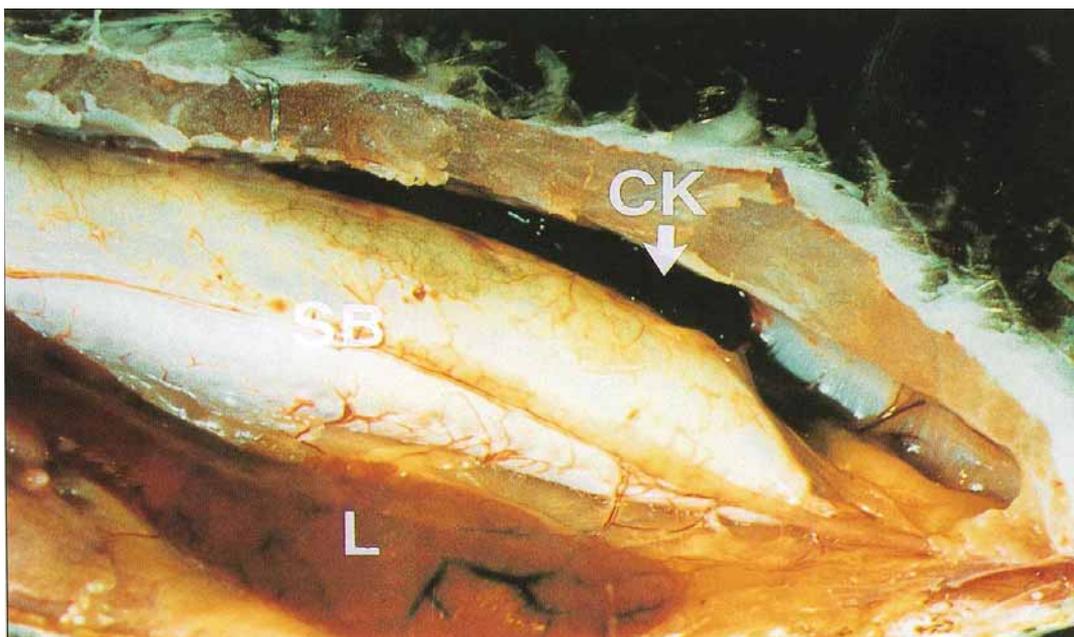


Figure 5.8 The internal anatomy of a dissected finfish. This photograph shows the location of the caudal kidney (CK) which is exposed when the swim bladder is deflected ventrally. The caudal kidney lies against the vertebral column and runs the length of the abdominal cavity, L = liver. SB = swim bladder

5.3 Collecting crustacean specimens for diagnostic laboratory examination

The crustacea include prawns, crayfish and crabs.

Prawns, crabs and crayfish decompose very rapidly after death. Only live or freshly fixed specimens are useful for veterinary laboratory examinations. The hepatopancreas (digestive organ), which is important in the diagnosis of many diseases, decomposes extremely quickly and special care needs to be taken to ensure it is preserved correctly.

5.3.1 Sampling live crustacea

The best samples to send to the laboratory are live samples. Live specimens are preferred as they enable the pathologist to see the clinical signs and prepare gill wet mounts, and are suitable for all laboratory tests (histology, bacteriology, parasitology and toxicology). Transport the live specimens to the laboratory in oxygen filled plastic bags or aerated transport tanks (see section H).

Select a minimum of six live, sick animals with clinical signs typical of the problem. Select six normal animals for comparison. A sample from each pond, cage, tank or aquarium, or each age class or species affected in the disease outbreak should be provided. Place each group in a separate and labelled container.

For larval and early post-larval crustaceans (less than 10 mm) or crab-1 etc, sample 50 larvae or post-larvae from each rearing or nursery tank, or age class or species affected by disease or mortality.

For juveniles (more than 10 mm long) and adult prawns or crabs, select a minimum of six live, sick animals with clinical signs typical of the problem together with six normal animals for comparison. A sample from each pond, pool, or tank, or age class or species affected in the disease outbreak should be provided.

5.3.2 Sampling fixed specimens

If it is too difficult to transport the specimens alive, the only alternative is to send fixed specimens. Fixed specimens are suitable for pathology and histopathology.

Use only five crustacea for fixation.

Juveniles and adults can be anaesthetised by chilling in a freezer. Do not freeze them.

A microscopic examination of larvae or post-larvae, and external and internal examinations of juvenile and adult crustacean, should be done and the findings recorded on a note to the laboratory.

Examination of wet preparations of gill filaments and appendages for attached organisms or abnormalities should be done if necessary before fixation.

5.3.3 Basic anatomy of crustacea

Before embarking with specimen fixation, familiarise yourself with the general anatomy of the species you are dealing with (see Figures 5.9 – 5.12).

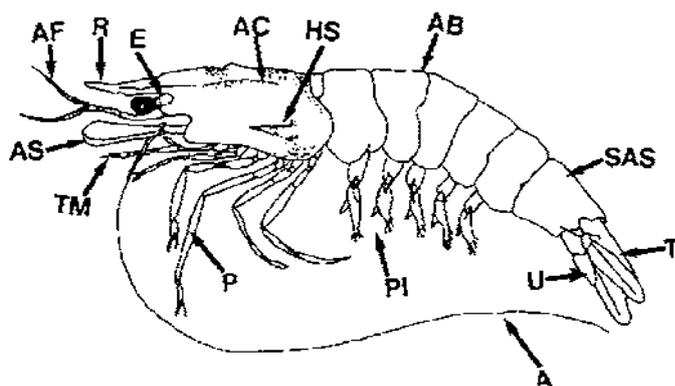


Figure 5.9 External anatomy of a prawn. A=antenna, AB=abdominal segment, AC = adostral carina, AF = antenna flagellum, AS = antenna scale, E = eyestalk, HS = hepatic spine, P = pereopods, P1 = pleopods, R = rostrum, SAS = sixth abdominal segment, T = telson, TM = third maxilliped, U = uropod

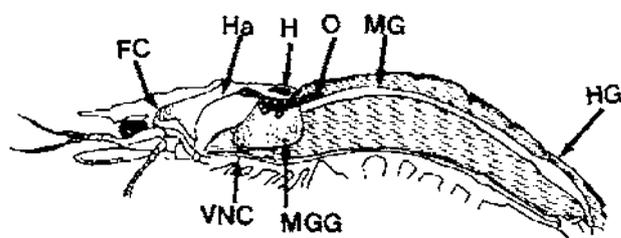


Figure 5.10 Internal anatomy of a prawn. FC = foregut chambers, Ha = haemocoel, H = heart, HG = hind gut, MG = mid gut, MGG = mid gut gland, O = ovary, VNC = ventral nerve cord.

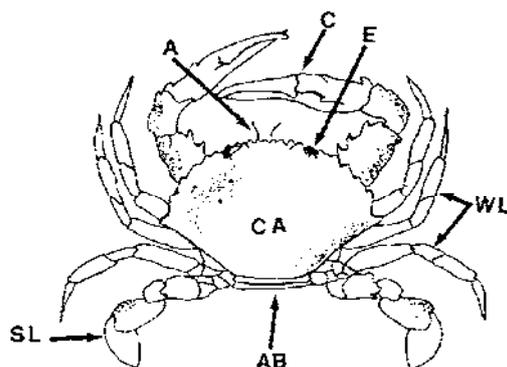


Figure 5.11 External anatomy of a crab. A = antenna, AB = abdomen, DG = digestive gland, E = eye, SL = swimming leg, WL = walking leg

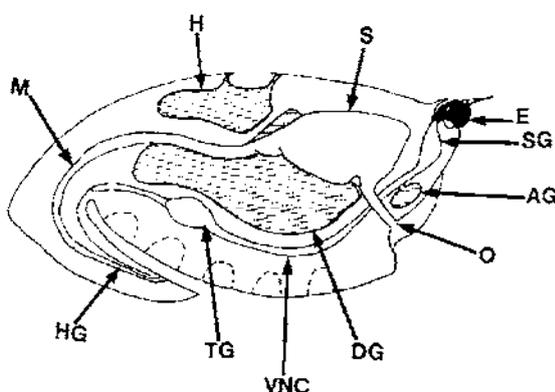


Figure 5.12 Internal anatomy of a crab. AG= antennal gland, DG = digestive gland, E = eye, H = heart, HG = hind gut, M = mid gut, O = oesophagus, S = stomach, SG = supraoesophageal ganglion, TG = thoracic gland, VNC = ventral nerve cord

5.3.4 Sampling and preparing fixed crustacean specimens

5.3.4.1 Dissecting prawns and crayfish

The method of prawn and crayfish dissection varies according to the size of the animal:

- Larvae and post-larvae less than 10 mm (1 cm) in length (or crab-1):
 - Catch 25 to 50 individuals with a plankton mesh net and place whole into a bottle of fixative solution, either 10 per cent formalin or Davidson's solution.
- Prawns or crayfish 10 mm to 30 mm in length:
 - Cut between the thorax (head) and abdomen (tail) and place in fixative.
- Crabs 10 mm to 30 mm:
 - Cut open the top carapace (shell) of the crab and place whole animal in fixative.
- Prawns or crayfish greater than 30 mm in length:
 - Draw up Davidson's solution into a syringe. Attach a needle (e.g. 21 gauge). Hold prawn firmly with head facing away from you. Inject 0.5 to 2.0 mL of fixative (depending on the size of the prawn) at a 45 degree angle into the head, aiming for the hepatopancreas.
 - Reposition the needle so it is pointing towards the tail and inject 1.0 to 2.0 mL of Davidson's solution into the abdominal muscle.

- Remove the thorax (head) from the abdomen (tail) by slicing between the head and tail using scissors.
- Cut along the dorsal surface (top) of the head, just underneath the carapace (shell) from the end of the head carapace right up to the rostrum. Take care not to damage the heart or stomach which lie directly beneath the shell of the head.
- Turn the prawn over and cut along the ventral (bottom) side along the midline thoracic carapace between the walking legs.
- Cut out a segment of abdomen, the thickness of one abdominal segment and place into the bottle of fixative (see Figure 5.13).

NOTE: Davidson's solution is a harsh chemical mixture and precautions should be taken to avoid skin and eye contact.

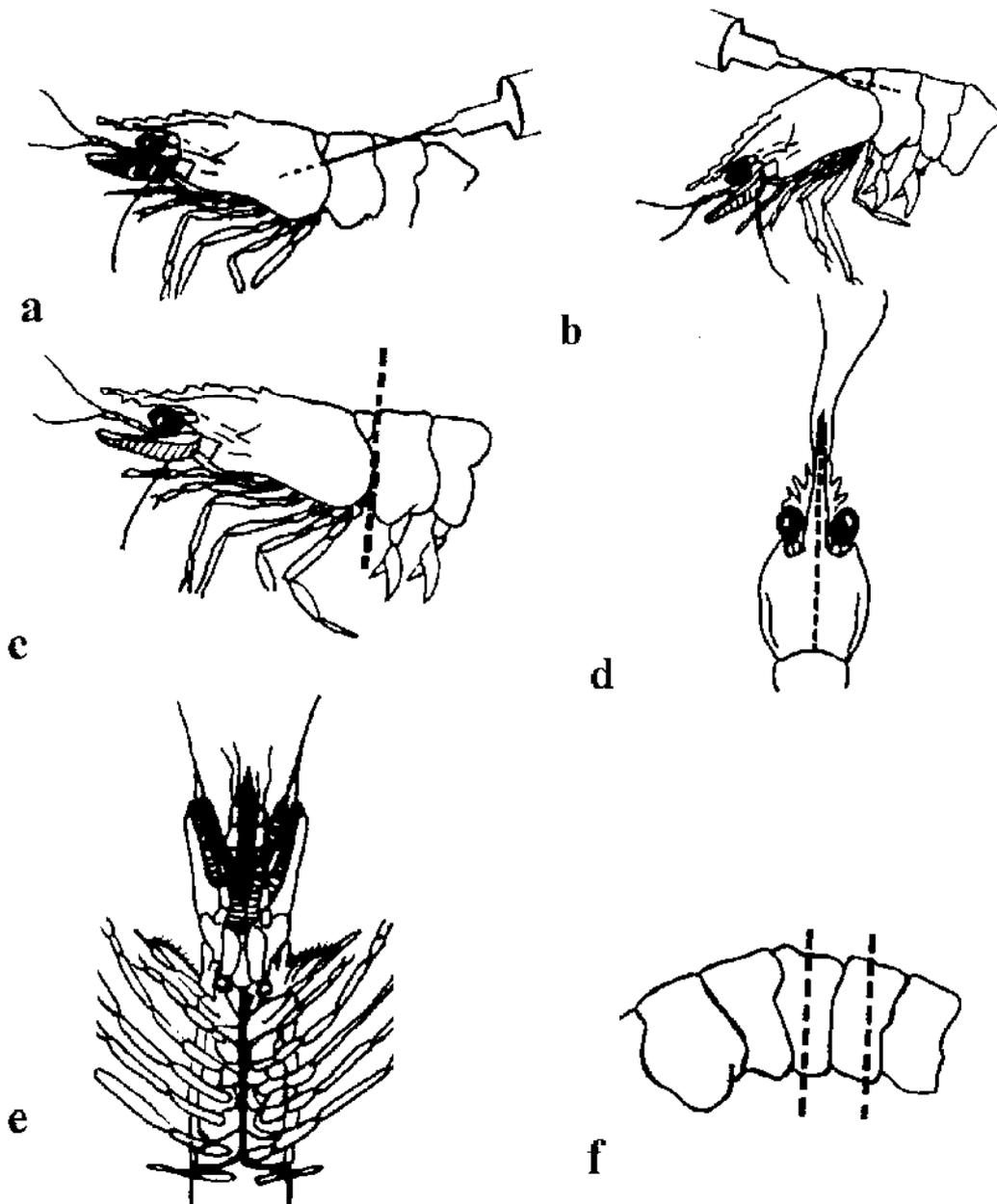


Figure 5.13 Steps in the dissection of a prawn or crayfish

5.3.4.2 Dissecting crabs

The method of crab dissection is as follows:

- Make two longitudinal cuts with a small hacksaw from the posterior (back) edge of the carapace (shell) adjacent to the swimming legs to the anterior (front) edge of the carapace just lateral to the eye stalks (see Figure 5.14).
- Cut across the carapace from right to left swimming legs, joining the two longitudinal cuts.
- Remove the piece of dorsal carapace. When lifting the carapace, carefully dissect away muscles and tissue attachments on the inside of the carapace.
- Twist off one lateral edge of the carapace to expose the gills on that side. Remove the digestive organ contained in this lateral carapace for fixation.
- The heart and thoracic organs should be exposed for examination and removal. The thoracic ganglion and antennal gland are only visible after the stomach, heart and digestive gland are removed.

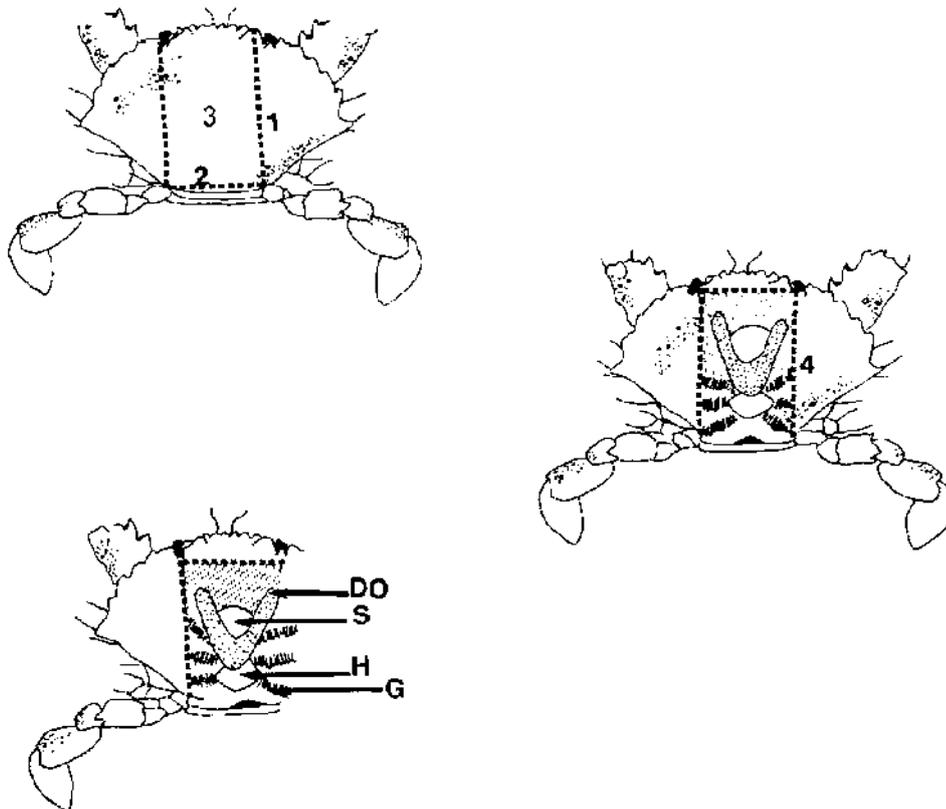


Figure 5.14 Steps to the dissection of a crab.

5.3.4.3 Important points concerning fixation of crustaceans

The fixative of choice for crustaceans is Davidson's solution.

If Davidson's solution is not available, 10 per cent formalin (formal saline or buffered neutral formalin) (see section 3.5.4) can be used as a poor alternative (do not transfer to ethanol).

There must be at least 10 times more fixative volume than tissue volume. After 24 to 72 hours the fixed tissues should be removed from the fixative solution, rinsed in tap water and transferred for storage in 50–70 per cent ethanol.

If possible place the tissues in chilled fixative as it will increase the time available for the chemicals to penetrate the cells, prior to decomposition.

Fixed specimens can be sent to the laboratory by wrapping in paper towels moistened with 50–70 per cent ethanol and sealing in two plastic bags.

Frozen crustaceans are only suitable for toxicology or virology. The history must indicate toxicoses and specific suspect toxin(s) must be nominated before laboratory analysis will be done.

5.3.5 Gill, appendage and larval wet mount preparations

Microscopic examination of gill clips and the tips or appendage outgrowths is the best way to detect ectocommensals, ectoparasites and excessive debris. Larval crustacea are small and many lesions and tissue changes can be missed when they are examined histologically. Gut contents, heart and gut activity, bacteria, fungi, protozoans and lesions are more easily assessed when larvae are examined microscopically in wet mount preparations.

5.3.5.1 Method for preparing gill smears and wet mounts for crustaceans

Remove the gill cover with scissors, cut off a gill filament and place on a clean glass microscope slide (see Figure 5.15). Remove appendage tips or outgrowths and place on a glass slide. Collect a group of larvae by filtration or pipette and place on a glass slide.

Add a drop of water (water that the crustacean was swimming in) or saline solution on to the glass slide.

Cover with a cover slip and avoid trapping air bubbles.

Examine under a microscope using a low-power objective (either 10x or 20x). Do not let the wet preparation dry out (add more water with a pipette), or the crustacean larvae and protozoa will die quickly.

Examination of larvae should cover 10 areas: eye surface, antennae, rostrum, gut content, midgut movement and size, gill area, walking legs (pereiopods), swimming legs (pleopods), tail (telson and uropods), and general pigmentation (see Figure 5.16).

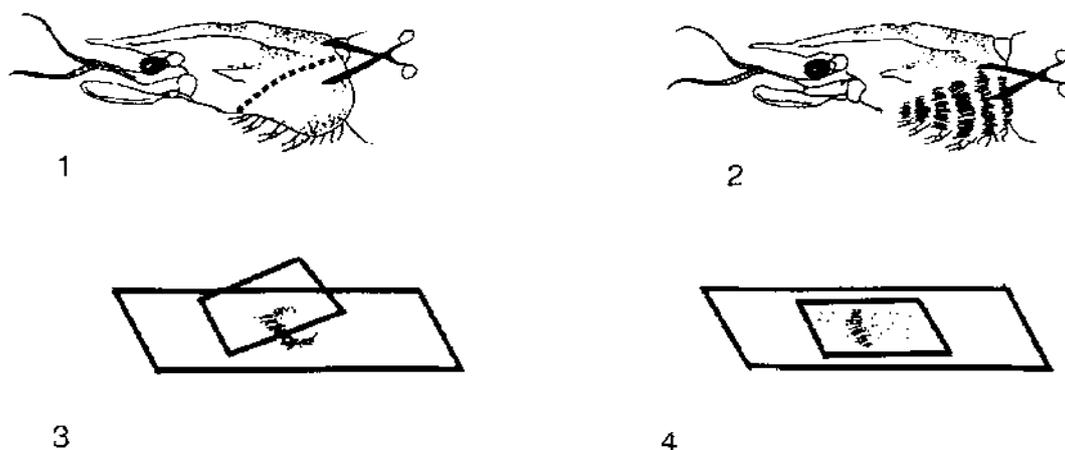


Figure 5.15 Preparing a gill mount from a prawn

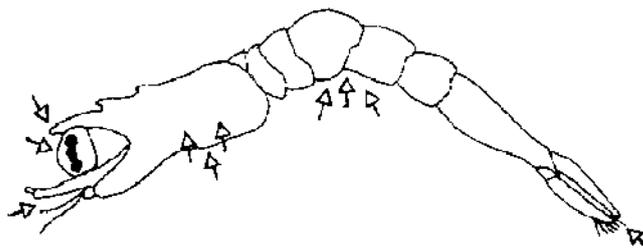


Figure 5.16 Points of a prawn larvae to examine

5.3.6 Sampling and preparing molluscs

Oysters and clams decompose very rapidly after death. Only live or freshly fixed specimens are used for diagnostic laboratory examination (see Figures 5.17–5.19).

5.3.6.1 Live molluscs

- Larvae and spat (or post-settlement stages):
 - Sample 50 larvae or spat from each rearing or nursery tank/pool/pond or age class or species affected by disease or mortality.
- Juveniles and adults:
 - Select a minimum of six live, sick animals with clinical signs typical of the problem together with six normal animals for comparison. A sample from each raft, rack area or tank, or age class or species affected in the disease outbreak should be provided.
- Transport the live specimens to the laboratory in oxygen filled plastic bags (larvae) or wrapped in damp paper towels or cloth in an insulated container.

NOTE: Live specimens are preferred as they enable the pathologist to see the gross clinical signs and prepare gill and wet mounts, and are suitable for all laboratory tests (histology, parasitology, bacteriology and toxicology).

5.3.6.2 Fixed mollusc specimens

- Select only five molluscs for fixation.
- Juveniles and adults: these can be anaesthetised by chilling or by placing them in magnesium chloride or propylene phenoxetol solution.
- A microscopic examination of larval molluscs should be done and the findings recorded on a note to the laboratory.
- Larvae and post-settlement stages less than 10 mm shell length: preserve 25 to 50 individuals intact.
- Oysters greater than 10 mm shell length: cut open the two valves, remove the soft organs from the shell and place in fixative. Cut the visceral mass into pieces no thicker than 8 mm if necessary, before fixation.
- Clams up to 10 cm shell length: remove the two valves by cutting the mantle and adductor muscle attachments, and place in fixative.
- Clams greater than 10 cm shell length: remove the valves, dissect out individual organs. Tissues to take include the gills, digestive gland, mantle, kidney, muscle, heart, gonad and any other organ or tissue with lesions.

- Pearl oysters up to 10 cm shell length: cut open the two valves, and remove and preserve all the soft organs as a group. A shallow cut may be made on one side of the organs to allow the fixative to enter more rapidly.
- Pearl oysters greater than 10 cm shell length: cut the oyster in half by making a parallel cut between the two shell valves. Remove the two halves of oyster tissue and place in fixative. If there is too much tissue, place each half in a separate container which is labelled so that both halves can be identified to the one pearl oyster.
- If possible place the tissues in chilled fixative as this will slow decomposition before the chemicals have a chance to penetrate the mollusc cells.
- Fixed specimens can then be sent to the laboratory by wrapping in paper towels moistened with fixative or 50–70 per cent ethanol (whichever is appropriate) and sealing in two plastic bags.
- The fixatives used include 10 per cent formal saline and Davidson's solution.

NOTE: Fixed specimens are only suitable for pathology and histopathology.

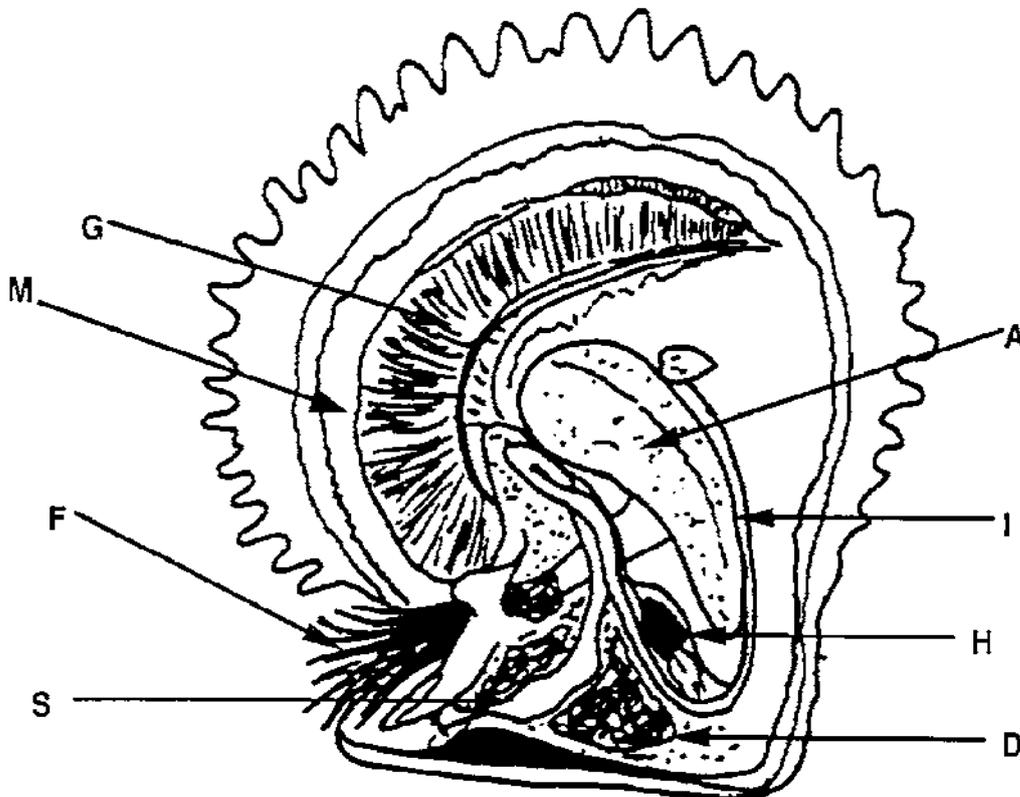


Figure 5.17 Internal anatomy of a pearl oyster. A = adductor muscle, D = digestive gland, F = foot, G = gills, H = heart, I = intestine, M = mantle, S = stomach

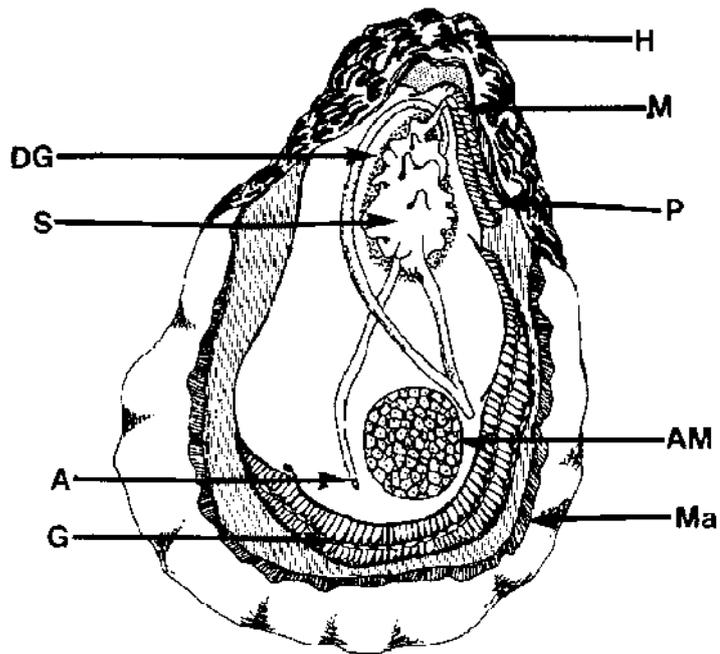


Figure 5.18 Internal anatomy of an edible oyster. A = anus, AM = adductor muscle, DG = digestive gland, G = gill, H = hinge, M = mouth, Ma = mantle, P = palps, S = stomach



Figure 5.19 Internal anatomy of a clam. A = adductor muscle, B = byssus, C = ctenidia, D = digestive/reproductive organs, F/BO = foot/byssal retractor muscle, H = heart, K = kidney, S = shell valve, SM = siphonal mantle

Part F Monitoring mangrove forest health

NOTE: In Queensland, mangrove and other marine vegetation is protected under the *Fisheries Act 1994*. Permits are required from Queensland Primary Industries and Fisheries (QPIF, under the Department of Employment, Economic Development and Innovation) to remove, destroy or damage a marine plant; or cause a marine plant to be removed, destroyed or damaged. Therefore, persons monitoring in this environment and requiring the removal of any mangrove matter from the field should contact their local office of the QPIF for further information.

6.1 Mangrove litter trapping

6.1.1 Introduction—what is litter and how is it related to mangrove forest health?

Mangrove litter production is the shedding of vegetative and reproductive structures of mangroves (e.g. leaves and seeds). This may be caused by natural growth cycles, age, stress and/or mechanical factors, such as wind. This litter fall, part of the net primary productivity of a mangrove system, is the basis of detritus food chains.

The rate of litter production can indicate the health of a mangrove community. A healthy system will produce a high and/or stable monthly volume as older leaves are shed and replaced with new ones. Declining production may indicate that a community is under stress. The amount of reproductive material can also be used as a measure of health, as reproduction effort can be considerably reduced if plants are stressed.

The ratio of fallen leaves to stipules of *Rhizophora* spp. can also be used as an indicator of system health. Every developing leaf is enclosed in a stipule, which is shed when the leaf matures. Thus, in a healthy community, the ratio of leaves to stipules in the litter should be close to 1:1. If there are more leaves than stipules, this may indicate that the plant is shedding leaves due to stress.

A significant decline in leaf and flower production outside seasonal variations may indicate that a mangrove community is under stress.

6.1.2 Why monitor litter productivity?

The main reasons for monitoring litter productivity are to:

- gain an understanding of the baseline litter productivity of a mangrove community
- indicate system health—litter fall is a useful indicator of this as mangrove communities under stress are likely to be less productive, resulting in less litter production over time. Alternatively, communities under stress produce a large amount of litter over a short time as the plants shed leaves
- look at unseasonably low litter production due to poor growth resulting in less detritus, and this may adversely affect faunal communities.

6.1.3 Method summary

Leaf litter traps are installed in a mangrove community. Litter is collected monthly, sorted into different categories (leaves, twig, bark, flowers and propagules), oven dried, and weighed. The dry weight is a measure of the productivity of the community. Problems to be aware of include: significant disturbances (e.g. cyclones) may damage sites and make it necessary to begin collecting data again for a time series; traps can be interfered with by others; and climatic and biological differences in Australian mangroves make it difficult to compare data from different locations.

If a storm has damaged a site and stripped many of the leaves, litter should not be collected. Instead, traps should be emptied and checked for damage. Monitoring can recommence, but a new starting date will have to be noted. As leaf loss is normally balanced with leaf production, a 1:1 ratio is the most useful indicator of mangrove health.

Leaf litter traps can be constructed from PVC pipe and plastic mesh as illustrated in Figure 6.1.

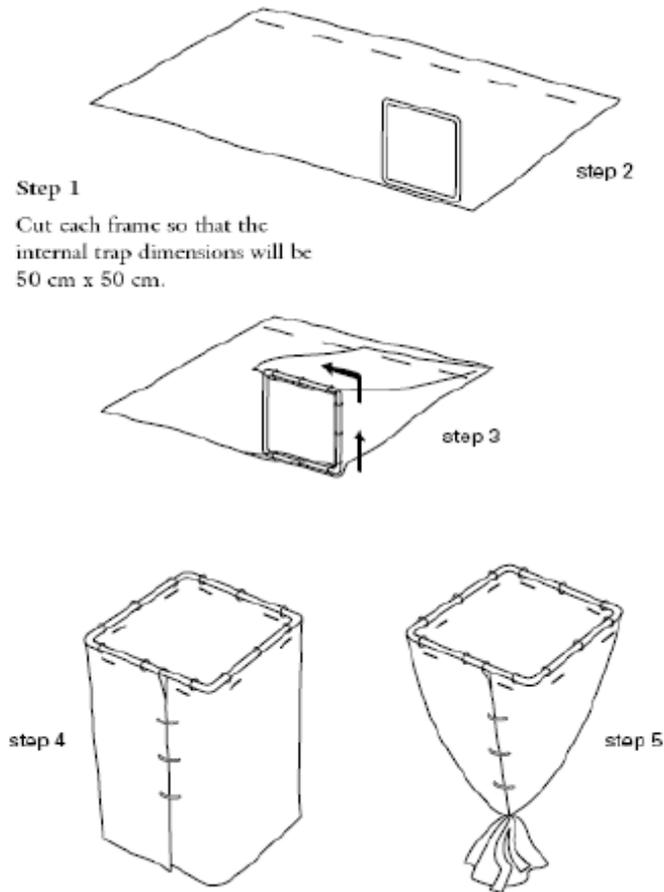


Figure 6.1 How to make a litter trap

6.1.4 Site selection

Survey the mangrove community and identify the different forest types or zones that occur. Depending on the objectives of your program, select a homogenous forest type to monitor. Within this forest, put litter traps at 5 m intervals along a transect running parallel to the tidal gradient. Alternatively, put them at random in large quadrats (e.g. 10 m x 10 m, 20 m x 20 m, etc.).

6.1.5 Installing litter traps

Install litter traps by attaching nylon cord to each corner of the trap and hanging them evenly from mangrove branches. Ensure that the bottom of the trap or chute is above the high tide mark (see Figure 6.2).

6.1.6 Emptying the traps

Traps should be emptied every month (every two weeks if measuring *Avicennia marina*) to prevent leaf decay and to determine monthly trends. To empty a trap, remove any large sticks and put them in a plastic bag marked with the trap number. Put the bag under the chute, untie the chute and empty the trap contents. Re-tie the chute securely and proceed to the next trap.

6.1.7 Sorting trap contents

On returning from the field, sort contents into leaves, flowers, bark (include wood), seeds, other and, if monitoring in a *Rhizophora* forest, stipules. Do not mix the litter contents from different traps. Count the number of leaves and stipules and record the result. Place the sorted contents into smaller, labelled paper bags, and then put the datasheet and smaller bags in the large labelled plastic bag for transport to the drying ovens.

Note: Leaf litter contents can be kept in a refrigerator for up to a week before being dried.

6.1.8 Dry and weigh trap contents

- Dry the labelled paper bags in a drying oven at 70°C for 72 hours.
- Using laboratory scales, weigh the contents from each category in each trap separately. Record the results (in grams, to three decimal places). If there is insect damage, leaf dry weight is likely to be low, biasing estimation of leaf productivity. Therefore, leaf loss needs to be quantified by sorting leaves from each trap into the closest matching category as detailed in Table 6.1 and Figures 6.2 and 6.3.

For example, if a leaf is about 40 per cent intact, put it in the '50% remaining' category; classify a leaf with 90 per cent remaining as a 'full leaf'. Weigh material in each percentage loss category, and correct for damage using the formulas provided. The sum of the corrected weights of leaves in all categories is the weight of leaves for the trap. Record this result on the datasheet for each trap.

Table 6.1 Percentage loss categories of mangrove leaves

Category of leaf loss	Measured weight	Correction factor	Corrected weight
Full leaf		None (as measured)	
75% remaining		Multiply by 1.333	
50% remaining		Multiply by 2	
25% remaining		Multiply by 4	
			Total =

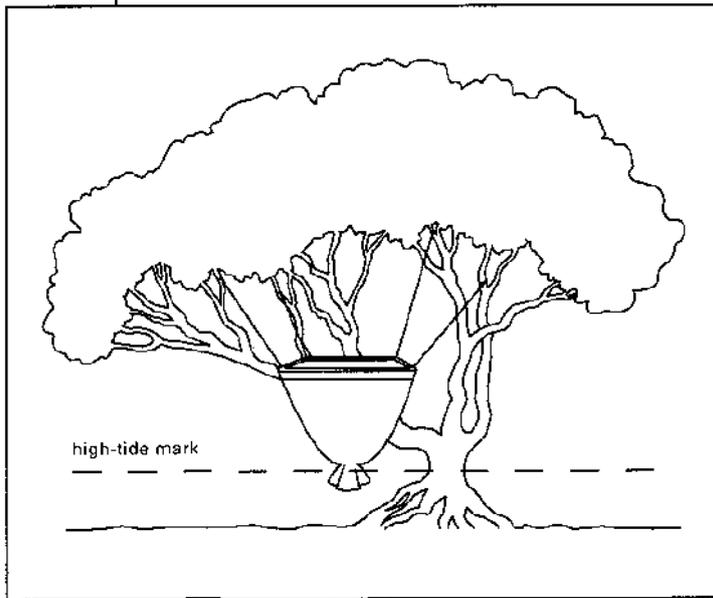


Figure 6.2 A litter trap in a mangrove forest

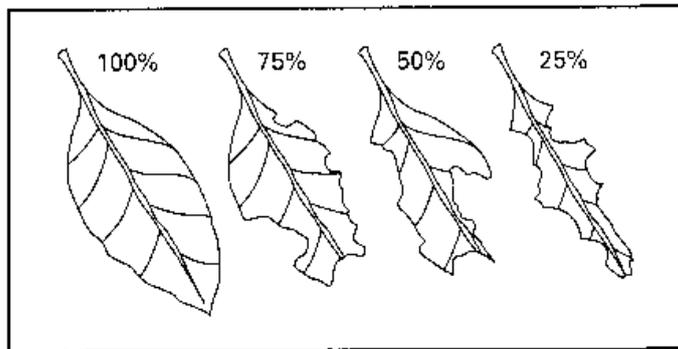


Figure 6.3 Leaf percentage loss

6.1.9 Data interpretation

Data is interpreted as mean dry weight of litter fall per square metre, per month, expressed as g/m²/month. Ranges and standard deviations between traps should also be calculated.

Mangrove communities exhibit strong seasonal, annual and temporal variations in litter production, with peak fall occurring in summer in most locations, and varying with climatic conditions from year to year. It will also vary between regions due to different climate, rainfall, salinity and nutrient availability. For example, mangroves in the wet tropics are likely to produce more litter than those in more temperate climates. As different species also produce litter at varying rates, it is not usually appropriate to compare results between different regions and species.

Significant decline in leaf litter fall or reproductive effort in a particular mangrove community may indicate that it is under stress, so seek advice from relevant experts if such trends occur. If soil salinity is also being monitored, check data to see if unusual levels (high ones, in particular) have been recorded.

If comparing the stipules to leaves ratio in communities of *Rhizophora* spp., the ratio should normally be close to 1:1. Trends showing a higher ratio of leaves to stipules may indicate that the plants are shedding leaves, indicating possible stress.

For analysis of trends, data should be collected for at least three years, as some species of mangroves produce propagules every 2–3 years only.

6.1.10 References and further reading

Bunt, J.S. (1995) Continental scale patterns in mangrove litter fall, *Proceedings of the Asia Pacific Symposium on Mangrove Ecosystems*, 1–3, pp. 135–40.

Duke, N.C., Bunt, J.S. & Williams, W.T. (1981) Mangrove litter fall in north-eastern Australia, 1. Annual totals by component in selected species, *Australian Journal of Botany*, vol. 29, pp. 547–53.

Snedaker, S.C. & Snedaker, J. G. (1984) *The Mangrove Ecosystem, Research Methods*, UNESCO, Paris.

6.2 Seedling regeneration

6.2.1 Introduction—why monitor mangrove seedlings?

Due to their intolerance to shade, seedlings of most mangrove species are absent, or in low densities, under a mature forest canopy. However, the death of mature trees leaves a gap in the canopy, allowing increased light to reach the forest floor, and triggering the establishment of seedlings. These rapidly colonise the light gap, beginning the process of regeneration and eventually refilling it. These seedlings can be more susceptible to environmental stress than mature mangroves are. A heavy deposition of sediment from an event or major changes to site hydrology can induce stress, resulting in decreased growth rates and increased mortality.

Light gap regeneration rate can be an indicator of mangrove system health. Seedlings respond to environmental changes more rapidly than mature stands do, and monitoring can produce useful data in as little as three months, which is the normal monitoring frequency.

Long-term hydrological changes, such as sediment deposition or greater tidal and freshwater influence, may have occurred at the site over the past 10–30 years, resulting in colonisation by a different species from the original. For example, long-term sediment deposition may raise the elevation of a site, resulting in conditions more favourable for species normally found higher up the tidal gradient. Other hydrological changes, resulting in more tidal or freshwater influence, could create conditions favouring species normally found closer to the seaward or landward margin. Identifying what species of mangrove is replacing the previous forest can indicate whether climatic or hydrological changes have occurred.

6.2.2 Method summary

In a light gap or a recovering mangrove forest, a belt transect containing a minimum of 25 mangrove seedlings is established. The height and stem diameter of each seedling within the transect is monitored every three months and is used to calculate the approximate trunk volume of the seedling.

6.2.3 Site selection

When selecting a site, use recent aerial photographs or local knowledge to find canopy or light gaps in a mangrove forest, and confirm that there are seedlings present by ground truthing. At least four light gaps from one homogenous mangrove community are required for data interpretation.

6.2.4 Establishing a belt transect

To establish a belt transect running north-south through the middle of a light gap:

- Walk to the middle of the gap and take bearings directly to the north and south.

- Mark with stakes the spots where the north-south bearings intercept the boundary of the gap. These will be the start and end points of the transect.
- Starting at the northern point, lay out the 50 m tape measure through the middle of the gap, to the southern boundary (see Figure 6.4)
- Record the length of the transect on the datasheet.

The transect needs to be wide enough to include at least 25 seedlings within its boundaries. Start with one that is 2 m wide (1 m either side of the tape measure), and count the number of seedlings. Increase or decrease the distance until a suitable width, containing an adequate number of seedlings, is established. Record this width on the datasheet.

If seedlings are extremely dense, establish four quadrats, each with 25 or fewer seedlings at regular intervals along the transect. The seedling density determines the size of the quadrats, but all must be equal. If seedlings are sparse (less than 50 in the entire gap), or if the light gap is small, sample the entire gap.

Note: This method is a general approach to establishing a monitoring plot that will compensate for uneven light distribution in most instances. However, a belt transect may not always be suitable, and the dimensions of a suitable monitoring plot should be established case by case.

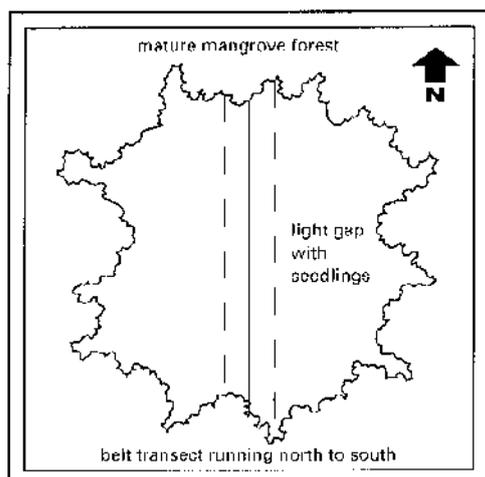


Figure 6.4 Belt transects can be established through a light gap running north to south

6.2.5 Tag seedlings

Using flagging tape, tag each seedling along the transect with a unique number. Beside the corresponding number on the datasheet, record the distance of each seedling along the transect and its position (distance to the left or right) from the middle of the transect (e.g. 12 m, left 0.7 m). This allows for easy location of the seedlings during repeat surveys.

6.2.6 Measure height

Using the measuring stick, record the height of the seedling by measuring from the ground to the base of the uppermost apical shoot. If the seedling is growing from a propagule, take the measurement from just above (see Figure 6.5). Record the result on the datasheet.

6.2.7 Measure stem diameter and stem density

Using plastic calipers, measure the stem diameter of the seedling at the base of the cotyledon, which is just above the original propagule. If there is no propagule, take the measurement at the base of the stem, just above the swelling.

Density (number of stems per m²) is also recorded. As the light gap matures, density is likely to decrease naturally, as many of the seedlings die due to competition.

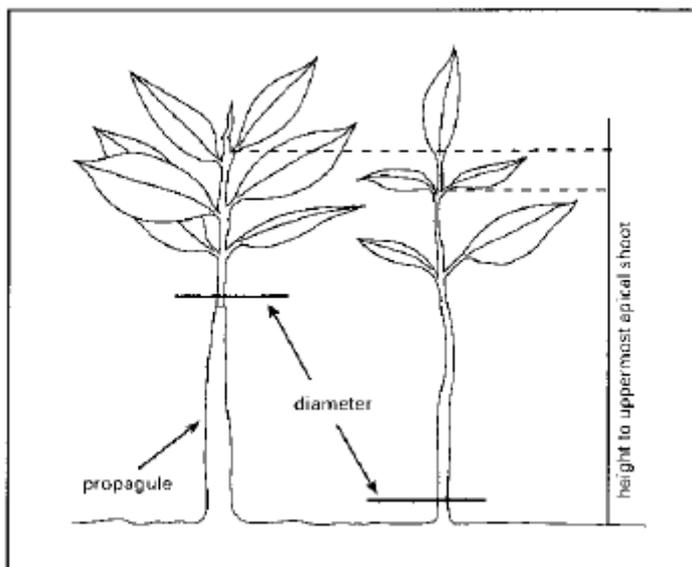


Figure 6.5 Where to take stem diameter and height measurement

6.2.8 Count the leaves

Count the number of leaves on each seedling. If there are more than 25, record the result as more than 25 leaves.

Leaf counts provide an indicator of seedling progress in the early stages of development. However, after 25 leaves have established this becomes very time consuming.

6.2.9 Record sediment type, pH and salinity

Collect a sample of the substrate at the middle of the transect and rub it between your fingers. Record the sediment type (silt, fine sand, sand, coarse sand, or gravel) based on its feel, listing the dominant type first (i.e. record a silty sand as sand/silt).

It is also advisable to record the salinity and pH of the sediment within the transect.

6.2.10 Draw a mud map of the site

Draw a mud map of the gap showing its dimensions, an arrow representing north, the position of the transect, and the surrounding forest type.

6.2.11 Measurements needed during re-survey

When the site is re-surveyed, the death of any seedling should be recorded beside its unique number. New seedlings should be assigned new numbers (do not reassign numbers from dead seedlings) and their height, stem diameter and leaf number recorded.

As seedling density decreases, the size of the study area will have to be increased to retain 25 plants (e.g. by increasing the width of the belt transect). When the stem diameter is greater than 2.5 cm, measure the stem at a height of 1.3 m, rather than at the base.

6.2.12 Data interpretation

The rate of increase in seedling biomass indicates the rate of regeneration of a site. To calculate this, measure the relative volume (as opposed to biomass) of seedlings per square metre within the transect, and its rate of increase over time. Slow or no increase in relative seedling volume and/or high seedling mortality rates may indicate environmental stress.

The relative volume of each seedling within a plot can be calculated from:

$$\text{Relative volume of seedling (cm}^3\text{)} = \frac{1}{3} \times \frac{1}{4} \times \pi D^2 \times H \text{ or } \frac{1}{3} \times \pi r^2 \times H$$

where:

$$\pi = 3.14 \text{ (approx.)}$$

D = Diameter of trunk (cm)

H = Height of plant (cm)

r = radius $D/2$ (cm)

Seedlings differ widely in shape due to their leaves and branches, making true volume difficult to measure. Based on the two key indicators of plant size (stem diameter and height), and the 1/3 multiplication factor, this formula actually measures the volume of the plant stem as if it were pyramid-shaped. This is a relative measurement, allowing the growth rate of seedlings to be monitored and compared with other seedlings.

The total volume of seedlings in the transect is calculated by summing the volumes of all the seedlings measured. Divide the total volume by the area of the transect to give volume (cm^3/m^2).

$$\text{Seedling volume cm}^3/\text{m}^2 = \frac{\Sigma \text{ relative seedling volume (cm}^3\text{)}}{\text{transect area (m}^2\text{)}}$$

where: Σ = Sum of individual seedling volumes

6.2.13 References and further reading

Duke, N. (1996) Mangrove reforestation in Panama: an evaluation of planning in areas deforested by a large oil spill, in Field, C. (ed.), *Restoration of Mangrove Ecosystems*, International Tropical Timber Association (ITTO), Tokyo.

Duke, N. (1992) Aging Rhizophora seedlings from leaf scar nodes: a technique for studying recruitment and growth in mangrove forests, *Biotropica*, vol. 24, pp. 173-6.

6.3 Canopy cover and leaf area index

6.3.1 Introduction—what is leaf area index and how is it related to mangrove forest health?

Leaf area index (LAI) is an index score of the total area of leaf surface within a plant community relative to the ground area of that community. Since plants under stress tend to shed leaves, thus reducing their leaf area, environmental stress can be detected by monitoring LAI. Significant decrease or gradual reduction over time in canopy cover and/or leaf area index score may indicate ecosystem stress or disturbance.

The LAI is not a true measurement of leaf area, but a relative score that can be used to compare results between sites and over time.

LAI can be used to monitor short to long-term foliage patterns and changes in a mangrove stand (e.g. high rates of primary productivity during good seasons, or defoliation through storm damage, seasonal or drought-related leaf fall, insect attack, etc.).

To calculate LAI, the intensity of full sunlight is measured (using a light meter), and this is compared with the light intensity measured under a mangrove canopy. Either a Lux or photosynthetic active radiation (PAR) meter is suitable. The cheap and robust Lux meters measure total light intensity, while the more expensive PAR meters measure photosynthetic active radiation, which is the light absorbed by plants during photosynthesis.

The choice of meter depends on the accuracy required. A scientific approach requires the more expensive and fragile PAR meter, which is highly sensitive and able to detect much smaller foliage pattern changes than the Lux meter can. However, despite some limitations, Lux meters can be used to detect and measure short-term changes to mangrove canopy cover.

Lux and PAR readings are not easily comparable, so choice of meter is important.

6.3.2 Method summary

Light readings are taken in the sun, outside the canopy of a homogenous mangrove community. A series of readings are then taken under the canopy, followed by a further series, again in the sun. LAI is determined by calculating the ratio of light under the canopy, to the light in the adjacent open space.

Best timing is midday ± 2 hours to ensure that the sun is as close to overhead as possible, and valid measurements can only be made on sunny days.

LAI measurement is not suitable for fringe mangrove environments, as light penetration from the edges will bias the result (e.g. on narrow river fringes).

6.3.3 Site selection

This method involves monitoring the LAI in wide, homogenous stands of mangroves. Prior to site selection, examine aerial photographs and look for patterns of zonation.

Select potential monitoring sites where mangrove forests are homogenous and are wide enough to minimise light infiltration from the forest edges.

At the site, walk through the forest and closely observe its structure (i.e. canopy height, species composition, and stem density) then select an area that appears to be representative of the mangrove community to be monitored. To avoid light penetration, ensure that there are at least 20 m between the quadrat and a forest edge.

Using the 50 m tape, mark out a quadrat of approximately 25 m x 25 m.

6.3.4 Using the light meter

Hold the light meter in one hand and the sensor in the other (see Figure 6.6), ensuring that the white surface of the sensor is facing upwards.

Turn on the light meter and select a range that is appropriate for the current light conditions.

To take a reading, blink your eyes and record the first reading that you see when you open them. A second person should carry the datasheets and record the results.

The light meter may have different range settings (e.g. x1, x10 and x100) to allow for a range of light intensities. When recording results, always record the range settings, or make the necessary corrections while taking measurements.

Wipe down the meter with a moist cloth after each use, treating the sensor with extreme care.

Always read instruction manuals for light meters, as some require the application of a correction factor.

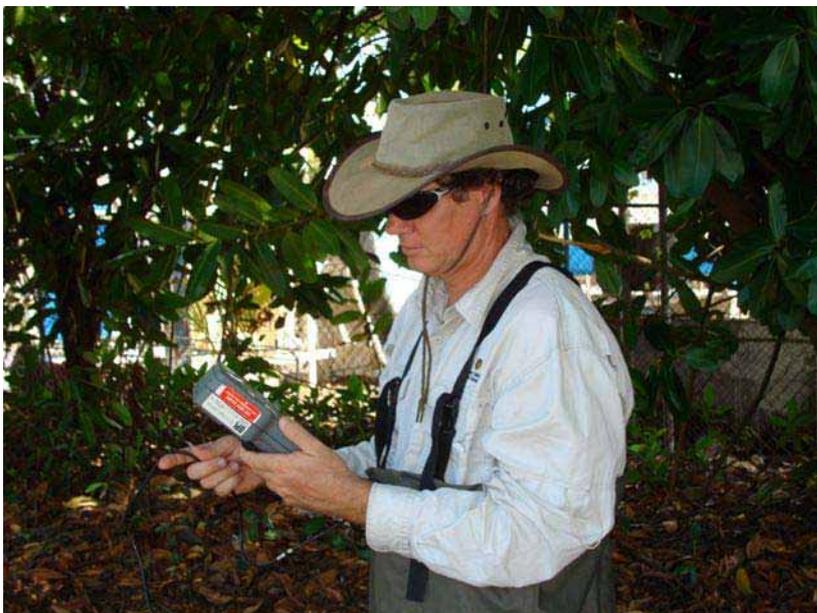


Figure 6.6 Using a light meter

6.3.4.1 Take the light meter readings

Take light readings outside the canopy:

- Turn on the light meter and set the range to 100x. Take five readings outside the canopy (multiplying each by 100 to adjust for range) and record the results.

Take light readings within the quadrat:

- Set the light meter to lx or 10x. Walk along the boundaries of the quadrat taking a light reading every metre for 100 m. Record the results, remembering to adjust for the range.
- When a light meter is used under a forest canopy, readings will occasionally go off-scale. If this happens, switch to a higher range setting and record the measurement on the new scale. Return to the original scale and continue to take readings. It is important to complete each set of readings within 30 minutes.

Take a light reading outside the canopy:

- Set the light meter to 100x and return to the outside of the canopy. Take another five readings and record the results.

6.3.4.2 Measure the zenith angle of the sun

An instrument called a clinometer is used to measure the zenith angle of the sun, which is its angle from the vertical (see Figure 6.7). The closer it is to midday, the smaller this angle will be. If a clinometer is not available, insert a 1-2 m pole into a flat area of sunlit ground, ensuring it is at 90°. Measure the height of the stick and the length of its shadow.

$$\text{Zenith angle} = \frac{\text{Tan}^{-1} (\text{Length of shadow})}{\text{Height of stick}}$$

Alternatively, the zenith angle for the site can be calculated from a nautical almanac or from a suitable computer program using the latitude, longitude (or GPS reading) and time of day.

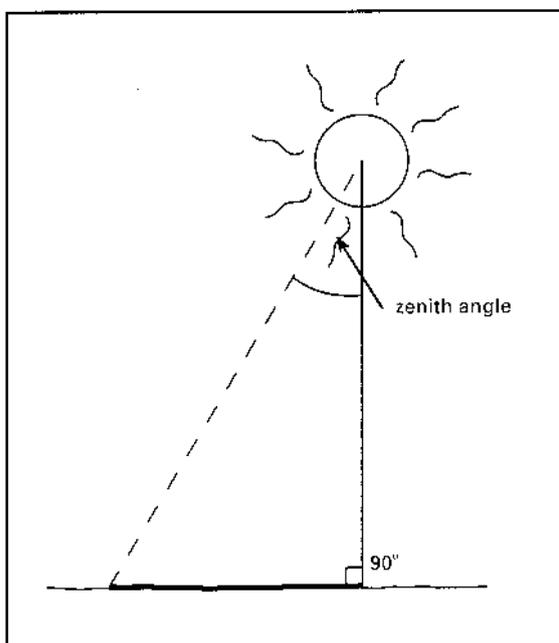


Figure 6.7 Zenith angle of the sun

6.3.5 Data interpretation

Calculate canopy cover and LAI of a plot using the following formulas:

$$\text{Canopy cover} = \frac{1 - \text{Average of canopy readings} \times 100}{\text{Average of open space readings}}$$

$$\text{LAI} = \text{Ln} \left(\frac{I_b}{I_0} \right) / -k \times \cos \left(\frac{\infty \pi}{180} \right)$$

where:

I_b = Mean value of light below the canopy

I_0 = Mean value of light above the canopy

k = is an extinction coefficient that accounts for the angle and orientation of the foliage (A k value of 0.55 has been chosen as appropriate for mangrove stands).

∞ = Zenith angle of the sun

Ln = natural log of number

π = Pi or 3.14

Note: The k value quoted can be used in calculations for closed canopy forests of *Rhizophora*, *Bruguiera* and *Ceriops* spp. but, due to the different structural characteristics of their canopies, is not suitable for use in closed canopy forests of *Avicennia* spp., or in open forests. However, as no k value has, as yet, been calculated for *Avicennia* stands, the nominated value can be used to calculate LAI, but the data can be compared only with that from other *Avicennia* stands.

Forest LAI and canopy cover are the mean results from each plot. Data can be displayed on histograms as the LA1 score, or as canopy cover per plot or forest over time. Median, range and standard deviations of readings are also calculated.

It is important to distinguish between natural and human-induced changes when interpreting data. As leaf area in canopies will naturally vary slightly from season to season, with a peak during the summer months, LAI can also vary naturally between sites and between different communities.

Large reductions in LAI are normally the result of disturbance or stress. If they are detected at a site, compare results from a control or other site (containing the same species) to determine if this reduction is local or more widespread. Volunteers can also return to the site to observe the forest closely for evidence of damage (e.g. storm damage, insect attack or stress).

6.3.6 References and further reading

Clough, B.F., Ong, J.E. & Gong, W.K. (1997) Estimating leaf area index and photosynthetic production in canopies of the mangrove *Rhizophora capiculata*, *Marine Ecology Progress Series*, vol. 159, pp. 285–92.

English, S., Wilkinson, C. & Baker, V. (eds) (1997) *Survey Manual for Tropical Marine Resources*, 2nd edition, Australian Institute of Marine Science, Townsville.

Gordon, D.M., Bougher, A.R., LeProvost, M.I. & Bradley, J.S. (1995) Use of models for detecting and monitoring change in a mangrove ecosystem, *North-Western Australia, Environment International*, vol. 21, no. 5, pp. 605–18.

6.4 Mangrove forest structure

6.4.1 Introduction—what is mangrove forest structure and how is it related to mangrove forest health?

Mangrove structure refers to the composition of a mangrove community in terms of canopy height, stem density, age, tree diameter and species represented. It varies considerably between different forest types, and between the same forest types in different locations. It is influenced by many natural factors including climate, tidal inundation, soil pH and salinity, sediment particle size and amount of freshwater.

Mangrove structure is likely to be affected when any of these parameters is altered (positively or negatively) by human-induced impacts. Positive changes can result in greater forest vigour (increased diameter, canopy cover and stem density), while negative changes can stress the mangrove community, resulting in reduced canopy cover, stem density, tree mortality and, eventually, reduced basal area of trees and/or lower canopy height.

Higher proportions of dead versus live stems, and/or decline in the basal area of the trunks of mangroves in a stand may indicate stress or past disturbance. Many aspects of mangrove structure tend to respond more slowly than most other estuarine indicators, and it can take several years before changes can be detected.

If saltmarshes are present, record the species types and estimate their percentage cover within the quadrat. Inspect the leaves of each tree for any signs of discoloration, wilting or insect damage. If there is insect damage, estimate the amount in terms of percentage loss of leaf surface area for the entire tree. If there are introduced vines, record the species (or describe their features) and estimate their percentage cover.

Also note any evidence of unusual occurrences, such as deposition of rubbish, or other human-induced disturbances.

6.4.2 Method summary

This method is used to provide baseline data on the diversity and structure of a mangrove community at a particular site, and to monitor long-term changes and provide a quantitative measure of species composition, stem density, and basal area of trees. This information can be useful for interpreting other parameters, such as leaf trapping ability and LAI. Changes to basal area, stem density and canopy cover can be indicators of ecosystem health.

The method is similar to the mangrove line transects method (English, Wilkinson & Baker 1997), but with some simplifications. Despite these, it is still a difficult, time-consuming method, and should be attempted only to study long-term changes to mangrove forests.

A transect running at right angles from the sea to the land is established, with 10 m x 10 m quadrats in each forest zone along the transect. Within each quadrat, the canopy cover, species type, tree height, sapling/seedling number and stem diameter are recorded.

6.4.3 Site selection

Though site selection will depend on the objectives of the monitoring program, in most instances it will be necessary to select sites that are representative of the mangroves in the area. Use aerial photographs to determine the size and extent of the site, and look for zonation patterns between the seaward and landward margins. Sites should be ground-truthed to confirm zonation patterns, and to ensure they are representative.

As mangrove systems are extremely diverse and can vary considerably in structure and floristics over short distances, a person of suitable experience should assist with this process.

6.4.4 Lay out transect and set up quadrats

If the program involves monitoring each homogenous zone, establish a transect beginning at right angles to the seaward side of the mangrove forest, and running to the landward edge (see Figure 6.8). Use the compass to establish the bearing to follow. Identify the major forest types or zones along the transect. For each forest type, find an area to the left of the transect that is representative (in terms of floristics and structure) of that mangrove community. If two quadrats are to be established, ensure that they are at least 20 m apart.

If monitoring a homogenous forest type or a narrow mangrove fringe along a creek, transects can be established parallel to the shoreline. Quadrats can be placed where the forest is representative of the mangrove community, or at regular intervals.

To set up a quadrat, mark out a 10 m x 10 m area within the forest. Use the compass to ensure that the corners are at 90 degrees, and mark each with a PVC pole (see Figure 6.9). Ensure that there is a minimum of 25 trees in each quadrat by increasing or decreasing its size if necessary (e.g. to 5 m x 5 m in a dense forest).

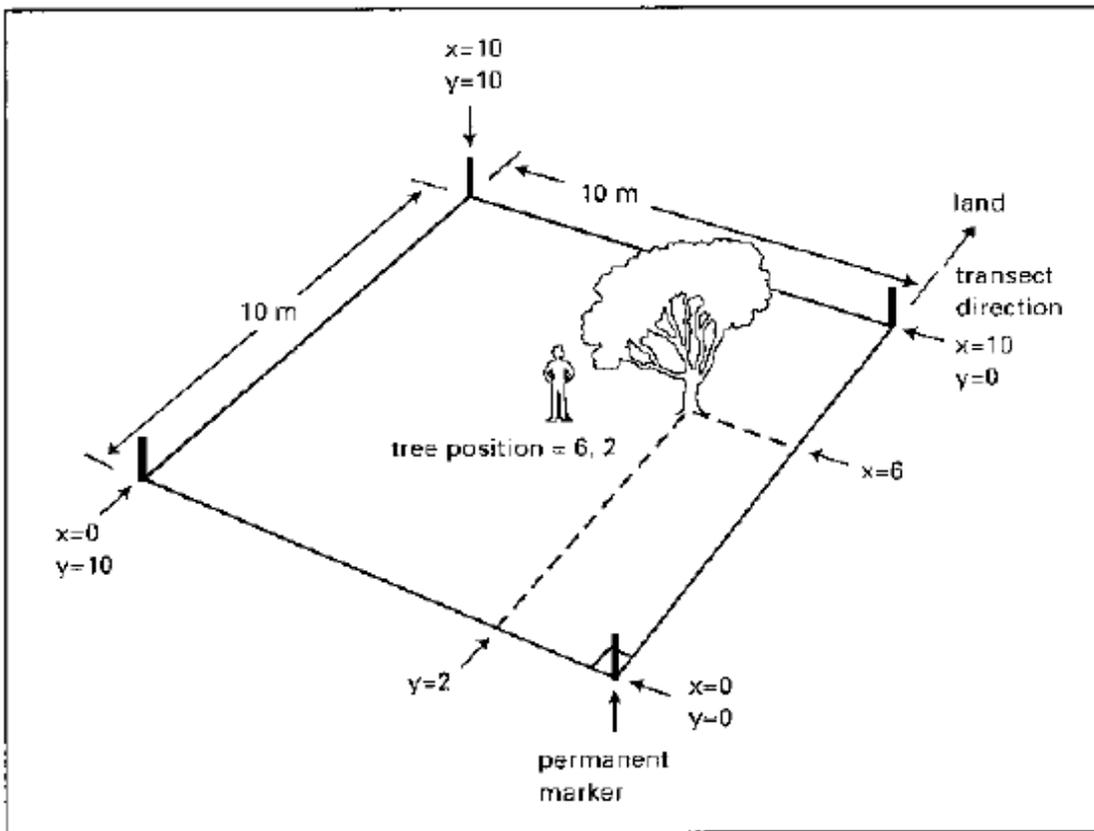


Figure 6.8 How to establish a quadrat and record position of tree using x/y coordinates

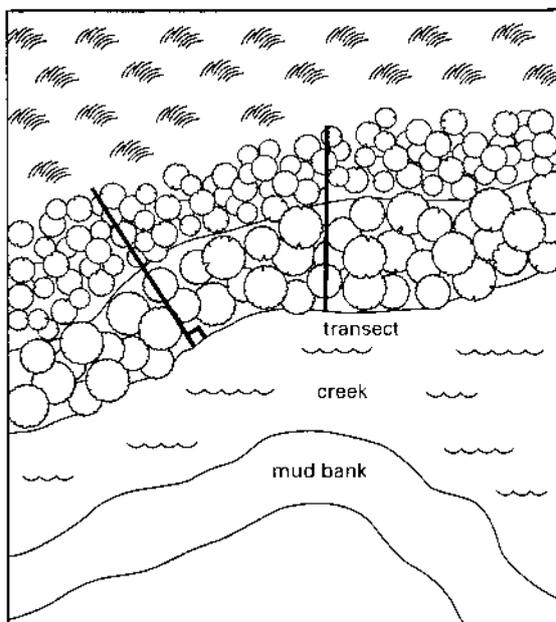


Figure 6.9 How to establish a transect

6.4.5 Estimate canopy cover

Imagine that the quadrat has been divided into four smaller quadrats. Stand in the middle of each of these imaginary quadrats and estimate the amount of sky that is blocked by the canopy. This score is referred to as canopy cover. (The illustrations in Figure 6.10 can be used as a guide.)

Calculate the average of these four estimates and record the result.

Note: If a light meter or forest densitometer is available, use this in preference to making visual estimates. See Section 6.3.4 for instructions on measuring canopy cover using a light meter.

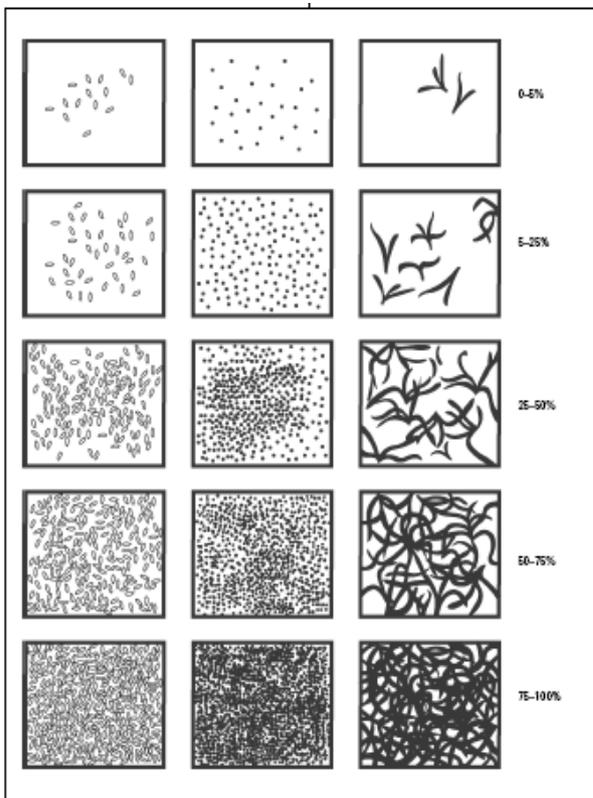


Figure 6.10 Estimating canopy cover

6.4.6 Estimate canopy dominance

If the canopy consists of more than one species of mangrove, estimate the percentage that each species contributes to the total canopy cover.

Note: Dominance is not the same as canopy cover; the total of all species must equal 100 per cent. For example, if there is a 70 per cent canopy cover and only one species, canopy dominance by that species will be 100 per cent.

6.4.7 Measure stem diameter

Measure the stem diameter of each tree at breast height (1.3 m above the ground) (see Figure 6.11). Measure only those trees with a stem diameter of 2.5 cm or more; do not measure saplings or seedlings (see Table 6.2).

Table 6.2 Criteria for distinguishing growth status

Tree	Stem DBH (1.3 m) 2.5 cm or greater
Sapling	Plant 1 m or more in height, with DBH < 2.5 cm
Seedling	Plant < 1 m in height

A diameter tape measures both circumference (girth) and the calculated diameter. Record result as diameter at breast height (DBH) (see Figure 6.11).

A tape measure measures circumference only. Record this as circumference at breast height, and calculate DBH by dividing this result by π (3.14 approx).

If carrying out long-term monitoring, hammer a galvanised nail (half of its length) into stems 10 cm below where measurements have been taken, to provide a reference point for future measurements. Note this on the datasheet.

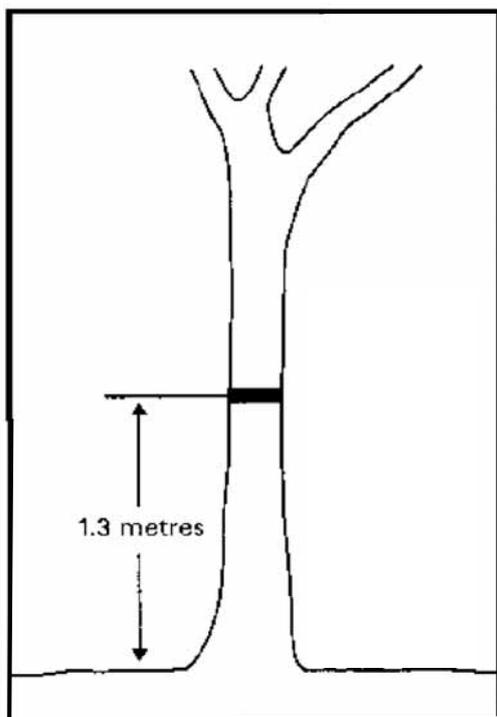


Figure 6.11 Measurements recorded at breast of height

6.4.7.1 How to measure irregularly shaped trees

Irregularly shaped trees are very common in mangrove forests. If an irregularity occurs at breast height (see Figure 6.12), use the following procedures to measure diameter:

- For multiple stems, fork below breast height; where stem diameter is 2.5 cm or greater, measure the diameter of each stem at breast height, and record all results in the same box on the datasheet. Do not count each stem as a separate tree.
- For multiple stems, fork at breast height; take the measurement slightly below the swelling caused by the fork. For buttress roots, take the measurement 30 cm above the uppermost prop root or buttress.
- For trunk swellings, take the measurement slightly above or below the swelling.

Some smaller mangrove forests may be naturally stunted or dwarf-like. In such situations these criteria are not suitable for determining growth status.

6.4.8 Count saplings and seedlings

Count the number and record species type of seedlings and saplings within the quadrat. If plants are dense, use a smaller quadrat (size will depend on numbers, but 1 m x 1 m is a starting point), ensuring that the area sampled is representative of the larger quadrat. Estimate the number of seedlings/saplings within the 10 m x 10 m quadrat, based on the results of the smaller quadrat sampling

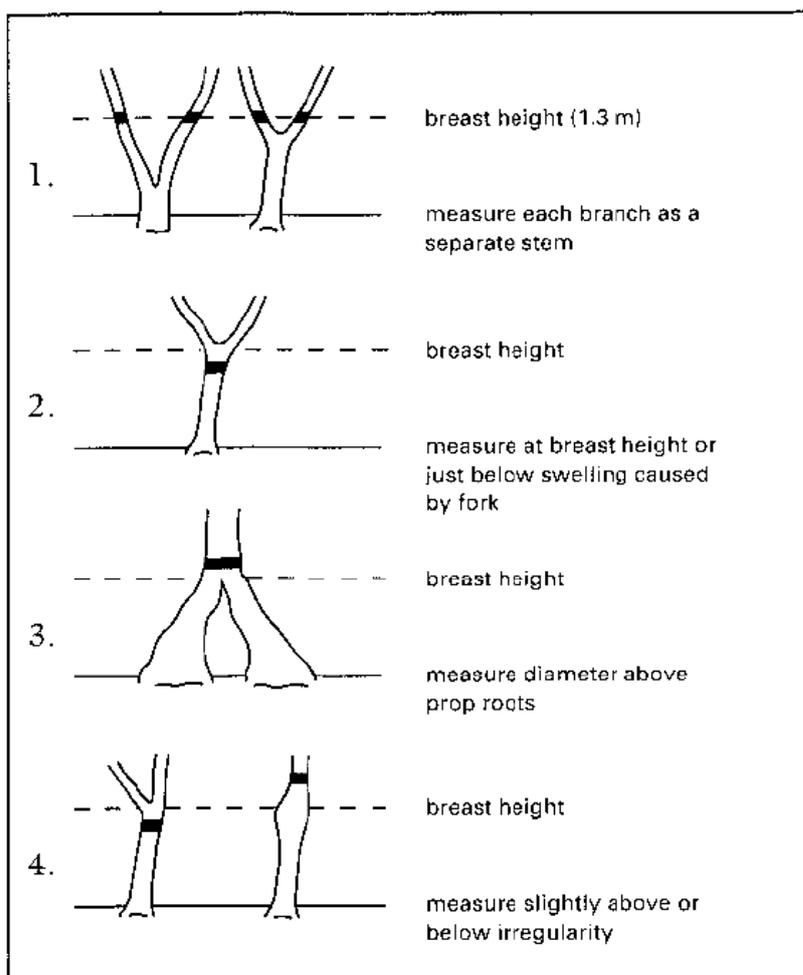


Figure 6.12 Measuring the stem diameter of irregularly shaped tree

6.4.9 Estimate height

To measure the height of each tree, stand the height pole up directly below the highest point of the tree (see Figure 6.13). Estimate the height of the tree to the nearest metre, based on the known length of the pole. Record the result.

Note: As this can be very difficult if the forest canopy is higher than 10 m, use of a clinometer is recommended in such situations.

6.4.10 Soils

Collect a sample of the substrate from the quadrat and rub it between your fingers. Record the sediment type based on its feel (e.g. sand, mud, sand/mud, mud/sand). Other information such as pH and salinity can be recorded also.

6.4.11 Tag and record position of trees

Since branches can die during long-term monitoring of a plot, attach alloy or stainless steel tags to the larger branches or to the main stem. Use nylon cable or stainless steel wire, ensuring that there is enough slack to allow for growth of the trees.

The position of trees should also be recorded using x/y coordinates (see Figure 6.8).

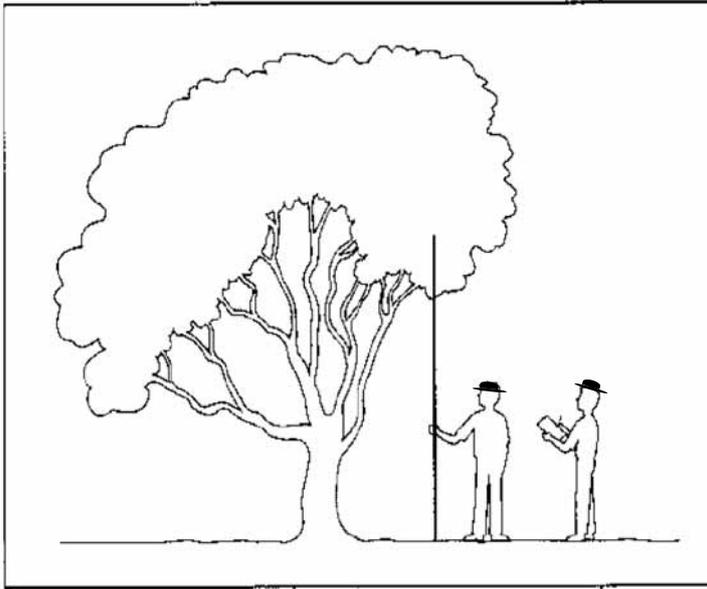


Figure 6.13 Using a height pole

6.4.12 Measurements needed during re-survey

As it is likely that a long time may have elapsed before repeat measurements are made, the original corner marker may have disappeared, but plot boundaries can be located using the tags and the x/y coordinates. If new trees have become established, they should be assigned a new number.

6.4.13 Data interpretation

Formal measurements provide quantitative data on the structure or level of ecological development of a mangrove community. Data is expressed as:

- stems (living and dead) per hectare
- basal area (square metres per hectare)
- tree height.

Stems per hectare (stems ha⁻¹) is a measure of the density of living mangrove trees. It is calculated using the formula:

$$\text{Stems ha}^{-1} = \frac{\text{Number of living stems in plot} \times 10\,000}{\text{Area of the plot (m}^2\text{)}}$$

Stems ha⁻¹ should be calculated for each plot, together with the average for all the plots. The number of dead stems per hectare can also be calculated using the above formula, together with the overall ratio of dead to live stems (total dead stems versus total live stems).

Basal area (BA) of a plant refers to the cross-sectional area of its stem at 1.3 m (breast height). The basal area of a stand (stand BA) is the sum of all stem BAs in the quadrat, and is expressed as square metres per hectare (m²/ha). BA is a measure of the size or level of ecological development of a mangrove community. Normally, the higher the BA, the greater the biomass and level of development of a mangrove community.

Basal area for an individual plant is calculated using the following formula:

$$BA \text{ (cm}^2\text{)} = \pi r^2$$

where:

$$r = \text{radius of the stem (cm)} = \frac{\text{DBH (cm)}}{2}$$

$$\pi = 3.14 \text{ (approx)}$$

If the plant has multiple stems, the basal area for the plant will be equal to the sum of the basal areas of the individual stems.

To calculate stand BA, use the following formula:

$$\text{Stand BA (M}^2\text{/ha)} = \frac{\sum \text{BA for the plot (CM}^2\text{)}}{\text{Area of the plot (M}^2\text{)}}$$

where Σ BA = sum of individual BAs. Increases in BA over time may indicate that the community is still growing and developing. Increases in average canopy height will support this theory. A significant decrease in BA may indicate that disturbance has occurred—a theory that would be supported by an increase in the ratio of dead to live stems.

Average or median tree height can also be calculated to provide an indicator of canopy height. However, tree height measurements are better used to track the progress of individual trees, rather than that of the entire forest.

6.4.14 References and further reading

Australian Parks and Wildlife Service (1981) *The Kakadu National Park Mangrove Forests and Tidal Marshes*, Volume 3, Commonwealth of Australia, Canberra.

Clough, B.F. (ed.) (1979) *Mangrove ecosystems in Australia—structure, function and management*, *Proceedings of the Australian National Mangrove Workshop*, Australian Institute of Marine Science, Canberra.

Clough, B.F., Dixon, P. & Dalhaus, O. (1997) Allometric relationships for estimating biomass in multi-stemmed mangrove trees, *Australian Journal of Botany*, vol. 45, pp. 1023–31.

English, S., Wilkinson, C. & Baker, V. (1997) *Survey Manual for Tropical Marine Resources*, 2nd edition, Australian Institute of Marine Science, Townsville.

Greening Australia (2001) *Tracking Your Community Vegetation Project*, Greening Australia, Brisbane.

Lovelock, K. (1997) *Field Guide to Mangroves*, Australian Institute of Marine Science, Townsville.

Snedaker, S.C. & Snedaker, J.G. (1984) *The Mangrove Ecosystem: Research Methods*, UNESCO, Paris.

6.5 Crab burrow counts

6.5.1 Introduction—why monitor crab hole density?

Estuarine crabs break down much of the leaf and other organic matter produced by mangrove forests. Their burrows also increase the ratio of soil surface area to air, resulting in some aeration and oxidation of the mostly anoxic mangrove soils. This oxidation can be important for the growth of mangrove plants.

Consequently, changes to the crab population can affect the nutrient cycling and oxidation of intertidal soils, which in turn can affect the productivity of mangroves. Decreased crab populations and associated burrow density can lead to decreased nutrient cycling and soil aeration, and reduced production of surrounding plants.

Data on crab burrow density may complement leaf litter trapping or other mangrove monitoring exercises. Crabs can be sensitive to pollution. Their absence from a mangrove forest may indicate that the site is experiencing human-induced stress.

6.5.2 Method summary

The number of crab burrows in a survey area is estimated by counting burrows within 50 cm x 50 cm quadrats. Monitor every three months.

6.5.3 Site selection

This method is normally used in association with other methods, but if establishing a new site, ensure that it is in a homogenous mangrove forest, in an area representative of the surrounding forest.

6.5.4 Establish transects

Establish three parallel 10 m transects through the site, 5 m apart. Mark the beginning and end of each with a peg to assist in locating the site again later.

6.5.5 Count the number of crab burrows

Starting at 0 m, place a quadrat to the left of the transect and count the number of crab burrows within it. Burrows on the edge of the quadrat should be counted only if the centre of the hole is within the quadrat.

If crab holes are very numerous, use a 25 cm x 25 cm area of the quadrat and multiply the results by four.

Replace the quadrat and count crab holes every 2 m along the length of the transect.

6.5.6 Data interpretation

Data is interpreted as crab holes per square metre (holes m⁻²).

Results may be highly variable between sites, so establish a baseline burrow density for each site. Long-term trends showing a significant decline in burrow numbers may indicate declining crab numbers and/or that the site is experiencing stress. Since crabs can have multiple burrow entrances and some species have been known to share burrows, the relationship is not linear.

Since crab hole abundance does not equate to absolute crab populations, significant changes in burrow counts would need to be recorded to indicate changes in population.

Crab holes can be covered by sediment plugs at low tide.

6.5.7 References and further reading

Moritz-Zimmermann, A. & Comley, B. (2000) Overview and methodologies, *Mangrove Monitoring Program, Darwin Harbour, Northern Territory*, Ch. 1, Department of Lands, Planning and Environment, Northern Territory.

Part G Monitoring seagrass

7.1 Intertidal percentage cover

7.1.1 Introduction

Measurement of percentage cover can provide an early warning of seagrass decline and can be used to monitor the long-term health of seagrasses in a local area.

Significant reduction in percentage cover, or failure to recover after a disturbance, may indicate pressure on a seagrass meadow. Although the rate at which seagrass beds recover from disturbances such as floods is unknown, slow or no recovery may indicate other pressures.

7.1.2 What is seagrass percentage cover?

Percentage cover is the percentage of a given area covered by seagrass (i.e. percentage cover is 100 per cent if the entire area is covered).

Percentage cover indicates the status and stage of development of a seagrass meadow. For example, if percentage cover is high and varies little over time, this indicates a stable, well-developed community. On the other hand, a reduction in cover, or increasing incidence of algae or epiphytes, may indicate natural or human-induced stress. Changes in percentage cover over time are also a useful indicator of the rate of recovery after disturbance.

7.2 Method for measuring seagrass percentage cover

7.2.1 Method summary

Quadrats (50 cm x 50 cm) are placed at regular intervals along three transects in an intertidal seagrass community. See Figure 7.1 for guidance in the use of transects and quadrats.

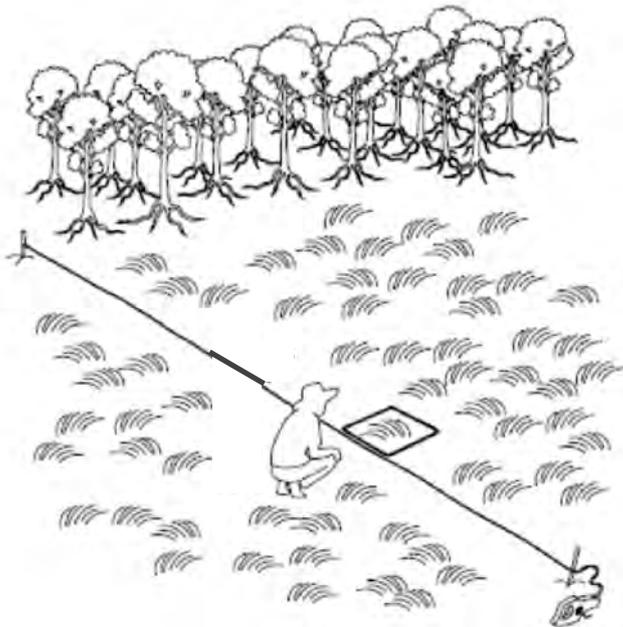


Figure 7.1 Using a transect

Percentage cover of seagrass in each quadrat can be rapidly assessed using the percentage cover illustration sheet (see Figure 7.2).

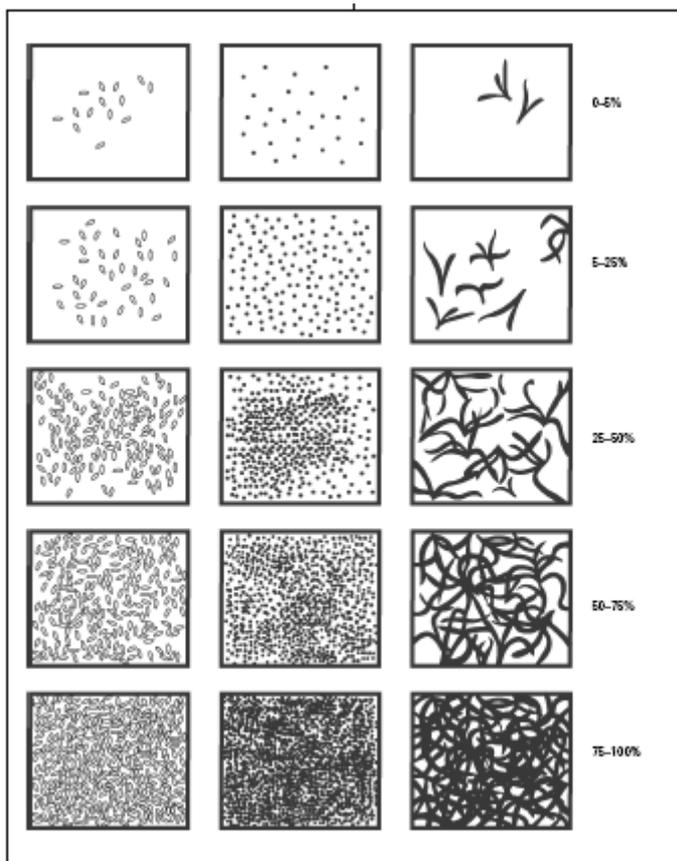


Figure 7.2 Estimating cover

Rapid visual estimates can be subject to individual observer bias; however, working in pairs can help reduce this. Shoot length and species dominance are recorded, and the percentage cover of algae and epiphytes is estimated.

Frequency of measurement should be a minimum of every three months to account for seasonal trends.

Water temperature, salinity and turbidity are also useful parameters to monitor along with seagrass parameters.

7.2.2 Site selection

Walk through a seagrass community to ensure that it is relatively homogenous and evenly shaped, with no sandbanks, mud ridges, or changes in the meadow. Select a 50 m x 50 m site that is representative of seagrass in the area concerned, has low variability, and is not difficult to revisit for future monitoring.

Once a site is selected, record its position using GPS and compass bearings from prominent land features to help relocate it again later.

7.2.2.1 Establishing transects

At least three transects are required at each site (see Figure 7.3). The middle transect at each site need to be permanently marked out. To mark where the middle transect begins, drive a plastic star picket into the ground at the landward edge until the top is only 10 cm above the surface, and attach the subsurface buoy. Record the position of the picket using a GPS.

Take a compass bearing from the site to the sea to ensure that the transect is at right angles to the shore. Holding the 50 m tape, follow the compass bearing (90°) for 50 m, and then take a back bearing (270°) to check your position and adjust if necessary. To mark the other end of the transect, drive a picket into the ground at this point.

Run transects 1 and 3 directly parallel to, and to the left and right of, transect 2. To do so, take a bearing at right angles to transect 2 and walk 25 m in that direction. Take a back bearing to check position and adjust if necessary. Set up transects 1 and 3 in the same way as transect 2.

When setting up the transect, hold the tape with the right hand. Always place the quadrats to the right of the transect, and walk on the left to avoid trampling the survey area. Photographic records of sample quadrats can be kept to complement the monitoring program and to assist with quality assurance. Stand above the quadrat (do not face the sun); place a quadrat photo labeller above the quadrats at 5 m, 25 m and 45 m, showing the site, transect and quadrat numbers; and take a photo. All monitoring should be conducted at low tide. Try to arrive about one hour before this to set up.

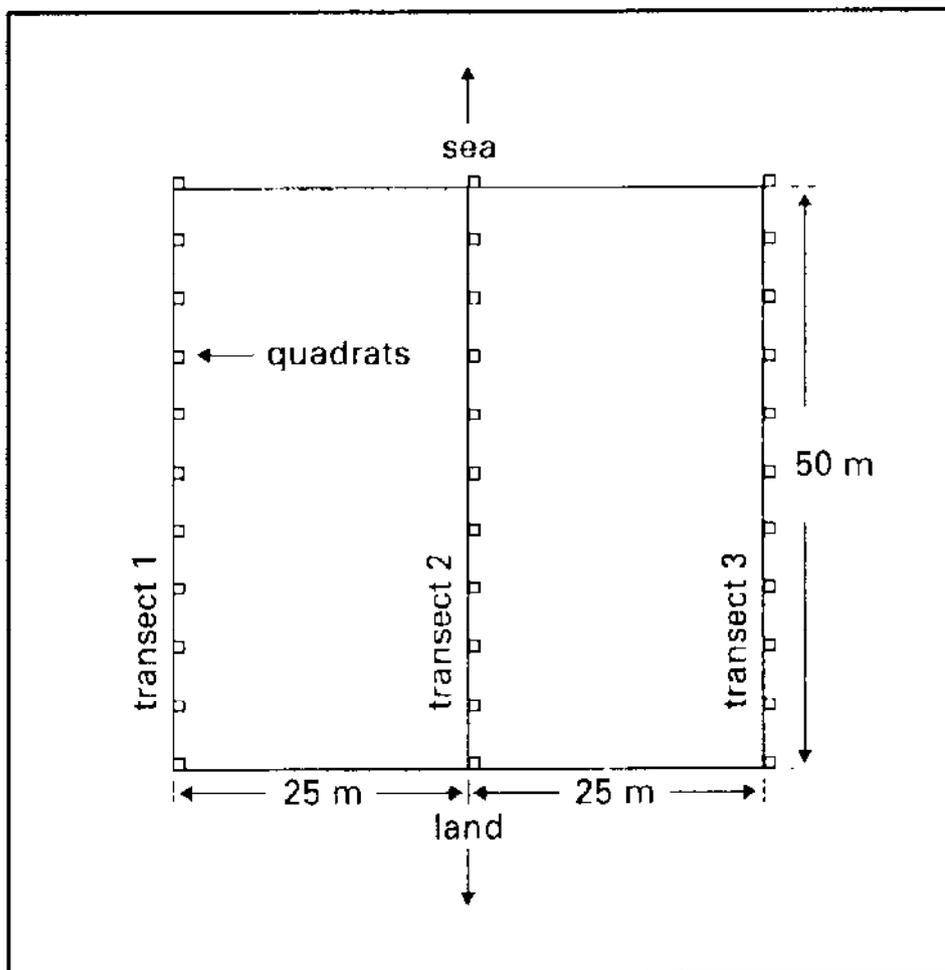


Figure 7.3 Overview of transect layer

7.2.2.2 Estimate percentage cover and species composition

Place the 50 cm x 50 cm quadrat to the right of the transect at 0 m.

Estimate the percentage cover of seagrass in the quadrat using the illustrations in Appendix H as a guide. Record the result. Record the species of seagrasses in the quadrat, and determine the dominance of each (i.e. the percentage of cover that each species represents). These figures must total 100 per cent in all quadrats where seagrass is present.

7.2.2.3 Measure blade length

Ignoring the tallest 20 per cent of leaves, randomly select 3–5 seagrass blades from within the quadrat and measure their length (in cm) from the base to the end. Calculate the average and record the result.

7.2.2.4 Sediment grain size composition

Collect a sample of the substrate from the quadrat and rub it between your fingers. Based on its feel, estimate the grain composition. Record the result in order of dominance (e.g. sand, mud, sand/mud, mud/sand).

7.2.2.5 Estimate epiphyte cover

Measure the percentage cover of epiphytes (microalgae) on the seagrass blades within the quadrat. This figure should be the percentage of seagrass leaf area covered by epiphytes, not quadrat area.

7.2.2.6 Estimate algal cover

Estimate the percentage cover of both filamentous and macroalgal cover in the quadrat, using the procedure in step 7.2.2.2.

7.2.2.7 Other information

Record the presence of fauna species (including yabbie or worm holes) and any other features of interest, such as dugong trails.

7.2.2.8 Repeat procedure

Repeat steps 2–6 at 5 m intervals along the transect up to, and including, the 50 m mark (i.e. in 11 quadrats). Repeat procedure for each transect.

7.3 Data interpretation

Data is presented as:

- mean percentage cover (per site, not per transect)
- mean algal cover
- mean epiphyte cover of seagrass blades
- mean shoot length.

Calculate the range and standard deviation of each parameter. Data is best presented as graphs or histograms which can be used to show trends over time at, and between, sites.

Bias in estimating percentage cover is a potential problem, particularly when values are low. If photographs of the quadrats have been taken, someone with experience can re-evaluate the estimates and a correction factor can be applied. Mean percentage values can be corrected if the level of error is known.

It is important to understand the natural changes that affect seagrass meadows. Seasonally, percentage cover is likely to be higher during the warmer months and lower during winter. To identify these trends it is necessary to collect data for a minimum of two years (but preferably more).

Significant gains or declines in percentage cover of seagrass at a site indicate that the seagrass bed is undergoing change. The rate of change should be compared with that at nearby sites (preferably ones with similar percentage cover) to determine if it is local or more widespread. A decline in cover may be due to environmental stress, while a gain can indicate recovery of a meadow after a flood event.

When comparing data between sites, it is important to realise that different levels of cover don't always indicate that one site is degraded. Some seagrass meadows may naturally have low cover.

High epiphyte and algal cover may indicate that nutrient enrichment is occurring at the site, particularly if there is freshwater or a local source of nutrient nearby. Values for these parameters are likely to be higher during the summer months.

A combination of blade length and percentage cover can indicate the structure of a seagrass meadow. For example, though a quadrat with very few shoots, but long leaf blades, may have the same percentage cover as one with many more shoots but much shorter blades, the structure of the meadow is very different in each.

7.4 References and further reading

Campbell, S.J. & McKenzie, L.J. (2001), *Seagrass Watch: Community-Based Monitoring of Seagrass Meadows in Hervey Bay and Whitsunday Regions: 1998-2001*, Department of Primary Industries, Cairns.

Kirkman, H. (1997) Seagrasses of Australia, in *Estuaries and the Sea*, State of the Environment Technical Paper Series, Environment Australia, Canberra.

McKenzie, L.J., Campbell, S.J. & Roder, C.A. (2001) *Seagrass Watch: Manual for Mapping and Monitoring Seagrass Resources by Community (Citizen Volunteers)*, Department of Primary Industries, Cairns.

Short, F.T. & Coles, R.G. (eds) (2001) *Global Seagrass Research Methods*, Elsevier Science B.V., Amsterdam.

Part H Appendixes

APPENDIX H1 Checklist of equipment needed for macroinvertebrate field sampling

	Tick when collected
Macroinvertebrate sampling equipment	
250µm macroinvertebrate sampling net	
Buckets x 4	
Sorting tray x 4	
Coarse sieve (10 mm)	
Tweezers and pipettes x 4	
Vials, vial labels and plastic bags	
Waders	
70% methylated spirits	
Squirt bottles	
Water quality equipment	
Alkalinity kit (check contents)	
Conductivity meter (ensure charged and calibrated)	
Dissolved oxygen meter (ensure charged and calibrated)	
pH meter (ensure charged and calibrated)	
Turbidity meter (ensure charged and calibrated)	
Water sample bottles (1 L and 250 mL)	
General equipment	
Site, habitat, water quality and macroinvertebrate field sheets	
Tape measure	
Waterplant and macroinvertebrate field identification books	
Current meter, staff and prop	
GPS	
Maps	
Sunscreen	
Car fridge or esky	
Drinking water	
Card table and chairs, beach umbrella or tarp and poles	
Camera and film	
Pens, pencils, erasers and clipboards	
Phone/radio	
First aid kit	
Shovel, 4WD recovery kit	

APPENDIX H2 Queensland Site Information Sheet

This sheet can be completed at any stage of the program. Some information may be required prior to the trip. Some is collected during the trip and the rest is done afterwards when the site has been confirmed. This sheet only needs to be completed on the first visit to a site. Note: 1:100 000 topographic maps are used for the following information, where they are available. In some areas of Queensland, only 1:250 000 topographic maps are available.

Latitude and longitude—Use GPS (global positioning system) and confirm readings on a 1:100 000 topographic map.

Altitude—Use 1:100 000 topographic maps.

Stream order—Hierarchical ordering system based upon the degree of branching (Strahler 1957). Stream orders should be determined using 1:100 000 scale maps. A second-order stream is formed by the joining of two first order-streams; the junction of two second-order streams forms a third order stream, etc. (see Figure H1).

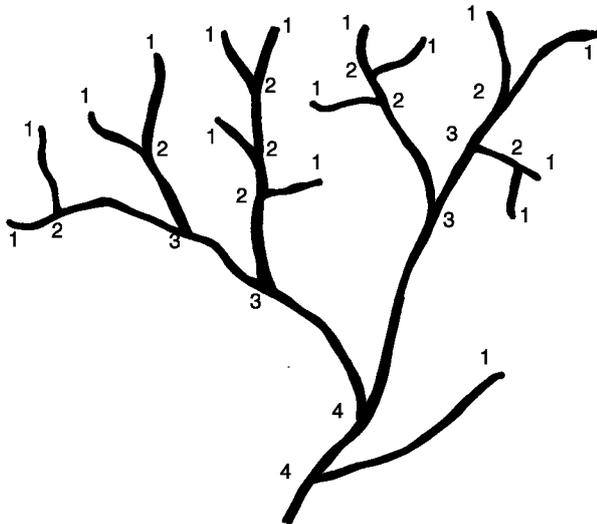


Figure H1 Method used by DERM to determine stream order (Strahler 1957)

Slope (m/m) = $\frac{\text{contour distance (m)}}{\text{distance of stream between contour lines (m)}}$

e.g. 6.5 km between 20 m and 40 m contour lines = $20\text{m}/6500\text{m} = 0.0031\text{m/m}$

Distance from source (km)—Distance from the site to longest thread of stream source.

AMTD (km) (adjusted middle thread distance)—The distance from the mouth of the stream (i.e. at the ocean or where it joins another stream) to the site.

Reach—An assessment of where in the catchment a site lies with relation to the watershed. Note that this does not necessarily correlate to the altitude.

Catchment area (km²)—The area of land above the site being assessed from which the water drains towards the stream.

Reference or test assessment—Determined using the Reference Condition Selection Criteria (Table 1 and page 3 of Site Information Sheet).

Nearest rainfall station—Within DERM, a departmental database called DRF is used. The same information can be extracted from the Bureau of Meteorology website <www.bom.gov.au>. Recording the station name eliminates searches for the closest station when there is a need to verify/update data.

Nearest weather station—Temperature information can be extracted from the Bureau of Meteorology website (see above). Again, recording the station name eliminates searches for the closest station when there is a need to verify/update data.



QUEENSLAND SITE INFORMATION SHEET

SITE NUMBER

SITE NAME

LATITUDE LONGITUDE

GRID REFERENCE

MAP NAME MAP NUMBER SCALE

ALTITUDE (m) STREAM ORDER

SLOPE (m/m) DISTANCE FROM SOURCE (km)

AMTD (km)..... REACH upland midland lowland

CATCHMENT AREA (km²)

REFERENCE or TEST ASSESSMENT (see last page).....

NEAREST RAINFALL STATION

NEAREST WEATHER STATION

ACCESS DETAILS

Directions.....

Property Owner Phone No.

Contact Phone No.

Access Instructions

.....

Notify before each visit? [] Yes [] No

Permission required? [] Yes [] No Key required? [] Yes [] No

Key available from

.....

Mud map of access route

Sketch of reach

No.	Reference condition selection criteria	Level of impact *
1	Influence of intensive agriculture upstream* Intensive agriculture is that which involves irrigation, widespread soil disturbance, use of agrochemicals and pine plantations. Dry-land grazing does not fall into this category.	
2	Influence of major extractive industry (current or historical) upstream* This includes mines, quarries and sand/gravel extraction.	
3	Influence of major urban area upstream This will be relative to population size, river size and distance between the site and the impact.	
4	Influence of significant point-source waste water discharge upstream* Exceptions can be made for small discharges into large rivers.	
5	Influence of dam or major weir* Sites within the ponded area of impoundments also fail. Sites failing this criterion automatically fail the overall assessment.	
6	Influence of alteration to seasonal flow regime This may be due to abstraction or regulation further upstream than the coverage by Criterion 5. Includes either an increase or decrease in seasonal flow.	
7	Influence of alteration to riparian zone Riparian vegetation should be intact and dominated by native species.	
8	Influence of erosion and damage by stock on riparian zone and banks Stock damage to the stream bed may be included in this category.	
9	Influence of major geomorphological change on stream channel Geomorphological change includes bank slumping, shallowing, braiding and unnatural aggradation or degradation.	
10	Influence of alteration to instream conditions and habitats This may be due to excessive algal and macrophyte growth, by sedimentation and siltation, by reduction in habitat diversity by drowning or drying out of habitats (e.g. riffles) or by direct access of stock into the river.	
	SITE ASSESSMENT	/50

* Note: the level of impact at a site will generally decrease as the distance from the source of impact increases.

Each criterion relates to an aspect of human activity that impacts on freshwater ecosystems, where impact is defined as a 'change from natural condition'. Each criterion is given a score according to the following categories:

1. Very major impact
2. Major impact
3. Moderate impact
4. Minor impact
5. Indiscernible impact.

Sites are assessed using the total score for the 10 criteria. Those sites that have a total greater than 44 are deemed to be reference sites. Sites that are given a score of 1, 2 or 3 for criterion 5 (no dam or major weir upstream) cannot be reference sites.

APPENDIX H3 Water Quality Sampling Field Sheet

This field sheet is intended to record information about the water quality parameters (DO, conductivity, water temperature, etc.) and factors that may have an influence on the water quality parameters (e.g. adjacent land use, bank erosion, etc.). The information on the sheet refers to the entire site (100 m reach) at the time it is sampled.

The front side of this sheet is a generic departmental water quality sheet which enables DERM officers to record information on the water quality sample collection site and field measurements, as well as noting the relevant samples and paperwork for external laboratory analysis. The reverse side of this sheet records observations of factors that may influence the water quality from the entire reach. Information on the types of macrophytes present can also be recorded as well as any notes



Queensland Government

WATER QUALITY SAMPLING FIELD SHEET

* Site Number	<input type="text"/>	Site Name	<input type="text"/>
* Date	<input type="text"/>	Gauge No.	<input type="text"/>
* Time	<input type="text"/>	Party	<input type="text"/> and <input type="text"/>
* Project Name	<input type="text"/>	Analysis No.	<input type="text"/>
* Collecting Authority	<input type="text"/>	TYPE	<input type="text"/>
* Sample Source	<input type="text"/>	Submitted	<input type="text"/>
		Received	<input type="text"/>

Parameter	Value	Quality	Variable
Gauge Height <small>m</small>	<input type="text"/>	<input type="text"/>	100.
Air Temperature <small>°C</small>	<input type="text"/>	<input type="text"/>	2065.5
Water Temperature <small>°C</small>	<input type="text"/>	<input type="text"/>	2080.5
Conductivity <small>µS/cm@25°</small>	<input type="text"/>	<input type="text"/>	2010.5
pH	<input type="text"/>	<input type="text"/>	2100.5
Dissolved O₂ <small>mg/l</small>	<input type="text"/>	<input type="text"/>	2351.5
Turbidity <small>NTU</small>	<input type="text"/>	<input type="text"/>	2030.5
Phenol. Alkalinity <small>mg/l</small>	<input type="text"/>	<input type="text"/>	2114.5
Total Alkalinity <small>mg/l</small>	<input type="text"/>	<input type="text"/>	2113.5
Transparency <small>(secchi) m</small>	<input type="text"/>	<input type="text"/>	2046.5
Velocity <small>m/s</small>	<input type="text"/>	<input type="text"/>	240.
Discharge <small>m³/s</small>	<input type="text"/>	<input type="text"/>	140.
Discharge Method: <input type="checkbox"/> measured <input type="checkbox"/> estimated <input type="checkbox"/> rating curve			

Observations at Water Sampling Site

Rain in past week: Yes [] No []

Weather: No rain [] Showers [] Heavy rain []
 Sunny [] Some Cloud [] Over cast []
 Calm [] Breeze [] Strong Wind []

Water Odour: None [] Effluent [] Anoxic [] Algae []

Water Foaming: None [] Detergent [] Surf. Spot [] Scum []

Algae: } ON SUBSTRATE: None [] Little [] Moderate [] Lot []
 } IN WATER COLUMN: None [] Little [] Moderate [] Lot []

Macrophytes: } EMERGENT: None [] Little [] Moderate [] Lot []
 } SUBMERGED: None [] Little [] Moderate [] Lot []
 } FLOATING: None [] Little [] Moderate [] Lot []

Presence of Pastoral Animals [] **Presence of Non-Pastoral Animals** []

Any Human Activity

Plant Types (aquatic only)

Animal Life (eg fish, prawn)

Comments:

(Office use only) ENTERED INTO HYDSYS ON / / BY

CHECKED ON / / BY

* Compulsory Fields

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Reach Observations						
Water odours:	1. normal	2. sewage	3. petroleum	4. chemical	5. none	[]
Water oils:	1. slick	2. sheen	3. globs	4. flecks	5. none	[]
Turbidity:	1. clear	2. slight	3. turbid	4. opaque		[]
Plume:	1. little	2. some	3. lots			[]
(amount of fine sediment generated when kick sampling)						
Sediment oils:	1. absent	2. light	3. moderate	4. profuse		[]
Sediment odours:		1. normal	2. sewage	3. petroleum	4. chemical	[]
		5. anaerobic	6. none	7. other		[]
Flow level: (relative to 'watermark' i.e. normal inundation level shown by limit of terrestrial grasses, or by eroded area, or boundary in bank sediment types).						
	1. no flow (dry/isolated)	2. low (<water mark)	3. moderate (=)	4. high (>water mark)	5. flood	[]
Bare ground above water mark: area in riparian zone expected to be vegetated but bare.						
					left bank	%
					right bank	%
Bank erosion:	1. extreme	2. extensive	3. moderate	4. limited	5. none	[]
Are the undersides of stones, which are not deeply embedded, black?						
				1. yes	2. no	[]
Sediment deposits:						
		1. none	2. sludge	3. sawdust	4. paper fibre	[]
		5. sand	6. relict shells	7. other		[]
Local catchment erosion:						
		1. none	2. some	3. moderate	4. heavy	[]
Local non-point source pollution:						
		1. no evidence	2. potential	3. obvious		[]
Local point source pollution:						
		1. no evidence	2. potential	3. obvious		[]
Dams/barriers:						
		1. absent	2. present	upstream/downstream		[]
				discharge: >natural flow/<natural flow		[]
Hydrologic deviation:						
		1. none	2. some extraction	3. minor dams, weirs etc		[]
		4. extensive extraction		5. major dams	6. other	[]
Site position in catchment:						
		1. upland	2. midland	3. lowland		[]
Site classification (of the reach):						
		1. steep valley	2. broad valley	3. wetland/bog	4. heath	[]
		5. levees present	6. stream bars	7. natural riparian meadow		[]
Adjacent landuse:						
		1. urban	2. semi-urban	3. irrigated cropping		[]
		4. non-irrigated cropping		5. light grazing	6. moderate grazing	[]
		7. heavy grazing	8. forestry	9. native forest	10. other	[]
Upstream catchment development:						
		1. >75%	2. 50-75%	3. 25-50%	4. 0-25%	5. none []
Bars: (bed surface protruding from normal water level & forming a bar)						
..... %						
Macrophytes Indicate whether the following common taxa are present in the reach:						
NATIVE			EXOTIC			
Azolla			Water Hyacinth (<i>Eichhornia</i>)			
Duckweed			Salvinia			
Hornwort (<i>Ceratophyllum</i>)			Alligator Weed (<i>Alternanthera</i>)			
Stoneworts (<i>Chara</i> or <i>Nitella</i>)			<i>Egeria</i>			
Hydrilla			Elodea			
Water Milfoil (<i>Myriophyllum</i>)			Para Grass (<i>Urochloa</i>)			
Pondweeds (<i>Potamogeton</i>)			Other			
Ribbonweed (<i>Vallisneria</i>)						
Water Ribbon (<i>Triglochin</i>)						
Water Lettuce (<i>Pistia striatotes</i>)						
Water Primrose (<i>Ludwigia</i>)						
Sedge (<i>Cyperus</i>)						
Common Rush (<i>Juncus</i>)						
Typha/Cumbungi						
Slender Knotweed (<i>Persicaria</i>)						
Other						
.....						
.....						

APPENDIX H4 Macroinvertebrate Sampling Field Sheet

This sheet contains information about the macroinvertebrate habitats sampled (water depth and velocity, substrate description, etc.) with longitudinal and cross-sectional sketches of the 100 m reach.

Most of the values derived for this field sheet are estimated, apart from the water velocity, mean depth and the mean channel width. The mean channel width is the distance between left bank water's edge and right bank water's edge.

The sketches are important for helping to assess the sites after they have been visited. These should include where the water and macroinvertebrate samples were taken, where any photos were taken, the approximate bank height (measured from the water level to the top of the bank), bank width, stream width and depth, where each of the different aquatic habitats are, and the width and composition of the riparian vegetation

River Bioassessment Program



Queensland Government

MACROINVERTEBRATE SAMPLING FIELD SHEET	
SITE NUMBER: [] SITE NAME: _____ Project Name: _____ Date: ____/____/____ Time (24 hrs): [] GPS: _____	
EDGE/BACKWATER: Y [] N [] Collected by: [] Picked By: [] No. vials: []	
Velocity (m/sec): max [.] min [.] Mean Depth: [.] m Mean Channel Width: [.] m Method: 10 m sweep [] 60 min random pick [] Other _____ [] Canopy Cover: [] % Width of Riparian Zone: LB [] m RB [] m Composition of Riparian Zone: Native [] % Exotic [] % *Riparian Vegetation: Grass [] % Trees <10 m high [] % Shrubs [] % Trees >10 m high [] %	Substrate Description: Bedrock [] % Gravel (4-16 mm) [] % Boulder (>256 mm) [] % Sand (1-4 mm) [] % Cobble (64-256 mm) [] % Silt/Clay (<1mm) [] % Pebble (16-64 mm) [] % Substrate Cover: Periphyton 0 1 2 3 4 Moss 0 1 2 3 4 Filamentous algae 0 1 2 3 4 Macrophytes 0 1 2 3 4 Detritus 0 1 2 3 4 0 = <10% 1 = 10-35% 2 = 35-65% 3 = 65-90% 4 = >90% Bank Overhang Vegetation: extensive [] moderate [] slight [] nil [] Trailing Bank Vegetation: extensive [] moderate [] slight [] nil []
BED: Y [] N [] Collected by: [] Picked By: [] No. vials: [] TYPE: Riffle [] Rocky/Gravel Bed [] Sandy/Silty []	
Velocity (m/sec): max [.] min [.] Mean Depth: [.] m Mean Channel Width: [.] m Method: 10 m kick only [] 10 m kick & gleaming rocks of different sizes (5) [] 60 min random pick [] Other _____ [] Canopy Cover: [] % Width of Riparian Zone: LB [] m RB [] m Composition of Riparian Zone: Native [] % Exotic [] % *Riparian Vegetation: Grass [] % Trees <10 m high [] % Shrubs [] % Trees >10 m high [] %	Substrate Description: Bedrock [] % Gravel (4-16 mm) [] % Boulder (>256 mm) [] % Sand (1-4 mm) [] % Cobble (64-256 mm) [] % Silt/Clay (<1mm) [] % Pebble (16-64 mm) [] % Substrate Cover: Periphyton 0 1 2 3 4 Moss 0 1 2 3 4 Filamentous algae 0 1 2 3 4 Macrophytes 0 1 2 3 4 Detritus 0 1 2 3 4 0 = <10% 1 = 10-35% 2 = 35-65% 3 = 65-90% 4 = >90% Bank Overhang Vegetation: extensive [] moderate [] slight [] nil [] Trailing Bank Vegetation: extensive [] moderate [] slight [] nil []
* Can add to > 100% Adjacent Landuse: Upstream Landuse: **Percent of habitat types in 100 m reach: Riffle [] % Run [] % Macrophytes [] % Pool (rocky) [] % Pool (sandy) [] % Dry [] % Edge [] % ** Riffle + Run + Pool + Macrophyte + Dry = 100%; Edge is % of habitat available to sample from L and R banks	
TOTAL NO. VIALS: _____ OTHERS: _____	



River Bioassessment Program

HABITAT ASSESSMENT FIELD SHEET cont.

Habitat Variable	CATEGORY		
	Excellent	Good	Fair
6. Pool/riffle, run/bend ratio. (Distance between riffles divided by stream width)	0-7 Variety of habitat. Deep riffles and pools. 15, 14, 13, 12	7-15 Adequate depth in pools and riffles. Bends provide habitat. 11, 10, 9, 8	15-25 Occasional riffle or bend. Bottom contours provide some habitat. 7, 6, 5, 4
7. Bank stability	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem. 10, 9	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods. 8, 7, 6	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme/high flows. 5, 4, 3
8. Bank vegetative stability	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble. 10, 9	50-79% of the streambank surfaces covered by vegetation, gravel or larger material. 8, 7, 6	25-49% of the streambank covered by vegetation, gravel or larger material. 5, 4, 3
9. Streamside cover	Dominant vegetation is of tree form. 10, 9	Dominant vegetation shrub. 8, 7, 6	Dominant vegetation is grass, sedge, ferns. 5, 4, 3
			Poor >25 Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 3, 2, 1, 0 Unstable. Many eroded areas. Side slopes > 60% common. 'Raw' areas frequent along straight sections and bends. 2, 1, 0 Less than 25% of the streambank surfaces covered by vegetation, gravel or larger material. 2, 1, 0 Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings. 2, 1, 0

Column Totals

Score

APPENDIX H6 Task Sheet River Bioassessment

River Bioassessment Program

FIELD SAMPLING TASKS TO BE COMPLETED

* Please check off each item before leaving a sampling site. *

SITE NO..... SITE NAME.....

Plan sketch of 100 m stream reach to be sampled; to include:

- location of different habitats, macrophytes and other vegetation
- location of biological sampling sites
- location of water quality measurement sites
- location of water collection sites for GCL samples
- location of x-sectional profile sketch
- location from where photograph(s) taken
- scale

X-sectional profile sketch; to include:

- stream width
- bank heights
- riparian vegetation heights

Photograph(s)/video of sampling site

Biological sampling of the different habitats and 60 min. random picking for each

Biological samples preserved in 80% methylated spirits, labelled and stored upright

Water quality measurements taken

Water quality samples for GCL collected, labelled and stored appropriately

Field sheets 1, 2 and GCL water analysis input sheets completed, checked and initialled

Gauge height/flow recorded

GPS recorded

Date.....

Signed.....

APPENDIX H7 Macroinvertebrate Identification Tally Sheet

MACROINVERTEBRATE IDENTIFICATION SHEET						Edge	Bed []	
Site Number	[] [] [] [] [] [] [] []					Sheet No.		
Site Name						Completed (init)		
Run No.	[] [] [] [] [] [] [] []	Collection Date	/	/		Date		
						No vials		
	Edge	Bed []		Edge	Bed []		Edge	Bed []
1			56			111		
2			57			112		
3			58			113		
4			59			114		
5			60			115		
6			61			116		
7			62			117		
8			63			118		
9			64			119		
10			65			120		
11			66			121		
12			67			122		
13			68			123		
14			69			124		
15			70			125		
16			71			126		
17			72			127		
18			73			128		
19			74			129		
20			75			130		
21			76			131		
22			77			132		
23			78			133		
24			79			134		
25			80			135		
26			81			136		
27			82			137		
28			83			138		
29			84			139		
30			85			140		
31			86			141		
32			87			142		
33			88			143		
34			89			144		
35			90			145		
36			91			146		
37			92			147		
38			93			148		
39			94			149		
40			95			150		
41			96			151		
42			97			152		
43			98			153		
44			99			154		
45			100			155		
46			101			156		
47			102			157		
48			103			158		
49			104			159		
50			105			160		
51			106			161		
52			107			162		
53			108					
54			109					
55			110					
						Entered		
						Checked		

APPENDIX H8 Keys used for identification of Queensland Macroinvertebrate Fauna

Keys used for identification of Queensland macroinvertebrate fauna

Order	Author/editor	Year	Key
General keys	Hawking, J.H.	1999	A preliminary guide to keys and zoological information to identify invertebrates from Australian freshwaters
General keys	Merritt, R.W. & Cummins, K.W.	1996	An introduction to the aquatic insects of North America (third edition)
General keys	Hawking, J.H.	1995	Monitoring River Health Initiative taxonomic workshop handbook
General keys	CSIRO	1991	The insects of Australia (second edition) Volume 1
General keys	CSIRO	1991	The insects of Australia (second edition) Volume 2
General keys	CSIRO	1999	Interactive guide to Australian aquatic invertebrates, Edition 2 (CD ROM)
General keys	Williams, W.D.	1980	Australian freshwater life
Acarina	Harvey, M.S. & Grown, J.E.	1998	A guide to the identification of families of Australian water mites (Arachnida: Acarina)
Coleoptera	Glaister, A.	1999	Guide to the identification of Australian Elmidae larvae (Insecta: Coleoptera)
Coleoptera	Watts, C.	1998	Preliminary guide to the identification of adult and larval Dytiscidae and adult aquatic Hydrophilidae
Coleoptera	Davis, J.	1998	(Insecta: Coleoptera) A guide to the identification of larval Psephenidae water pennies (Insecta: Coleoptera)
Crustacea	Sheil, R.	2000	Cladocera (Crustacea)
Crustacea	Wilson, G.D.F.	1999	Phreatoicidae (Isopoda, Crustacea)
Crustacea	Bradbury, J.	1999	Described Australian Amphipoda
Crustacea	Griggs, J.A., Shiel, R.J. & Croome, R.L.	1999	A guide to the identification of Chydorids (Branchiopoda: Anomopoda) from Australian inland waters
Crustacea	Horwitz, P., Knott, B. & Williams, W.D.	1995	A preliminary key to the Malacostracan families (Crustacea) found in Australian inland waters
Crustacea	Horwitz, P.	1995	A preliminary key to the species of Decapoda (Crustacea: Malacostraca) found in Australian inland waters
Crustacea	Shiel, R.J.	1995	A guide to identification of rotifers, Cladocerans and Copepods from Australian inland waters
Crustacea	De Deckker, P.	1995	Notes to help identify Ostracods from Australian inland waters and a guide to Ostracod dissection; Attempt at keying Australian Ostracods for their identification
Diptera	Cranston, P.	1997	Identification guide to the Chironomidae of New South Wales
Diptera		1995	Key to aquatic diptera families
Ephemeroptera	Suter, P.J.	1999	Illustrated key to the Australian Caenid nymphs (Ephemeroptera: Caenidae)

Ephemeroptera	Suter, P.J.	1997	Preliminary guide to the identification of nymphs of Australian Baetid mayflies (Insecta: Ephemeroptera) found in flowing waters
Ephemeroptera	Dean, J.C. & Suter, P.J.	1996	Mayfly nymphs of Australia—a guide to genera
Hemiptera	Moller Andersen, N. & Weir, T.A.	1994	Austrobates rivularis, gen. Et sp. Nov., a freshwater relative of Halobates Eschscholtz (Hemiptera: Gerridae), with a new perspective on the evolution of sea skaters
Hemiptera	Moller Andersen, N. & Weir, T.A.	1994	The Girrine water striders of Australia (Hemiptera: Gerridae): Taxonomy, distribution and ecology
Hemiptera	Moller Andersen, N. & Weir, T.A.	1994	The sea skaters, genus Halobates Eschscholtz (Hemiptera: Gerridae), of Australia: Taxonomy, Phylogeny and Zoogeography
Megaloptera	Theischinger, G.	2000	Australian alderfly larvae and adults (Insecta: Megaloptera) a preliminary guide to the identification of larvae and survey of adults of Australian alderflies.
Mollusca	Ponder, W.F., Clark, S.A. & Dallwitz, M.J.	2000	Freshwater and estuarine molluscs: An interactive, illustrated key for New South Wales
Mollusca	Miller, A.C., Ponder, W.F. & Clark, S.A.	1999	Freshwater snails of the genera Fluvidona and Austropyrgus (Gastropoda, Hydrobiidae) from northern New South Wales and southern Queensland, Australia.
Mollusca	Smith, B.J.	1996	New South Wales and southern Queensland, Australia: Identification keys to the families and genera of bivalve and gastropod molluscs found in Australian inland waters
Mollusca	Sheldon, F. & Walker, K.F.	1993	Shell variation in Australian Notopala (Gastropoda: Prosobranchia: Viviparidae)
Mollusca	Smith, B.J.	1992	Zoological catalogue of Australia—non-marine Mollusca
Mollusca	Walker, J.C.	1988	Classification of Australian buliniform planorbids (Mollusca: Plumonata)
Mollusca	Stoddart, J.A.	1985	Analysis of species lineages of some Australian thiarids (Thiaridae, Prosobranchia, Gastropoda) using the evolutionary species concept
Mollusca	Kuiper, J.G.J.	1983	The Sphaeriidae of Australia (extract only)
Mollusc		1966	Studies on Ancyliidae
Mollusca	Stoddart, J.A.		Western Australian Viviparids (Prosobranchia: Mollusca)
Mollusca	Brown, D.S.		Observations on Planorbinae from Australia and New Guinea
Odonata	Hawking, J. & Theischinger, G.	1999	Dragonfly larvae (Odonata)—a guide to the identification of larvae of Australian families and identification and ecology of larvae from New South Wales
Odonata	Theischinger, G.	2000	Preliminary keys for the identification of larvae of the Australian Gomphides (Odonata)
Plecoptera	Yule, C.	1997	Identification guide to the stonefly nymphs of New South Wales and northern Victoria

Plecoptera	Tsyrlin, E.	1999	Preliminary key to mature nymphs of Leptoperla stoneflies in Victoria
Trichoptera	St.Clair, R.M.	2000	Preliminary keys for the identification of Australian Caddisfly larvae of the family Leptoceridae
Trichoptera	St.Clair, R.M.	2000	Preliminary keys for the identification of Australian Caddisfly larvae of the families Odontoceridae, Kokiriidae and Oeconesidae
Trichoptera	Dean, J.C.	2000	Preliminary keys for the identification of Australian Caddisfly larvae of the families Antipodoeciidae, Atriplectididae, Limnephilidae and Plectrotarsidae
Trichoptera	Dean, J.C. & St Clair, R.M.	1999	Taxonomy of immatures of selected families of Ephemeroptera and Trichoptera
Trichoptera	Dean, J.C.	1999	Preliminary keys for the identification of Australian Trichoptera larvae of the family Hydropsychidae
Trichoptera	Cartwright, D.I.	1998	Preliminary guide to the identification of late instar larvae of Australian Polycentropodidae, Glossosomatidae, Dipsuedopsidae and Psychomyiidae (Insecta: Trichoptera)
Trichoptera	Jackson, J.	1998	Preliminary guide to the identification of late instar larvae of Australian Calocidae, Helicophidae and Conoesucidae
Trichoptera	St Clair, R.M.	1997	Conoesucidae (Insecta: Trichoptera) – Preliminary guide to the identification of late instar larvae of Australian Philorheithridae, Calamoceratidae and Helicopsychidae (Insecta: Trichoptera)
Trichoptera	Dean, J.C.	1997	A preliminary guide to the identification of larval Hydroptilidae (Insecta: Trichoptera)
Trichoptera	Wells, A.	1997	A key to species of late instar larvae of Australian Trichoptera (families Dipseudopsidae, Glossosomatidae, Polycentropodidae, Psychomyiidae, Ecnomidae, Philopotamidae and Tasmidae)
Trichoptera	Cartwright, D.I.	1997	Identification of late instar larvae of Australian Trichoptera genera
Trichoptera	Dean, J.C., St Clair, R.M., Cartwright, D.I. & Wells, A.	1996	Freshwater snails of the genera Fluvidona and Austropyrgus (Gastropoda, Hydrobiidae) from northern New South Wales and southern Queensland, Australia.

Appendix H9 List of predictor variables used for the Mark I and Mark II models

Predictor variables used for the Mark I and Mark II models

Mark I			
Spring edge	Spring bed	Autumn edge	Autumn bed
Depth (m)	Bedrock (%)	Alkalinity (mg/L)	Altitude (m) Cobble
Distance from source (km)	Cobble (%)	Distance from source (km)	(%) Gravel (%)
Latitude ¹	Gravel (%)	Latitude ¹	Maximum velocity (m/s)
Longitude ¹	Latitude ¹	Longitude ¹	Water body description ²
Water body description ²	Macrophyte cover ³	Minimum velocity (m/s)	Sand (%) Silt (%)
Water temperature (°C)	Minimum velocity (m/s)	Stream slope (m/m)	Stream order
	Water body description ²		Stream slope (m/m)
	Stream slope (m/m)		Stream wetted width (m)
			Water temperature (°C)
Mark II			
Spring edge	Spring pool	Autumn edge	Autumn pool
		Alkalinity (mg/L)	Alkalinity (mg/L) Bedrock
		Cobble (%)	(%) Cobble (%)
		Number of habitats	Distance from source (km)
		Latitude ¹	Latitude ¹
		Longitude ¹	Longitude ¹
		Mean annual rainfall (mm)	Mean dry season monthly rainfall (mm)
		Slope (m/m)	(MDMR)
		Soil class ⁴	Pebble (%)
		Stream order	Ratio of mean wet to mean dry season monthly rainfall (mm)
		Water temperature (°C)	(RAWD)
		Range in wet season; monthly rainfall means (mm) (WETR)	Reach category ⁵
			Stream wetted width (m)

¹ Decimal degrees.

² (reflow) 1: some part of water body flowing; 2: No flow—surface area <100 m²; 3: No flow—surface area >100 m².

³ Measured in the habitat: 0: none (0%); 1: little (1-30%); 2: moderate (31-70%); 3: extensive (>70%).

⁴ Soil class number (1-11)—attained from GIS map overlay.

⁵ 0: lower; 1: middle; 2: upper.

⁶ Number of substrate categories in reach (bedrock, boulder, cobble, pebble, gravel, and silt/clay—7 categories in total).

APPENDIX H10 National taxonomic codes for macroinvertebrate families collected in Queensland

National taxonomic codes for macroinvertebrate families collected in Queensland

Order	Family	National taxon code	Order	Family	National taxon code
Porifera	Porifera	IA999999	Amphipoda	Melitidae	OP099999
Hydrozoa	Hydridae	IB019999	Isopoda	Cirolanidae	OR129999
Hydrozoa	Clavidae	IB029999	Isopoda	Sphaeromatidae	OR139999
Temnocephalidea	Temnocephalidea	IF499999	Isopoda	Janiridae	OR189999
Turbellaria	Dugesiidae	IF619999	Isopoda	Oniscidae	OR259999
Nemertea	Nemertea	IH999999	Decapoda	Atyidae	OT019999
Nematoda	Nematoda	IJ999999	Decapoda	Palaemonidae	OT029999
Nematomorpha	Nematomorpha	IJ999999	Decapoda	Parastacidae	OV019999
Tardigrada	Tardigrada	IR999999	Decapoda	Sundathelphusidae	OX519999
Rotifera	Rotifer	JZ999999	Decapoda	Grapsidae	OX619999
Gastropoda	Viviparidae	KG019999	Crustacea	Crustacea	OZ999999
Gastropoda	Hydrobiidae	KG029999	Collembola	Collembola	QA999999
Gastropoda	Bithyniidae	KG039999	Coleoptera	Microsporidae	QC039999
Gastropoda	Thiaridae	KG049999	Coleoptera	Carabidae	QC059999
Gastropoda	Lymnaeidae	KG059999	Coleoptera	Haliplidae	QC069999
Gastropoda	Ancylidae	KG069999	Coleoptera	Hydrobiidae	QC079999
Gastropoda	Planorbidae	KG079999	Coleoptera	Noteridae	QC089999
Gastropoda	Physidae	KG089999	Coleoptera	Dytiscidae	QC099999
Gastropoda	Neritidae	KG109999	Coleoptera	Gyrinidae	QC109999
Gastropoda	Gastropoda	KG999999	Coleoptera	Hydrophilidae	QC119999
Bivalvia	Hyriidae	KP019999	Coleoptera	Hydraenidae	QC139999
Bivalvia	Corbiculidae	KP029999	Coleoptera	Staphylinidae	QC189999
Bivalvia	Sphaeriidae	KP039999	Coleoptera	Scirtidae	QC209999
Bivalvia	Bivalvia	KP999999	Coleoptera	Elmidae	QC349999
Hirudinea	Glossiphoniidae	LH019999	Coleoptera	Limnichidae	QC359999
Hirudinea	Ozobranchidae	LH029999	Coleoptera	Heteroceridae	QC369999
Hirudinea	Richardsonianidae	LH039999	Coleoptera	Psephenidae	QC379999
Hirudinea	Ornithobdellidae	LH049999	Coleoptera	Ptilodactylidae	QC399999
Hirudinea	Erpobdellidae	LH059999	Coleoptera	Chrysomelidae	QCAH9999
Hirudinea	Hirudinea	LH999999	Coleoptera	Brentidae	QCAM9999
Oligochaeta	Oligochaeta	LO999999	Coleoptera	Curculionidae	QCAN9999
Polychaeta	Polychaeta	LP999999	Coleoptera	Coleoptera	QCZZ9999
Arachnida	Acarina	MM999999	Diptera	Tipulidae	QD019999
Anostraca	Anostraca	OD999999	Diptera	Tanyderidae	QD039999
Conchostraca	Conchostraca	OF999999	Diptera	Blephariceridae	QD049999
Cladocera	Cladocera	OG999999	Diptera	Chaoboridae	QD059999
Ostracoda	Ostracoda	OH999999	Diptera	Dixidae	QD069999
Copepoda	Copepoda	OJ999999	Diptera	Culicidae	QD079999
Branchiura	Branchiura	OK999999	Diptera	Ceratopogonidae	QD099999
Amphipoda	Talitridae	OP019999	Diptera	Simuliidae	QD109999
Amphipoda	Ceinidae	OP029999	Diptera	Thaumaleidae	QD119999
Amphipoda	Eusiridae	OP039999	Diptera	Psychodidae	QD129999

National taxonomic codes for macroinvertebrate families collected in Queensland

Order	Family	National taxon code	Order	Family	National taxon code
Amphipoda	Corophiidae	OP059999	Diptera	Athericidae	QD229999
Amphipoda	Paramelitidae	OP069999	Diptera	Tabanidae	QD239999
Diptera	Stratiomyidae	QD249999	Neuroptera	Osmylidae	QN039999
Diptera	Empididae	QD359999	Neuroptera	Neurorthidae	QN049999
Diptera	Dolichopodidae	QD369999	Neuroptera	Sisyridae	QN059999
Diptera	Syrphidae	QD439999	Zygoptera	Coenagrionidae	QO029999
Diptera	Sciomyzidae	QD459999	Zygoptera	Isostictidae	QO039999
Diptera	Ephydriidae	QD789999	Zygoptera	Protoneuridae	QO049999
Diptera	Muscidae	QD899999	Zygoptera	Lestidae	QO059999
Diptera	s-f Aphroteniinae	QDAA9999	Zygoptera	Hypolestidae	QO069999
Diptera	s-f Diamesinae	QDAB9999	Zygoptera	Megapodagrionidae	QO079999
Diptera	s-f Telmatogetoninae	QDAC9999	Zygoptera	Synlestidae	QO089999
Diptera	s-f Podonominae	QDAD9999	Zygoptera	Diphlebiidae	QO099999
Diptera	s-f Tanypodinae	QDAE9999	Anisoptera	Aeshnidae	QO129999
Diptera	s-f Orthocladiinae	QDAF9999	Anisoptera	Gomphidae	QO139999
Diptera	s-f Chironominae	QDAJ9999	Anisoptera	Petaluridae	QO159999
Diptera	Chironomidae (unid.)	QDAZ9999	Anisoptera	Corduliidae	QO169999
Diptera	Diptera	QDZZ9999	Anisoptera	Libellulidae	QO179999
Ephemeroptera	Baetidae	QE029999	Zygoptera	Zygoptera	QO999997
Ephemeroptera	Ameletopsidae	QE049999	Anisoptera	Anisoptera	QO999998
Ephemeroptera	Leptophlebiidae	QE069999	Plecoptera	Eustheniidae	QP019999
Ephemeroptera	Ephemerellidae	QE079999	Plecoptera	Gripopterygidae	QP039999
Ephemeroptera	Caenidae	QE089999	Plecoptera	Plecoptera	QP999999
Ephemeroptera	Prosopistomatidae	QE099999	Trichoptera	Hydrobiosidae	QT019999
Ephemeroptera	Ephemeroptera	QE999999	Trichoptera	Glossosomatidae	QT029999
Hymenoptera	Hymenoptera	QG999999	Trichoptera	Hydroptilidae	QT039999
Hemiptera	Mesoveliidae	QH529999	Trichoptera	Philopotamidae	QT049999
Hemiptera	Hebridae	QH539999	Trichoptera	Hydropsychidae	QT069999
Hemiptera	Hydrometridae	QH549999	Trichoptera	Polycentropodidae	QT079999
Hemiptera	Veliidae	QH569999	Trichoptera	Ecnomidae	QT089999
Hemiptera	Gerridae	QH579999	Trichoptera	Psychomyiidae	QT099999
Hemiptera	Saldidae	QH609999	Trichoptera	Tasimiidae	QT139999
Hemiptera	Nepidae	QH619999	Trichoptera	Conoesucidae	QT159999
Hemiptera	Belostomatidae	QH629999	Trichoptera	Antipodoeciidae	QT169999
Hemiptera	Ochteridae	QH639999	Trichoptera	Helicopsychidae	QT179999
Hemiptera	Gelastocoridae	QH649999	Trichoptera	Calocidae/Helicophidae	QT189999
Hemiptera	Corixidae	QH659999	Trichoptera	Philorheithridae	QT219999
Hemiptera	Naucoridae	QH669999	Trichoptera	Odontoceridae	QT229999
Hemiptera	Notonectidae	QH679999	Trichoptera	Atriplectidae	QT239999
Hemiptera	Pleidae	QH689999	Trichoptera	Calamoceratidae	QT249999
Hemiptera	Hemiptera	QHZZ9999	Trichoptera	Leptoceridae	QT259999
Mecoptera	Nannochoristidae	QK019999	Trichoptera	Dipseudopsidae	QT269999
Lepidoptera	Pyralidae	QL019999	Trichoptera	Trichoptera	QT999999
Lepidoptera	Lepidoptera	QL999999	Unidentified	Unidentified	XX999999
Megaloptera	Corydalidae	QM019999			
Megaloptera	Sialidae	QM029999			

Appendix H11 Transport of live aquatic animals

Unaccompanied road transport

Place finfish/crustacea in two strong large plastic bags, with the inner one 1/4 to 1/3 full of water from the pond or tank from which the animals came (Figure H2a). Fill the inner bag with air (for a 1-2 hour trip) or oxygen (for a longer trip). Be sure to expel all air from the inner bag prior to filling with oxygen. Bring the top together, fold back on itself and seal with a rubber band (Figure H2b). Seal the second plastic bag over the top of the inner one (Figure H2c).

Place the bag in a large insulated container, e.g. a polystyrene esky. Label correctly and include written information on the history/problem of the animals it contains (attach to outside).

Accompanied road transport

The above method may be used. Alternatively, a plastic rubbish bin lined with a large unsealed plastic bag may be used. The transported water can be aerated during the trip with a portable battery-operated aquarium air pump or a fisherman's bait aerator.

Air transport

Transport of live animals within a state by air must conform to current Australian Domestic Airline Seafood Regulations and Packaging Approvals and IATA regulations as specified by the airline. The regulations outline the correct packing procedures and the approved transport box to be used. For example, live freshwater fish must be packed and transported according to IATA regulations, while the transport of live saltwater fish must comply with the current Australian Domestic Airline Seafood Regulations and Packaging Approvals. Contact the freight section of your nearest airport to check requirements before packing and transporting live fish to the laboratory.

NOTE: Interstate transport of sick animals is illegal, since there may be a risk of introducing a disease to a state declared free of a particular disease. You must contact your nearest Animal Health Laboratory within Queensland if you have a suspected disease outbreak.

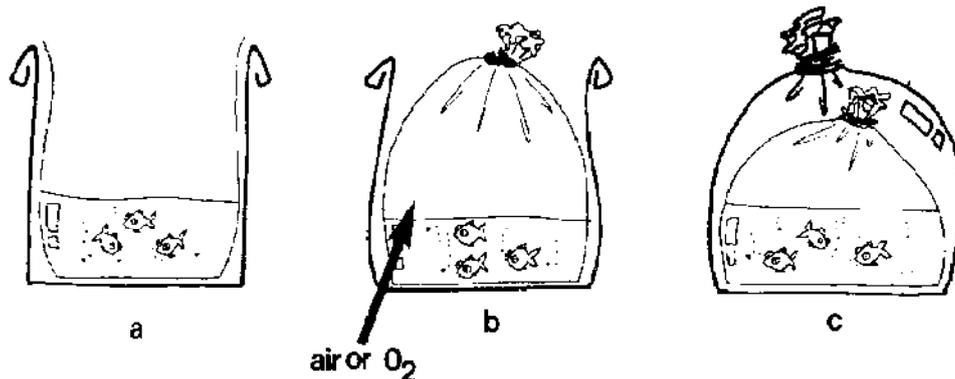


Figure 22. Packing method for transport of live fish

Glossary of useful terms

Abiotic	The non-living components of a system (see biota).
Absorption	In chemistry: penetration of one substance into the body of another. In biology: the act of absorbing (i.e. to take in as fluids or gases through a cell membrane). To take a substance (e.g. water, nutrients) into the body through the skin or mucous membranes or, in plants, through root hairs. See also Adsorption.
Acidic	Having a high hydrogen ion concentration (low pH).
Acid-soluble metal	The concentration of a metal that passes through a 0.45 micron (μm) membrane filter after the sample is acidified to pH 1.5–2.0 with nitric acid.
Acid volatile sulphide (AVS)	Sulfides in sediment that liberate hydrogen sulphide on reaction with cold dilute acid (mainly FeS or MnS in sediments).
Acute toxicity	Rapid adverse effect (e.g. death) caused by a substance in a living organism. Can be used to define either the exposure or the response to an exposure (effect).
Adsorption	The taking up of one substance at the surface of another.
Aerobic	Organisms requiring oxygen for respiration or conditions where oxygen is available.
Algae	Comparatively simple chlorophyll-bearing plants, most of which are aquatic and microscopic in size.
Alkalinity	The quantitative capacity of aqueous media to react with hydroxyl ions. The equivalent sum of the bases that are titratable with strong acid. Alkalinity is a capacity factor that represents the acid neutralising capacity of an aqueous system.
Ambient waters	All surrounding waters, generally of largely natural occurrence.
Anaerobic	Conditions where oxygen is lacking (anoxic); organisms not requiring oxygen for respiration.
Analyst	A particular person in the receiving laboratory who is to perform or supervise the analyses on the samples in question and has recognised qualifications.
Analytes	The physical and chemical species (indicators) to be determined.
Antagonism	A phenomenon in which the effect or toxicity of a mixture of chemicals is less than that which would be expected from a simple summation of the effects or toxicities of the individual chemicals present in the mixture.
Anthropogenic	Produced or caused by humans.
Aquatic ecosystem	Any watery environment from small to large, from pond to ocean, in which plants and animals interact with the chemical and physical features of the environment.
Aquifer	An underground layer of permeable rock, sand or gravel that absorbs water and allows it free passage through pore spaces.
Assimilation	The incorporation of absorbed substances into cellular material.
Assimilative capacity	The maximum loading rate of a particular pollutant that can be tolerated or processed by the receiving environment without causing significant degradation to the quality of the ecosystem and hence the environmental values it supports.
Baseline data	Also called pre-operational data (studies); collected (undertaken) before a development begins.

Benthic	Referring to organisms living in or on the sediments of aquatic habitats (lakes, rivers, ponds, etc.).
Benthos	The sum total of organisms living in, or on, the sediments of aquatic habitats.
Bioaccumulation	General term describing a process by which chemical substances are accumulated by aquatic organisms from water, either directly or through consumption of food containing the chemicals.
Bioassay	A test that exposes living organisms to several levels of a substance that is under investigation, and evaluates the organism's responses.
Bioavailable	The fraction of the total of a chemical in the surrounding environment that can be taken up by organisms. The environment may include water, sediment, soil, suspended particles, and food items.
Biochemical (or Biological) Oxygen Demand (BOD)	The decrease in oxygen content in mg/L of a sample of water in the dark at a certain temperature over a certain of period which is brought about by the bacterial breakdown of organic matter. Usually the decomposition has proceeded so far after 20 days that no further change occurs. The oxygen demand is measured after five days (BOD5), at which time 70% of the final value has usually been reached.
Bioconcentration factor (BCF)	A unitless value describing the multiple by which a chemical can be concentrated in the tissues of an organism in the aquatic environment. At apparent equilibrium during the uptake phase of a bioconcentration test, the BCF is the concentration of a chemical in one or more tissues of the aquatic organisms divided by the average exposure concentration in the test.
Biodiversity (biological diversity)	The variety of life forms, including the plants, animals and microorganisms, the genes they contain and the ecosystems and ecological processes of which they are a part.
Biofilm	Layer of materials created by microorganisms on an underwater surface.
Biological assessment	Use and measurement of the biota to monitor and assess the ecological health of an ecosystem.
Biological community	An assemblage of organisms characterised by a distinctive combination of species occupying a common environment and interacting with one another.
Biomagnification	Result of the processes of bioconcentration and bioaccumulation by which tissue concentrations of bioaccumulated chemicals increase as the chemical passes up through two or more trophic levels. The term implies an efficient transfer of chemicals from food to consumer, so that residue concentrations increase systematically from one trophic level to the next.
Biomass	The living weight of a plant or animal population, usually expressed on a unit area basis.
Biosolids	Sewage sludge, organic residuals remaining after domestic sewage treatment.
Biota	The sum total of the living organisms of any designated area.
Bioturbation	The physical disturbance of sediments by burrowing and other activities of organisms.
Bivalve	A mollusc with a hinged double shell.
Bloom	An unusually large number of organisms per unit of water, usually algae, made up of one or a few species.
Buffer	A solution containing a weak acid and its conjugate weak base, the pH of which changes only slightly on the addition of acid or alkali.

Buffering capacity	A measure of the relative sensitivity of a solution to pH changes on addition of acids or base.
°C	Degrees Celsius.
Carcinogen	A substance that induces cancer in a living organism.
Catchment	The total area draining into a river, reservoir, or other body of water.
Chemical oxygen demand (COD)	The amount of oxygen required to oxidise all organic matter that is susceptible to oxidation by a strong chemical oxidant.
Chlorination	<ul style="list-style-type: none"> • The process of introducing one or more chlorine atoms into a compound. • The application of chlorine to water, sewage or industrial wastes for disinfection.
Chronic	Lingering or continuing for a long time; often for periods from several weeks to years. Can be used to define either the exposure of an aquatic species or its response to an exposure (effect). Chronic exposure typically includes a biological response of relatively slow progress and long continuance, often affecting a life stage.
Chronic value	The geometric mean of the lower and upper limits obtained from an acceptable chronic test or by analysing chronic data using a regression analysis. A lower chronic limit is the highest tested concentration that did not cause an unacceptable amount of adverse effect on any of the specified biological measurements, and below which no tested concentration caused unacceptable effect. An upper chronic limit is the lowest tested concentration that did cause an unacceptable amount of adverse effect on one or more biological measurements and above which all tested concentrations also caused such an effect.
Colloid	Material in solution typically 1 nm–100 nm in diameter. Colloidal particles do not settle out of solution through the force of gravity. Organic colloidal matter is considered especially important in the transport of inorganic substances such as P through the soil profile.
Community	An assemblage of organisms characterised by a distinctive combination of species occupying a common environment and interacting with one another.
Community composition	All the types of taxa present in a community.
Community metabolism	The biological movement of carbon in an ecosystem, involving two processes, production (via photosynthesis) and respiration.
Community structure	All the types of taxa present in a community and their relative abundances.
Compliance	Action in accordance with upholding a 'standard' (water quality).
Concentration	The quantifiable amount of chemical in, say, water, food or sediment.
Criteria (water quality)	Scientific data evaluated to derive the recommended quality of water for different uses.
Cyanobacteria	A division of photosynthetic bacteria, formerly known as blue-green algae that can produce strong toxins.
Cytotoxic	Having an adverse impact on living cells.
Decision criteria	Criteria by which decisions will be made as a result of monitoring for potential impacts.

Depuration	Process whereby the re is elimination of contaminant from the tissues when an organism is surrounded by uncontaminated water or sediment; also used to describe the use of a controlled aquatic environment to reduce the level of pathogenic organisms that may be present in live shellfish prior to marketing.
Detection limit	The smallest concentration or amount of a substance that can be reported as present with a specified degree of certainty by definite complete analytical procedures.
Detritus	Unconsolidated sediments composed of both inorganic and dead and decaying organic material.
Dinoflagellates	Major class of marine algae that move by flagella. They are often red in colour, and can produce strong toxins that can kill many fish and other marine organisms.
Direct toxicity assessment (DTA)	A laboratory procedure for quantifying the potential toxicity of a sample of effluent through exposing a range of test specimens to that effluent. It assesses the toxicity of mixtures of bioavailable chemicals rather than individual chemicals. Also known as Whole Effluent Toxicity (WET) testing.
Diurnal	Daily.
Dose	The quantifiable amount of a material introduced into an animal.
EC50	(or median effective concentration) The concentration of material in water that is estimated to produce a measurable response in 50% of the test organisms. The EC50 is usually expressed as a time-dependent exposure value (e.g. 24-hour or 96-hour EC50). See also LC50.
Effect size	The size of impact that would cause concern (or constitute an early warning). Often defined as a level of (ecological) change that is acceptable in comparison to a defined reference.
Effluent	A complex waste material (e.g. liquid industrial discharge or sewage) discharged into the environment.
Electrical conductivity	The ability of water or soil solution to conduct an electric current.
End-points	Measured attainment response, typically applied to ecotoxicity or management goals.
Endemic, endemism	Confined in occurrence to a local region.
Enterococci	Any streptococcal bacteria normally found in the human intestinal tract; usually non-pathogenic.
Environmental authority or development approval	A licence, permit or other authority for an environmentally relevant activity, granted by an administering body in accordance with the <i>Environmental Protection Act 1994</i> .
Environmental values	Particular values or uses of the environment that are important for a healthy ecosystem or for public benefit, welfare, safety or health and that require protection from the effects of pollution, waste discharges and deposits. Several environmental values may be designated for a specific water body.
Ephemeral stream	A stream that carries water only during or immediately after periods of rainfall.
Epilimnion	The uppermost layer of water in a lake, characterised by an essentially uniform temperature that is generally warmer than elsewhere in the lake, and by relatively uniform mixing by wind and wave action.
Epilithon	Organisms attached to rocks, such as algae and lichens.
Epiphyte	A plant that grows on the outside of another plant, using it for support only and not obtaining food from it.

Eukaryotes	An organism characterised by the presence of membrane-bound organelles. See also Prokaryote.
Euphotic	Of surface waters to a depth of approximately 80–100 m; the lit region that extends virtually from the water surface to the level at which photosynthesis fails to occur because of reduced light penetration.
Euryhaline	Describes organisms that are capable of osmoregulating over a wide range of salinities.
Eutrophic	Abundant in nutrients and having high rates of productivity frequently resulting in oxygen depletion below the surface layer of a water body.
Eutrophication	Enrichment of waters with nutrients, primarily phosphorus, causing abundant aquatic plant growth and often leading to seasonal and/or diurnal deficiencies in dissolved oxygen.
Fate	Disposition of a material in various environmental compartments (e.g. soil or sediment, water, air, biota) as a result of transport, transformation and degradation.
Flocculation	<ul style="list-style-type: none"> • The process by which suspended colloidal or very fine particles coalesce and agglomerate into well-defined hydrated floccules of sufficient size to settle rapidly. • The stirring of water after coagulant chemicals have been added to promote the formation of particles that will settle.
Flow-through system	An exposure system for aquatic toxicity tests in which the test material solutions and control water flow into and out of test chambers on a once-through basis either intermittently or continuously.
Fouling	Accumulation of material through chemical, physical or biological processes.
Gastropod	A mollusc of the class Gastropoda, with a locomotive organ placed ventrally (e.g. snail and limpet).
Gross alpha (activity)	A measure of the concentration of alpha-particle emitting radionuclides in water. This is determined by standard techniques involving the evaporation of a water sample and measurement of the alpha activity of the residue.
Gross beta (activity)	A measure of the concentration of beta-particle emitting radionuclides in water. This is determined by standard techniques involving the evaporation of a water sample and measurement of the beta activity of the residue.
Groundwater	Water stored underground in rock crevices and in the pores of geologic materials that make up the earth's crust; water that supplies springs and wells. See also Aquifer.
Guideline trigger values	These are the concentrations (or loads) of the key performance indicators measured for the ecosystem, below which there exists a low risk that adverse biological (ecological) effects will occur. They indicate a risk of impact if exceeded and should 'trigger' some action, either further ecosystem specific investigations or implementation of management/remedial actions.
Guideline (water quality)	Numerical concentration limit or narrative statement recommended to support and maintain a designated water use.
Habitat	The place where a population (e.g. human, animal, plant, microorganism) lives and its surroundings, both living and non-living.
Half-life	Time required to reduce by one-half the concentration of a material in a medium (e.g. soil or water) or organism (e.g. fish tissue) by transport, degradation, transformation or depuration.

Hardness	The concentration of all metallic cations, except those of the alkali metals (e.g. sodium and potassium), present in water. In general, hardness is a measure of the concentration of calcium and magnesium ions in water and is frequently expressed as mg/L calcium carbonate equivalent.
Hazard	The potential or capacity of a known or potential environmental contaminant to cause adverse ecological effects.
High reliability guideline trigger values	Trigger values that have a higher degree of confidence because they are derived from an adequate set of chronic toxicity data and hence require less extrapolation from the data to protect ecosystems.
Humic substances	Organic substances only partially broken down that occur in water mainly in a colloidal state. Humic acids are large-molecule organic acids that dissolve in water.
Hydrolysis	<ul style="list-style-type: none"> • The formation of an acid and a base from a salt by the ionic dissociation of water. • The decomposition of organic compounds by interaction with water.
Hydrophilic	Having an affinity for water, readily absorbs water.
Hydrophobic	Having little or no affinity for water, repels or does not absorb water.
Hypolimnion	The region of a water body that extends from below the thermocline to the bottom of the lake; it is thus removed from much of the surface influence.
Hypothesis	Supposition made from known facts as a starting point for further investigation.
Hypoxia	Deficiency of oxygen in tissues or in blood; anoxia.
Indicator	A parameter that can be used to provide a measure of the quality of water or the condition of an ecosystem.
Inorganic carbon	Generally, simple ions and molecules that contain carbon bonded only to inorganic atoms. Carbonates are the most common group, although the cyanide ion is also considered to be inorganic.
Intermittent stream	A stream that carries water a considerable portion of the time, but that ceases to flow occasionally or seasonally because bed seepage and evapotranspiration exceed the available water supply.
Interstitial	Occurring in interstices or spaces; applied to water and to flora and fauna living between sand grains and soil particles.
Invertebrates	Animals lacking a dorsal column of vertebrae or a notochord.
In vitro	Outside the intact organism; generally applied to experiments involving biochemical events occurring in tissue fragments or fractions in a laboratory.
Ion	An electrically charged atom.
LC100	Lowest concentration of a toxicant that kills all the test organisms.
LC50	(or median lethal concentration) The concentration of material in water that is estimated to be lethal to 50% of the test organisms. The LC50 is usually expressed as a time-dependent exposure value, e.g. 24-hour or 96-hour LC50, the concentration estimated to be lethal to 50% of the test organisms after 24 or 96 hours of exposure.
LD50	(or median lethal dose) The dose of material that is estimated to be lethal to 50% of the test organisms. Appropriate for use with test animals such as rats, mice and dogs, it is rarely applicable to aquatic organisms because it indicates the quantity of a material introduced directly into the body by injection or ingestion rather than the concentration of the material in water in which aquatic organisms are exposed during toxicity tests.
Leachate	Water that has passed through a soil and that contains soluble material removed from that soil.

Lethal	Causing death by direct action. Death of aquatic organisms is the cessation of all visible signs of biological activity.
Level of protection	A level of quality desired by stakeholders and implied by the selected management goals and water quality objectives for the water resource.
Life-cycle study	A chronic (or full chronic) study in which all the significant life stages of an organism are exposed to a test material. Generally, a life-cycle test involves an entire reproductive cycle of the organism.
Live weight	Weight of the living animal.
LOEC	(or lowest observed effect concentration) The lowest concentration of a material used in a toxicity test that has a statistically significant adverse effect on the exposed population of test organisms as compared with the controls.
LOEL	(or lowest observed effect level) The lowest concentration that produces an observable effect in a test species. Below this concentration there are no observed effects in the test species.
Long-term trigger value (LTV)	The maximum concentration of contaminant in irrigation water which can be tolerated assuming 100 years of irrigation, based on key irrigation loading assumptions.
Low reliability guideline trigger values	Trigger values that have a low degree of confidence because they are derived from an incomplete data set. They are derived using either assessment factors or from modelled data using the statistical method. They should only be used as interim indicative working levels.
Macrophyte	A member of the macroscopic plant life of an area, especially of a body of water; large aquatic plant.
Median	Middle value in a sequence of numbers.
Mesotrophic	Water bodies or organisms which are intermediate between nutrient-rich and nutrient-poor.
Metabolite	Any product of metabolism.
Mixing zones	An explicitly defined area around an effluent discharge where effluent concentrations may exceed guideline values and therefore result in certain environmental values not being protected. The size of the mixing zone is site-specific.
Moderate reliability guideline trigger values	Trigger values that have a moderate degree of confidence because they are derived from an adequate set of acute toxicity data and hence require more extrapolation than high reliability trigger values, including an acute-to-chronic conversion.
Neurotoxin	Toxic substances which adversely affect the nervous system.
NOEC	(or no observed effect concentration) The highest concentration of a toxicant at which no statistically significant effect is observable, compared to the controls; the statistical significance is measured at the 95% confidence level. Not detectable or below the limit of detection of a specified method of analysis.
Octanol: water partition coefficient (Kow)	The ratio of a chemical's solubilities in n-octanol and water at equilibrium. Kow is used as an indication of a chemical's propensity for bioconcentration by aquatic organisms where n-octanol is a surrogate for typical animal lipid. The symbol Pow is sometimes used in place of Kow but they are alternative names for the same equilibrium solubility ratio.
Oligotrophic	Waters with a small supply of nutrients.
Organic carbon	Generally carbon which is chemically bonded to other carbon atoms, although methane (one carbon atom only) and its derivatives are considered organic.
Organism	Any living animal or plant; anything capable of carrying on life processes.

Osmoregulation	The biological process of maintaining the proper salt concentration in body tissues to support life.
Osmosis	Diffusion of a solvent through a semi-permeable membrane into a more concentrated solution, tending to equalise the concentrations on both sides of the membrane.
Oxidation	The combination of oxygen with a substance, or the removal of hydrogen from it or, more generally, any reaction in which an atom loses electrons.
Oxygenation	The process of adding dissolved oxygen to a solution.
PAH	Polycyclic aromatic hydrocarbons.
Parameter	A measurable or quantifiable characteristic or feature.
Partition coefficient	A ratio of the equilibrium concentration of the chemical between media, for example, between a non-polar and polar solvent, or between air and water, or water and sediment.
Pathogen	An organism capable of eliciting disease symptoms in another organism.
Pelagic	Term applied to organisms which inhabit the open seas and oceans.
Percentile	Division of a frequency distribution into one hundredths.
Periphyton	The organisms attached to submerged plants.
Pesticide	A substance or mixture of substances used to kill unwanted species of plants or animals.
pH	Value that represents the acidity or alkalinity of an aqueous solution. It is defined as the negative logarithm of the hydrogen ion concentration of the solution.
Photodegradation	Breakdown of a substance by exposure to light; the process whereby ultra-violet radiation in sunlight attacks a chemical bond or link in a chemical structure.
Photolysis	The decomposition of a compound into simpler units as a result of the absorption of one or more quanta of radiation.
Photosynthesis	The conversion of carbon dioxide to carbohydrates in the presence of chlorophyll using light energy.
Physico-chemical	Refers to the physical (e.g. temperature, electrical conductivity) and chemical (e.g. concentrations of nitrate, mercury) characteristics of water.
Phytoplankton	Small (often microscopic) aquatic plants suspended in water.
Phytotoxicity	Toxicity of contaminants to plants.
Plankton	Plants (phytoplankton) and animals (zooplankton), usually microscopic, floating in aquatic systems.
Pollution	The introduction of unwanted components into waters, air or soil, usually as a result of human activity, e.g. hot water in rivers, sewage in the sea, oil on land.
Polychlorinated biphenyls (PCBs)	Highly toxic and persistent compounds derived from the replacement of numerous H radicals by Cl radicals on biphenyl, which consists of two benzene rings joined by a covalent bond, with the elimination of two H radicals (C ₁₂ H ₁₀).
Potable water	Water suitable, on the basis of both health and aesthetic considerations, for drinking or culinary purposes.
Practical quantitation limit (PQL)	The best level achievable among laboratories within specified limits during routine laboratory operations. The PQL represents a practical and routinely achievable detection level with a relatively good certainty that any reported value is reliable. The PQL is often around five times the method detection limit.

Precipitation	<ul style="list-style-type: none"> • The formation of solid particles in a solution; generally, the settling out of small particles. • The settling-out of water from cloud, in the form of rain, hail, snow, etc.
Primary production	The production of organic matter from inorganic materials.
Producers	Organisms that are able to build up their body substance from inorganic materials.
Prokaryotes	Organisms characterised by the absence of membrane-bound organelles (opposite to eukaryotes).
Protocol	A formally agreed method and procedure for measuring an indicator; it defines the sampling, sample handling and sample analysis procedures.
Protozoans	Single-celled, animal-like organisms of the kingdom Protista.
Quality assurance (QA)	The implementation of checks on the success of quality control (e.g. replicate samples, analysis of samples of known concentration).
Quality control (QC)	The implementation of procedures to maximise the integrity of monitoring data (e.g. cleaning procedures, contamination avoidance, sample preservation methods).
Redox potential	An expression of the oxidising or reducing power of a solution relative to a reference potential. Redox potential is dependent on the nature of the substances dissolved in the water, as well as on the proportion of their oxidised and reduced components.
Reference condition	An environmental quality or condition that is defined from as many similar systems as possible and used as a benchmark for determining the environmental quality or condition to be achieved and/or maintained in a particular system of equivalent type.
Release of water	Water freed from a site for specified purposes such as disposal. May occur by means of infrastructure such as a constructed channel or pipe, or by a natural flow pathway such as an overland gully or drainline.
Residence time	The period of time that a volume of liquid (and any associated contaminants) remains in a waterway, catchment system, creek bed, or a part thereof.
Salinity	The presence of soluble salts in or on soils or in water.
Sediment	Unconsolidated mineral and organic particulate material that settles to the bottom of aquatic environment.
Sediment pore waters	Water that occupies the space between particles in a sediment, as distinct from overlying water which is the water above the sediment layer.
Sewage fungus	A thick filamentous bacterial growth that develops in water contaminated with sewage. The filamentous material is composed predominately of the bacterium <i>Sphaerotilus natans</i> .
Short-term trigger value (LTV)	The maximum concentration of contaminant in irrigation water which can be tolerated for a shorter period of time (20 years) assuming the same maximum annual irrigation loading to soil as for the long-term trigger value.
Sodicity	The presence of a high proportion of sodium ions relative to other cations in a soil.
Sorption	Process whereby contaminants in soils adhere to the inorganic and organic soil particles.
Speciation	The distribution of an element among defined chemical forms, for example, valency or organic and inorganic forms.

Species	A group of organisms that resemble each other to a greater degree than members of other groups and that form a reproductively isolated group that will not produce viable offspring if bred with members of another group.
Species richness	The number of species present (generally applied to a sample or community).
Suspended particulate matter (SPM)	This is insoluble material which resides in the water column, or is dispersed in a sample upon agitation.
Standard (water quality)	An objective that is recognised in enforceable environmental control laws.
Sub-lethal	Involving a stimulus below the level that causes death.
Supersaturation	Refers to a solution containing more solute than equilibrium conditions will allow.
Synergism	A phenomenon in which the effect or toxicity of a mixture of chemicals is greater than that to be expected from a simple summation of the effects or toxicities of the individual chemicals summation of the effects or toxicities of the individual chemicals present in the mixture.
Teratogen	An agent that increases the incidence of congenital malformations.
Thermotolerant coliforms	Also known as faecal coliforms. In tropical and sub-tropical areas, thermotolerant coliforms may on some occasions include microorganisms of environmental rather than faecal origin.
Threshold concentration	A concentration above which some effect (or response) will be produced and below which it will not.
Total dissolved solids (TDS)	A measure of the inorganic salts (and organic compounds) dissolved in water.
Total metal	The concentration of a metal in an unfiltered sample that is digested in strong nitric acid.
Toxicant	A chemical capable of producing an adverse response (effect) in a biological system at concentrations that might be encountered in the environment, seriously injuring structure or function or producing death. Examples include biocides, pesticides and biotoxins (i.e. domoic acid, ciguatoxin and saxitoxins).
Toxicity	The inherent potential or capacity of a material to cause adverse effects in a living organism.
Toxicity identification and evaluation (TIE)	Toxicity characterisation procedures involving use of selective chemical manipulations or separations and analyses coupled with toxicity testing to identify specific classes of chemicals and ultimately individual chemicals that are responsible for the toxicity observed in a particular sample.
Toxicity test	The means by which the toxicity of a chemical or other test material is determined. A toxicity test is used to measure the degree of response produced by exposure to a specific level of stimulus (or concentration of chemical).
Trigger values	These are the concentrations (or loads) of the key performance indicators measured for the ecosystem, below which there exists a low risk that adverse biological (ecological) effects will occur. They indicate a risk of impact if exceeded and should 'trigger' some action, either further ecosystem-specific investigations or implementation of management/remedial actions.
Volatile	Having a low boiling or subliming pressure (a high vapour pressure).
Water quality criteria	Scientific data evaluated to derive the recommended quality of water for various uses.

Water quality objective	A numerical concentration limit or narrative statement that has been established to support and protect the designated uses of water at a specified site. It is based on scientific criteria or water quality guidelines but may be modified by other inputs such as social or political constraints.
Wastewater	Water that has been adversely affected in quality by anthropogenic influence such as use in a washing, flushing, or manufacturing process.
Watertable	The level of groundwater; the upper surface of the zone of saturation for underground water.
Whole effluent toxicity testing (WET testing)	See Direct toxicity assessment.
Xenobiotic	A foreign chemical or material not produced in nature and not normally considered a constituent of a specified biological system. This term is usually applied to manufactured chemicals.
Zooplankton	The animal portion of the plankton.

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Final Model Water Conditions for Coal Mines in the Fitzroy Basin

Note:

Explanatory notes are in green. **DELETE** prior to issue of EA.

Insertions required by applicants and or the administering authority are in blue. **DELETE** prior to issue.

Contaminant Release

- W1** Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.
- W2** The release of contaminants to waters must only occur from the release points specified in Table 1 and depicted in Figure 1 <this would be a plan or plans locating all monitoring (water quality and flow) and release points> attached to this environmental authority.

Table 1 (Contaminant Release Points, Sources and Receiving Waters)

Release Point (RP)	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Contaminant Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	e.g. Stormwater Dam Spillway Overflow	Dam Spillway	Wet Creek
RP 2	XXXX	XXXX	e.g. Dam overflow pipe	Sampling Tap on pipe where the pipe enters Sandy Creek	Sandy Creek

- W3** The release of contaminants to waters must not exceed the release limits stated in Table 2 when measured at the monitoring points specified in Table 1 for each quality characteristic.

Table 2 (Contaminant Release Limits)

EXPLANATORY NOTES – Setting interim release limits for EC:

Option (c) – To negotiate a higher value for end-of-pipe EC limits, it will be necessary to have sufficient background water quality data from historical flow events, ideally above each discharge point. This data should be used to demonstrate that there is sufficient “assimilative capacity” in receiving waters to receive mine discharges of the proposed higher EC levels and maximum flows specified in condition W9. In other words, the limits should be such that the predicted in-stream water quality downstream will always remain below 1000 µS/cm EC (for example, using all historical data and assumptions of complete dilution). Consideration should also be given to the potential impact on any drinking water reservoirs immediately downstream of the discharge and the need to keep in-stream water quality below 750 µS/cm.

Option (d) – To negotiate a stepped approach to achieve Option (b) or (c) it will be necessary to predict the likely downstream receiving water EC as a result of the proposed limits for each step proposed. It will be necessary to have sufficient background water quality data from historical flow events, ideally for each discharge point. The data should be used to demonstrate that there is sufficient assimilative capacity to receive mine discharges of the proposed higher EC levels and maximum flows specified in condition W9. The limits should be such that predicted the in-stream water quality downstream is not likely to result in environmental harm from high salinity impacts. Ideally, in-stream EC s should remain below 1000 µS/cm EC (for example, using all historical data and assumptions of complete dilution). Where in-stream EC is likely to be above 1000 µS/cm then a case should be put forward as to why this is required and comments about the likelihood and potential extent of impacts. Consideration should also be given to the potential impact on any drinking water reservoirs immediately downstream of the discharge and the need to keep in-stream water quality below 750 µS/cm.

Quality Characteristic	Interim Release Limits for all mines (limits to apply from the date of issue)	Future Release Limits from XX/XX/XXXX (negotiated date) Note: These future limits will apply from a yet to be negotiated date using alternative numbers that will be derived from the information gathered by any combination of the following: (1) the results of near field monitoring, (2) any studies or investigations carried out in accordance with recommendations 2 & 3 of the Cumulative Impact Study on water quality in the Fitzroy River Basin. (3) any review of the QLD Water Quality Guidelines. (4) other relevant information Note: This information should be available by the end of 2011 if not before and when it becomes available limits will be determined for each mine site based on the environmental values to be protected and in accordance with criteria below	Monitoring frequency	Comment
Electrical conductivity (uS/cm)	<p>Hierarchy for determining limits in priority order starting with (a):</p> <p>(a) for mines that do not release contaminants to waters - no conditions are required for release authorisation, then conditions W2, to W15 inclusive, W18, W19 and W43 can be deleted.</p> <p>(b) Current limit for those mine sites not under a TEP or 1500 EC (Maximum)* which ever is lower or</p> <p>(c) a negotiated higher limit value that does not result in the contaminant release exceeding a maximum 1000 EC in the receiving waters and where the mine site demonstrates to DERM that it is unreasonable and impractical to immediately comply with the 1500 EC limit in (b) above and supported by a business case and commitment to ongoing environmental improvement on the mine site and with nominated timeframes.</p> <p><i>Note: If the current limit is lower than a limit determined as above then the current limit would initially apply.</i></p> <p>(d) for those other mines which cannot immediately achieve (b) or (c) above a stepped approach within the interim period ending 2011 to achieve (b) or (c) will be</p>	<p>Aquatic ecosystem protection (no drinking water value):</p> <p>An end-of-pipe limit to achieve in the range 0 to 1000 EC in the receiving waters. (Must have natural flow i.e. the 20th percentile flow trigger and achieve a 1:4 dilution</p> <p>OR</p> <p>for mines in the upper catchments must have natural flow i.e. the 20th percentile flow trigger.</p> <p>OR</p> <p>Drinking water protection:</p> <p>An end-of-pipe limit to achieve 0 to 750 EC in the receiving waters. (Must have natural flow, either 1:4 dilution and only release where a 20th percentile flow trigger occurs; OR for mines in the upper catchment must have a natural flow i.e. 20th percentile trigger.</p>	Daily during release (the first sample must be taken within 2 hours of commencement of release)	

	<p>required.</p> <p><i>Note: some of these mines may already be under an approved TEP and EC limits and compliance timeframes in the TEP need to be taken into account with the stepped approach.</i></p> <p>To support a stepped approach DERM will require a business case and commitment to ongoing environmental improvement on the mine site to ensure that all reasonable and practicable measures are being/will be taken to prevent and/or minimise environmental harm.</p>			
pH (pH Unit)	<p>6.5 (minimum)</p> <p>9.0 (maximum)</p>	<p>6.5 (minimum)</p> <p>9.0 (maximum)</p>	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
Turbidity (NTU)	NA*	NA*	Daily during release* (first sample within 2 hours of commencement of release)	Turbidity is required to assess ecosystems impacts and can provide instantaneous results.
Suspended Solids (mg/L)	Current Limit	Limit to be determined based on receiving water reference data and achievable best practice sedimentation control and treatment	Daily during release* (first sample within 2 hours of commencement of release)	Suspended solids are required to measure the performance of sediment and erosion control measures.
Sulphate (SO ₄ ²⁻) (mg/L)	Current limit or 1000 (maximum) which ever is the lower	<p>250 (Maximum) (Protection of drinking water Environmental Value)</p> <p>OR</p> <p>1000 (Maximum) (Protection of irrigation environmental value)</p>	Daily during release* (first sample within 2 hours of commencement of release)	Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC & ARMCANZ 2000 stock water quality guidelines.

Note: NA – not available, * local trigger values need to be developed

W4 The release of contaminants to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2 and Table 3.

Table 3 (Release Contaminant Trigger Investigation Levels)

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level	Monitoring Frequency
Aluminium	100	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	Commencement of release and thereafter weekly during release
Arsenic	13	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Cadmium	0.2	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Chromium	1	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Copper	2	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Iron	300	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Lead	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Mercury	0.2	<i>For aquatic ecosystem protection, based on LOR for CV FIMS</i>	
Nickel	11	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Zinc	8	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Include additional contaminants as required	Include additional contaminants as required		

EXPLANATORY NOTES – Table 3 Potential Contaminants:

The quality characteristics listed below should be assessed on a site by site basis by each mine prior to finalisation of amendment applications. Based on this assessment, the quality characteristic should be either disregarded if below trigger levels; or included as priority contaminants in Table 3 if above trigger levels. Assessment should involve comparison of representative data from dams that have historically been discharged or likely to be discharged from contaminant release points in Table 1. Data may include historical results or sampling undertaken for this specific purpose. The intent here is that not all dams on site would need to be sampled but those that would make up the majority of water in dams with release points. It could also be demonstrated based on existing water quality information that the water source and relative water quality of some dam are the same, in which case such dams may not need to be sampled individually. For metals and metalloids, trigger levels apply if dissolved results exceed trigger levels. However, total (unfiltered) results for metals and metalloids can be used to disregard a characteristic for inclusion in Table 3. Terms include SMD – slightly moderately disturbed level of protection, guideline - refers ANZECC & ARMCANZ (2000), LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical methods required to achieve LOR.

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level
Boron	370	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Cobalt	90	<i>For aquatic ecosystem protection, based on low reliability guideline</i>
Manganese	1900	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Molybdenum	34	<i>For aquatic ecosystem protection, based on low reliability guideline</i>
Selenium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Silver	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Uranium	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>

Vanadium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Ammonia	900	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Nitrate	1100	<i>For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN</i>
Petroleum hydrocarbons (C6-C9)	20	
Petroleum hydrocarbons (C10-C36)	100	
Fluoride (total)	2000	<i>Protection of livestock and short term irrigation guideline</i>

Note:

1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.
2. The list of quality characteristics required to be monitored as per Table 3 will be reviewed once the results of the monitoring data is gathered for the interim period until 31 December 2011 or an earlier date if the data is, or becomes, available and if it is determined that there is no need to monitor for certain individual quality characteristics these can be removed from Table 3.
3. SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARMCANZ (2000).
4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

W5 If quality characteristics of the release exceed any of the trigger levels specified in Table 3 during a release event, the environmental authority holder must compare the down stream results in the receiving waters to the trigger values specified in Table 3 and:

1. where the trigger values are not exceeded then no action is to be taken; or
2. where the down stream results exceed the trigger values specified Table 3 for any quality characteristic, compare the results of the down stream site to the data from background monitoring sites and;
 - (a) if the result is less than the background monitoring site data, then no action is to be taken; or
 - (b) if the result is greater than the background monitoring site data, complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W5 2(b)(ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

W6 If an exceedance in accordance with condition W5 2(b)(ii) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Contaminant Release Events

W7 The holder must install, operate and maintain a stream flow gauging station to determine and record stream flows at the locations upstream of each Release Point as specified in Table 4 for any receiving water into which a release occurs.

W8 Notwithstanding any other condition of this environmental authority, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in Table 4 for the contaminant release point(s) specified in Table 1.

Table 4 (Contaminant Release during Flow Events)

EXPLANATORY NOTES – Table 4

Gauging station description:

The intent here is that every release point in Table 1 is associated with a gauging station that measures flow upstream of the discharge point. More than one discharge point may be associated with the same gauging station. The gauging station should be at a minimum distance from the discharge point such that water flow under trigger flow events will not significantly diminish by the time it reaches the discharge point. The location of the gauging station should ideally be such that it is not significantly affected by other upstream point source releases or times of discharge are limited to periods of “natural” flow.

Under certain circumstances it may be appropriate to have a downstream gauging station in addition to or in replace of an upstream gauging station. The location should ideally not be affected by the discharge (e.g. be measured off the main waterway). The need for this must be demonstrated on a case by case basis to show why an upstream gauging station is insufficient. This may be the case when mines are located in the upper parts of catchments or near the downstream confluence or a major waterway. Similarly, the gauging station should be at a distance from the discharge point such that water flow during triggered flow events will not significantly diminish between the discharge point and the measuring point (or the confluence with the creek being measured). For downstream flow triggers, some changes to calculation for flow triggers and maximum release flows would typically be required based on the relative sizes of the waterways involved.

Minimum Flow Trigger:

The intent for the minimum flow trigger is that the times of discharge are limited to times of natural flow events only (for ephemeral receiving waters). Ideally, the flow trigger should be chosen such that it represents, for example, a 20th percentile average daily flow (in m³/s) of a minimum ten year period. This or a similar approach should aim to eliminate discharges during “low flow” periods. The maximum discharge volume can then be calculated by dividing the upstream flow trigger by 4. The intent here is that a minimum dilution 1:4 is always maintained (20% of downstream flow). In some situations, this will not allow the mine to release sufficient quantities of water. Therefore, it is possible to propose more than one flow trigger. For example, a 40th percentile average daily flow trigger may also be used in addition to the initial 20th percentile flow trigger such that above the 40th percentile average daily flow trigger a higher release volume will be allowed during periods of higher in-stream flow (while still maintaining a 1:4 dilution ratio).

The expectation is that where flow gauging data is available, it is used to calculate flow triggers. Where gauging data is not available or is insufficient, flow triggers should be based on runoff/stream flow estimates using appropriate hydrological calculations or models and known catchment area, rainfall estimations etc.

Under certain circumstances, such as where a mine is in the upper part of the catchment, achieving a 1:4 dilution with receiving waters as described above may not allow the mine to discharge sufficient volumes. In such a case, a lower flow trigger must still be proposed but the discharge volume will also need to be linked to some downstream flow measure with sufficient dilution (ideally much greater than 1:4). The need for this must be demonstrated on a case by case basis and be supported by various flow calculations to demonstrate feasibility and show minimal environmental impacts.

Other special cases include discharges to creeks below water reservoirs or dams and these should be dealt with on a case by case basis to address the intent described above.

Receiving water description	Release Point	Gauging station description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Minimum Flow in Receiving Water Required for a Release Event	Flow recording Frequency
Wet Creek		Gauging station 1	XXXX	XXXX	Depending on individual catchment this minimum flow trigger will be either the release comprising less than 20% of the natural flow or any natural flow in the receiving environment. The volume of flow can be determined by height of water or flow. The actual flow must be a quantifiable measure. Example: > or = 5 m ³ /sec	Continuous (minimum daily)

- W9** Contaminant release flow rate must not exceed 20% of receiving water flow rate.
- W10** The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in Table 1.
- W11** Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

Notification of Release Event

- W12** The authority holder must notify the administering authority as soon as practicable (no later than 6 hours of having commenced releasing mine affected water to the receiving environment). Notification must include the submission of written verification to the administering authority of the following information:
- release commencement date/time;
 - expected release cessation date/time;
 - release point/s;
 - release volume (estimated);
 - receiving water/s including the natural flow rate; and
 - any details (including available data) regarding likely impacts on the receiving water(s).
- Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.*
- W13** The authority holder must notify the administering authority as soon as practicable, (nominally within twenty-four (24) hours after of cessation of a release) of the cessation of a release notified under Condition W12 and within 28 days provide the following information in writing:
- release cessation date/time;
 - natural flow volume in receiving water;
 - volume of water released;
 - details regarding the compliance of the release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
 - all in-situ water quality monitoring results; and
 - any other matters pertinent to the water release event.

Notification of Release Event Exceedance

- W14** If the release limits defined in Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.
- W15** The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:
- the reason for the release;
 - the location of the release;
 - all water quality monitoring results;
 - any general observations;
 - all calculations; and
 - any other matters pertinent to the water release event.

Monitoring of Water Storage Quality

- W16** Water storages stated in Table 5 which are associated with the release points must be monitored for the water quality characteristics specified in Table 6 at the monitoring locations and at the monitoring frequency specified in Table 5.

Table 5 (Water Storage Monitoring)

Water Storage Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Monitoring Location	Frequency of Monitoring
XXXX	XXXX	XXXX	To be negotiated- will depend on the individual storage structure volume. This will deal with stratification – depth profiles and be appropriate to in situ quality characteristics.	Quarterly

W17 In the event that waters storages defined in Table 5 exceed the contaminant limits defined in Table 6, the holder of the environmental authority must implement measures, where practicable, to prevent access to waters by all livestock.

Table 6 (Onsite Water Storage Contaminant Limits)

Quality Characteristic	Test Value	Contaminant Limit
pH (pH unit)	Range	Greater than 4, less than 9 ²
EC (µS/cm)	Maximum	5970 ¹
Sulphate (mg/L)	Maximum	1000 ¹
Fluoride (mg/L)	Maximum	2 ¹
Aluminium (mg/L)	Maximum	5 ¹
Arsenic (mg/L)	Maximum	0.5 ¹
Cadmium (mg/L)	Maximum	0.01 ¹
Cobalt (mg/L)	Maximum	1 ¹
Copper (mg/L)	Maximum	1 ¹
Lead (mg/L)	Maximum	0.1 ¹
Nickel (mg/L)	Maximum	1 ¹
Zinc (mg/L)	Maximum	20 ¹

Note:

¹ Contaminant limit based on ANZECC & ARMCANZ (2000) stock water quality guidelines.

² Page 4.2-15 of ANZECC & ARMCANZ (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".

Note: Total measurements (unfiltered) must be taken and analysed

Receiving Environment Monitoring and Contaminant Trigger Levels

W18 The quality of the receiving waters must be monitored at the locations specified in Table 8 for each quality characteristic and at the monitoring frequency stated in Table 7.

Table 7 (Receiving Waters Contaminant Trigger Levels)

Quality Characteristic	Trigger Level	Monitoring Frequency	Comments
pH	6.5 – 8.0	Daily during the release	See Table 2 comments
Electrical Conductivity (µS/cm)	1000		
Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.		
Sulphate (SO ₄ ²⁻) (mg/L)	250 (Protection of drinking water Environmental Value) OR 1000 (Protection of irrigation environmental value)		

Table 8 (Receiving Water Upstream Background Sites and Down Stream Monitoring Points)

EXPLANATORY NOTES – Selection of monitoring sites:

The intent here is that that each discharge point has both an upstream and downstream monitoring point associated with it. These monitoring points should be located as close as practicable to the release point and the distances should be defined in the footnotes in Table 8. The location of flow monitoring points should also be considered in selecting upstream monitoring points. Other considerations include accessibility, particularly during wet weather conditions.

Monitoring Points	Receiving Waters Location Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)
Upstream Background Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Downstream Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX

Notes:

- a) The upstream monitoring point should be within Xkm the release point.
- b) the downstream point should not be greater than Xm from the release point.
- c) The data from background monitoring points must not be used where they are affected by releases from other mines.

W19 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table 7 during a release event the environmental authority holder must compare the down stream results to the upstream results in the receiving waters and:

1. where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or

2. where the down stream results exceed the upstream results complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W19 2(ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

EXPLANATORY NOTES – Designing a REMP:

The intent here is that the REMP will be designed for specific requirements of the mine's releases and the receiving environment. The monitoring within the REMP should not be the primary basis for compliance but will be essential for providing supporting information when incidents may occur or for deriving future license limits. The focus should also be on reporting against water quality objectives for relevant waterways affected by the discharge and be on a longer term basis compared to compliance reporting. The intent is that the REMP is to provide condition assessment of near-field areas, ie. local areas likely to be significantly affected by the mine's releases. To do this, it is necessary that monitoring data is collected during times of natural flow outside of times of release in addition to time of release. The REMP is likely to include monitoring sites and indicators in addition to what is presented in the tables of these conditions. The intent is that far-field areas and cumulative impacts will be monitored as part of regional monitoring described in Condition W43 and assist in providing regional condition assessment and regionally specific reference information.

W20 A REMP must be developed and implemented by XX/XX/XXXX (WITHIN 3 MONTHS OF THE DATE OF ISSUE) to monitor and record the effects of the release of contaminants on the receiving environment periodically and whilst contaminants are being discharged from the site, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water. A copy of the REMP must be provided to the administering authority prior to its implementation and due consideration given to any comments made on the REMP by the administering authority.

For the purposes of the REMP, the receiving environment is the waters of the XX and connected waterways within XX (e.g. Xkm) downstream of the release.

W21 The REMP must address (but not necessarily be limited to) the following:

- a) Description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and
- b) Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the Environmental Protection (Water) Policy 1997); and
- c) Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed; and
- d) Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.
- e) Monitoring for any potential adverse environmental impacts caused by the release;
- f) Monitoring of stream flow and hydrology;
- g) Monitoring of toxicants should consider the indicators specified in Table 3 to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC & ARMCANZ 2000 guidelines for slightly to moderately disturbed ecosystems;
- h) Monitoring of physical chemical parameters as a minimum those specified in Table 2 (in addition to dissolved oxygen saturation and temperature);
- i) Monitoring biological indicators (for macroinvertebrates in accordance with the AusRivas methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;

- j) The locations of monitoring points (including the locations specified in Table 8 which are background and downstream impacted sites for each release point);
- k) The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within 2 years (depending on wet season flows) in accordance with the *Queensland Water Quality Guidelines 2006*. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;
- l) Specify sampling and analysis methods and quality assurance and control;
- m) Any historical datasets to be relied upon;
- n) Description of the statistical basis on which conclusions are drawn, and
- o) Any spatial and temporal controls to exclude potential confounding factors.

W22 A report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with conditions W20 must be prepared and submitted in writing to the administering authority by 1 October 2011. This should include an assessment of background water quality, any assimilative capacity for those contaminants monitored and the suitability of current discharge limits to protect downstream environment values.

Water Reuse

W23 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying stock water to properties directly adjoining properties owned by the environmental authority holder or a third party and subject to compliance with the quality release limits specified in Table 9.

Table 9 (Stock Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	5000

W24 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying irrigation water to properties directly adjoining properties owned by the environmental authority holder or a third party and subject to compliance with quality release limits in Table 10.

Table 10 (Irrigation Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	Site specific value to be determined in accordance with ANZECC & ARMCANZ (2000) Irrigation Guidelines

W25 Water contaminated by mining activity may be piped or trucked off the mining lease for the purpose of supplying water to a third party for purpose of construction and/or road maintenance in accordance with the conditions of this environmental authority.

W26 Water contaminated by mining activity may be piped or trucked for the purpose of supplying water to <name adjoining mine> in accordance with the conditions of this environmental authority. The volume, pH and electrical conductivity of water transferred to {name adjoining mine} must be monitored and recorded.

W27 If the responsibility of water contaminated by mining activities (the water) is given or transferred to another person in accordance with conditions **W23, W24, W25 or W26:**

- a) the responsibility of the water must only be given or transferred in accordance with a written agreement (the third party agreement); and

- b) include in the third party agreement a commitment from the person utilising the water to use water in such a way as to prevent environmental harm or public health incidences and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters.

Water General

W28 All determinations of water quality must be:

- a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
- b) made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual;

Note: Condition W28 requires the Water Quality Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.

- c) collected from the monitoring locations identified within this environmental authority, within XX hour of each other where possible; and
- d) carried out on representative samples.
- e) **laboratory testing must be undertaken using a laboratory accredited (e.g. NATA) for the method of analysis being used.**

W29 The release of contaminants directly or indirectly to waters:

- a) must not produce any visible discolouration of receiving waters; nor
- b) must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual Water Monitoring Reporting

W30 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:

- a) the date on which the sample was taken;
- b) the time at which the sample was taken;
- c) the monitoring point at which the sample was taken;
- d) the measured or estimated daily quantity of the contaminants released from all release points;
- e) the release flow rate at the time of sampling for each release point;
- f) the results of all monitoring and details of any exceedences with the conditions of this environmental authority; and
- g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with waterways

W31 Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Water *Guideline - Activities in a Watercourse, Lake or Spring associated with Mining Activities*.

Water Management Plan

W32 A Water Management Plan must be developed and implemented by **XX/XX/XXXX (WITHIN 3 MONTHS OF THE DATE OF ISSUE)** that provides for the proper and effective management of the actual and potential environmental impacts resulting from the mining activity and to ensure compliance with the conditions of this environmental authority.

W33 The Water Management Plan must be developed in accordance with DERM Guideline for Preparing a Water Management Plan 2009 **(to be developed by 1 October)** or any updates that become available from time to time and must include at least the following components:

- a) Contaminant Source Study;
- b) Site Water Balance and Model;
- c) Water Management System;
- d) Saline Drainage Prevention and Management Measures;
- e) Acid Rock Drainage Prevention and Management Measures (if applicable);
- f) Emergency and Contingency Planning;
- g) Monitoring and Review.

W34 Each year the holder of the environmental authority must undertake a review of the Water Management Plan prior to the wet season (i.e. by 1 November) and a further review following the wet season (i.e. by 1 May the following year) to ensure that proper and effective measures, practices or procedures are in place so that the mine is operated in accordance with the conditions of this environmental authority and that environmental harm is prevented or minimised.

W35 A copy of the Water Management Plan and/or a review of the Water Management Plan must be provided to the administering authority on request.

Saline Drainage

W36 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

W37 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water sediment controls

W38 An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of storm water.

W39 The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any receiving waters.

W40 Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters.

All Dams

EXPLANATORY NOTES – Dam conditions:

Note: Conditions W41 and W42 to be removed if already conditioned in the authority.

W41 The hazard category of each dam must be determined by a suitably qualified and experienced person at least once in each two year period.

W42 Dams having a hazard category determined to be significant or high, must be specifically authorised by an environmental authority.

Fitzroy River Basin Study

W43 The administering authority and the holder of this environmental authority both acknowledge that the conditions for release of contaminants to the XX River in this environmental authority have been calculated without the benefit of the findings of projects proposed to be undertaken as per recommendations 2 and 3 of the *Study of cumulative impacts on water quality of mining activities in the Fitzroy River Basin* (April 2009). The administering authority may, based on the information provided in the study report when it becomes available, all relevant information available at the time and the regulatory framework applicable at that time, consult with the holder of this environmental authority about the conditions in the environmental authority concerning the treatment and disposal of waste water.

The aim of the consultation shall be the meaningful review of the contaminant release limits imposed in this authority having regard to:

- a) the study results;
- b) near field monitoring results;
- c) QLD Water Quality Guidelines; and
- d) best practice environmental management.

If this review leads to a change in the requirements on this environmental authority holder, this shall be advanced by way of an authority amendment or a Transitional Environmental Program and as is necessary or desirable.

Definitions:

"20th percentile flow" means the 20th percentile of all daily flow measurements (or estimations) of daily flow over a 10 year period for a particular site. The 20th percentile calculation should only include days where flow has been measured (or estimated), i.e. not dry weather days.

"acid rock drainage" means any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining activity.

"administering authority" means the Department of Environment and Resource Management or its successor.

"appropriately qualified person" means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods or literature.

"dam" means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. However; a dam does *not* mean a fabricated or manufactured tank or container designed to a recognised standard, *nor* does a dam mean a land-based structure where that structure is designed to an Australian Standard. In case there is any doubt, a levee (dyke or bund) is a dam, but (for example) a bund designed for spill containment to AS1940 is *not* a dam.

"environmental authority" means an environmental authority granted in relation to an environmentally relevant activity under the *Environmental Protection Act 1994*.

"environmental authority holder" means the holder of this environmental authority.

"flowable substance" means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

"hazard" in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

"hazard category" means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 2.0, 2009) published by the Environmental Protection Agency on its website.

"natural flow" means the flow of water through waters caused by nature.

"receiving environment" means all groundwater, surface water, land, and sediments that are not disturbed areas authorised by this environmental authority.

"receiving waters" means all groundwater and surface water that are not disturbed areas authorised by this environmental authority.

"representative" means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

"saline drainage" The movement of waters, contaminated with salt(s), as a result of the mining activity.

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, and groundwater and any part thereof.

MFB-05-02 - Environmental Protection Regulation 2008

This document can be found at:

<http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/E/EnvProtR08.pdf>

Report to Queensland Premier

Review of the Fitzroy River Water Quality Issues

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In collaboration with
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November 2008



Acknowledgements

I am most grateful for the excellent cooperation and speedy responses to my many questions and requests from all involved in this review. My particular thanks to DNRW Rockhampton (Ed Donohue and his team) and Ensham Resources (Colin Moffett) for their assistance.

Also I am most grateful to Graeme Milligan and Ed Donohue (DNRW), Lindsay Delzoppo (EPA) and Alex Beavers (Premiers) for their assistance as my 'Steering Committee'.

Headline Findings

1. The decision by the EPA to issue Ensham with a Transitional Environmental Program (TEP) that permitted the discharge of a very large quantity of mine-affected water into the Nogoia-Mackenzie-Fitzroy River system over 7 months (February to September) in 2008 was justifiable.
2. However, this discharge has resulted in:
 - discomfort to the residents of Tieri, Blackwater, Bluff, Middlemount and Dysart due to the poor drinking water quality, but no serious health effects (short or long term),
 - potential discomfort to the residents of Rockhampton due to poor drinking water quality if the system is not flushed this wet season,
 - unquantified effects on the riverine biota, and a high likelihood that there will be serious adverse effects on the spawning success of Fitzroy Golden Perch when the poor quality water (high salinity) is flushed out of the river during the early part of the wet season, exactly the time when this species spawns,
 - no serious short or long term problems for agriculture (irrigation, stock watering),
 - Stanwell Power Station needing to make a range of plant modifications and gain an EPA-approved TEP relating to management of its water discharges.
3. The review has identified issues with the EPA's processes for developing the discharge licence (TEP) to Ensham, particularly limited involvement of key stakeholders, a lack of transparency, and poor communications with key stakeholders and the community during the response to this issue.
4. In the longer term there is a need to strengthen EPA's processes for establishing Environmental Authorities and Transitional Environmental Program (TEP) under the Environmental Protection Act 1994.
5. A number of management actions have been identified that should be implemented immediately to reduce the severity of the drinking water quality problems being experienced by residents Tieri, Blackwater, Bluff, Middlemount and Dysart. But flushing of the mine-affected water from system will only occur during the coming wet season.
6. The available management options are all severely constrained by the current Fitzroy Water Resource Plan (and operational rules), which has virtually all the water in Fairbairn Dam allocated to consumptive uses and no contingency allocation owned by the State. These and other anomalies should be addressed during the 10-yearly review of this plan currently underway.
7. The review identified an urgent need for Government to appoint a 'lead agency' to be the responsible 'caretaker' of river health in the Fitzroy catchment, and for this agency to develop a 'catchment management plan' and a coordinated monitoring and assessment program for the Fitzroy catchment.
8. Government needs to develop a set of Emergency Response Principles relevant to the mining industry to be applied in future situations, such as the current Ensham emergency. These principles would include the need to: identify a lead agency, undertake a risk assessment, coordinate key agencies, develop an action plan, develop a communications plan, and identify a key spokesperson.

Executive Summary

This report contains a review of the current situation regarding water quality in the Fitzroy River resulting from the discharge of 138 Gigalitres of mine-affected floodwater from the Ensham Resources Pty Ltd (Ensham) coal mine located near Emerald in Central Queensland.

The Terms of Reference (ToR) for this review are to advise the Queensland Premier on:

- any short and long-term risks to human health, aquatic ecology, agriculture and industry that could result from the mine-affected floodwaters discharged from the Ensham coal mine, and how these should be managed,
- the scope of the water quality and biological monitoring program to be undertaken by the EPA to assess the potential impacts of the mine-affected floodwater discharge from Ensham coal mine,
- any changes that might be made to conditions of Environmental Authorities (for mining activities) and associated statutory documents under the *Environmental Protection Act 1994* in order to ensure that the impacts of discharges of mine-affected waters in Central Queensland are appropriately managed and monitored,
- any other matters that might be of relevance to this issue.

This review has focused on the risks from the mine-affected water discharge from Ensham. It is recognised that there are a number of other issues relating to coal mining in the Fitzroy Catchment that are of concern to community groups, but these are not covered in this Report.

The main conclusions and recommendations of this review are listed below.

Risks to human health, aquatic ecology, agriculture and industry

Human health

Blackwater, Bluff, Tieri, Middlemount and Dysart

There is no evidence of any serious health problems in the above townships due to the elevated sodium levels in their drinking water supply. However, it is possible that the poor quality water did increase the effects of a viral gastroenteritis outbreak in the region in late August 2008.

There is considerable evidence that the residents have been adversely affected by the poor taste of their drinking water supply.

Additional major concerns are that: (a) downstream drinking water supplies appear not to have been considered by the EPA in issuing the TEP, (b) neither the Central Highlands Regional Council, Queensland Health nor the residents were informed of the impending problems early enough, and (c) media reports indicate significant community concern about this issue, a lack of trust in Government to fix the issue, and resentment with Ensham.

Rockhampton

It seems unlikely that any serious health problems will arise as a result of the current (October 2008) increased salinity and sodium concentrations in Rockhampton's drinking water supply. These concentrations are likely to increase further during November (and even December if there is a lack of rain), but provided medical practitioners and the small number of vulnerable people are well informed, and there is access to bottle water, serious health problems are unlikely to occur.

It is quite possible that Rockhampton Regional Council will experience a large increase in complaints about the poor taste of the drinking water, at least until the Fitzroy Barrage is fully flushed.

If Rockhampton's water supply decreases further in quality, problems are also expected at the Rockhampton Hospital and its Dialysis Clinics and Home Dialysis service.

There is a real possibility that blue-green algal blooms will occur in the Fitzroy Barrage in the next month or so, given that water in the Barrage is considerably clearer than normal. However, the Rockhampton Regional Council are aware of this possibility and have contingency measures in place to minimise any risks to human health from blue-green algal toxins in drinking water supplies.

Additional concerns are that: (a) downstream drinking water supplies for the major population centre of Rockhampton appear not to have been considered by the EPA in issuing the TEP, (b) neither the Rockhampton Regional Council, Queensland Health nor the residents were informed of the situation early enough, and (c) media reports indicate significant community concern about this issue, a lack of trust in Government to fix the issue, and resentment with Ensham.

Aquatic biota

Review of the possible effects on river health has been hampered by a dearth of relevant information.

It is clear that there have not been any catastrophic effects (e.g. major fish kills) on the fish population in the Nogoia-Mackenzie-Fitzroy River system during the time the Ensham mine-affected discharge occurred. This is consistent with the available evidence suggesting that most Australian adult fish species are relatively tolerant of increased salinity, and unlikely to be adversely affected by salinities up to around 1,500 $\mu\text{S}/\text{cm}$.

However, this is not true for the effects of increased salinity on the early life stages of fish (e.g. survival of eggs and larvae), where the small amount of available evidence suggests that salinities of 1,000-1,500 $\mu\text{S}/\text{cm}$ are likely to cause adverse effects.

It seems quite possible that this coming wet season could result in serious adverse effects on the spawning success of Fitzroy Golden Perch because of the poor quality water (high salinity) that will be flushed out of the river during the early part of the wet season, exactly the time when this species spawns.

The results of a study by Biosecurity Queensland indicated that catfish sampled from Bedford and Tartru Weirs were in poor health. However, it was not possible to relate these back to the mine-affected water discharged to the river system.

There is no evidence of adverse effects on the aquatic biota due to heavy metals in the mine-affected water.

The available information on the sensitivity of macroinvertebrates to increased salinity levels suggests that adverse effects are unlikely to occur at levels below around 1,000 mS/cm . However, this level is based on data that mostly relate to short-term studies, and not to continual exposure over a 7-8 month period. Advice has been obtained suggesting that a rapid rise in salinity to levels of 1,000-1,500 $\mu\text{S}/\text{cm}$ would adversely affect macroinvertebrate communities (particularly mayflies), given the quite low salinity (200-300 $\mu\text{S}/\text{cm}$) they normally experience.

There is insufficient information available to make an assessment of potential adverse effect on other biota, such as frogs, platypus and turtles.

Again there is insufficient information available to assess whether the increased clarity of the water in the river system as a result of the mine-affected discharge, has resulted in major changes to the aquatic ecology, including increased algal production, increased predation and changes to important food webs (i.e. what eats what).

The response of relevant Government agencies to assessing the possible impacts of the mine-affected water on the riverine biota has been tardy to say the least. The EPA is currently (November 2008) coordinating a comprehensive monitoring and assessment program (water quality, sediments and biota) to determine if there have been adverse effects in the Fitzroy River system due to the mine-affected water.

Agriculture

It is unlikely that the Ensham mine-affected water has or will caused any major problems for agriculture.

Industry

Coal industry

The coal industry is the major industrial user of water in the Fitzroy catchment. Water is used for coal processing, dust suppression, in underground operations and in industrial areas. It is unlikely that water with conductivities to around 1,500 uS/cm would cause any major problems to the coal industry. However, there is evidence that an increase in raw water salinity can lead to increased maintenance costs.

Stanwell Power Station

The mine-affected water has had no impact on electricity generation activities to date. Additionally, Stanwell Power Station expects to be able to handle likely salinity increases in their raw water over the next month or so, and do not expect any impact on electricity generation.

Options available to manage these risks

A number of sensible and feasible management options have been identified by the Technical Working Group (TWG) to address the current water quality problems in the Nogoia-Mackenzie-Fitzroy system. If implemented these management actions will have some positive effect on both

drinking water quality and river health, and will show to the community that Government is serious about this issue and prepared to do something positive about it.

However, the ultimate flushing of the mine-affected water currently in the Fitzroy system will only occur with the large flows normally expected in the wet season (December-March).

It should be noted that all the management options currently being considered to alleviate the current water quality problems are restricted to a very large extent by the water use rules (ROP) for the Nogoa-Mackenzie River system, rules that appear to be largely dictated by agricultural and industrial use of the water. These rules may need to be modified in the future to consider other legitimate users of water, such as the environment and townships, and the possible need for a State-owned contingency licence to a certain proportion of the water in Fairbairn Dam.

Option A (to address some of the issues in Bedford and Bingeang Weirs) should be implemented as soon as possible, given the time (approx. 3 weeks) for water to get from Fairbairn Dam to dilute that in Bedford Weir. Implementation of this Option would have community support in that the Government would be seen to be doing something positive.

Further, it is recommended that the Central Highland Regional Council establish a Task Force to develop a contingency plan for addressing the drinking water quality issue for Blackwater, Bluff, Tieri, Middlemount and Dysart should the Bedford and Bingeang Weirs not be adequately flushed during this coming wet season.

Option C (to address water quality issues in Eden Bann Weir and the Fitzroy Barrage) should be implemented as soon as possible.

Additionally, a contingency plan should be developed by DNRW during November to handle the possibilities that: (a) additional mine-affected water will be flushed into this system from the Isaac/Connors system, and (b) that the expected normal wet season flows will not occur and the dilution and flushing of mine-affected water from Eden Bann Weir and the Fitzroy Barrage does not occur.

An emergency water management plan should be developed by DNRW during November 2008 to improve water quality in the Nogoa-Mackenzie-Fitzroy River system between the storages. This plan will need to be innovative and not constrained by the current restrictive ROP rules.

Review of the EPA-coordinated monitoring & assessment program

The response of relevant Government agencies to assessing the possible impacts of the mine-affected water on the riverine biota has been tardy, so much so that the Premier, in October 2008, directed the EPA to establish a whole-of-government monitoring program to assess the potential impacts of mine-affected floodwater discharged from the Ensham mine on the Nogoa-Mackenzie-Fitzroy River system.

A draft Project Plan (Fitzroy Basin Water Quality Monitoring: Assessing the impact of Ensham floodwater release, Version 1.0, 28 October 2008) to undertake a comprehensive study of the water quality, sediments and biota in the system has been developed.

This review provided comments to the EPA (29 October 2008) aimed at strengthening the program. A full assessment of the final monitoring and assessment program will be made in a separate report.

Because there is little baseline information available, this study will be challenged in determining if any short-term biological impacts have occurred due to the mine-affected water. For this reason, the study should continue for at least 2 years (3 wet-dry cycles) so that any recovery in the condition of the biota can be measured. The information on the system that will be collected during this time will also be vital in the development of a more comprehensive Fitzroy catchment-wide monitoring and assessment program.

Assessment of the Government actions to manage the Fitzroy water quality issue

This current water quality issue in the Nogoa-Mackenzie-Fitzroy River system arose as a result of an emergency situation caused by flooding of the Ensham coal mine in January 2008, the desire by Ensham and Government to get the mine back into production as rapidly as possible, and the decision by the EPA to grant Ensham a Transitional Environmental Program (TEP) to discharge a very large volume (138 GL) of mine-affected water into the Nogoa River.

Given all the factors, the decision by the EPA to issue Ensham with a Transitional Environmental Program for the mine-affected water was justifiable.

However, my assessment is that the EPA process for determining the Ensham TEP was less than adequate (for the reasons outlined in Section 3.4), and that EPA did not adequately consult with

key stakeholders in establishing the TEP, or inform the community generally about what was happening and what the possible effects could be. The whole process lacked transparency.

My assessment is that the EPA underestimated the scale of this emergency situation (discharge of a very large volume (138 GL) of mine-affected water over a period of 6-8 months to a river system that was largely not flowing), and as a result misjudged the community reaction to what was happening.

Adequacy of the current Government actions

Government actions since late August have been mixed in their responsiveness and effect. These are summarized in the main report.

The somewhat cynical community view of the current Government response to this issue is: (a) that the establishment of the TWG and my review are welcome initiatives but they will be too late to result in any management actions to solve the immediate problem, (b) that the Government is waiting for the wet season rains to 'solve' the problem, and (c) that nothing will be learned from this issue to change Government response processes.

While it is true that flushing of the mine-affected water currently in the Fitzroy system will really only occur with the large flows normally expected in the wet season (December-March), the management actions recommended in Section 5 of this report will have some positive effect on both drinking water quality and river health. If initiated, these management actions will show to the community that Government is serious about this issue and prepared to do something positive about it.

The establishment of the Fitzroy River Water Quality Technical Working Group (TWG) in September 2008 has been a very positive move. The TWG has significantly improved the level of knowledge and data sharing, and has provided a forum for sensible discussion about possible management actions.

The EPA-coordinated monitoring and assessment program is also a welcome initiative. However, as noted in the report this would not have been needed if adequate monitoring had been required as part of the Ensham TEP. Also, it is disappointing that it has taken until November for this to have been established when the issue was well appreciated as long ago as late August.

Change needed to manage the Fitzroy water quality situation going forward?

There appears to be little more the Government can do about this current water quality issue, assuming that decisions are made quickly to initiate the recommended management actions. However, this water quality issue has highlighted a number of broader issues that need to be addressed in the longer term.

TEP process

The most obvious is the deficiencies in the TEP process (lack of adequate consultations between the EPA and key stakeholders, lack of transparency in the process, poor communication with the key agencies and the community about the reality of the water quality issue and what could be done about it). Largely because of the poor communications, but also because of the lack of credible monitoring information, a range of 'conspiracy' theories arose and escalated the issue.

A review of the EPA procedures for developing TEPs has been recommended, with the results (a new set of guidelines) to be published on the EPA web site.

Monitoring and assessment

There are a number of monitoring programs being undertaken in the Fitzroy Basin (TWG Document), but it is clear they are largely focused on the specific responsibilities of particular agencies, are not well coordinated, and are not comprehensive.

This review has identified an urgent need for the establishment of comprehensive and well coordinated long-term monitoring and assessment program to assess the ecological health of the Fitzroy River system.

Fitzroy Water Resources Plan

The available options to manage this water quality issue are all severely constrained by the current Fitzroy Water Resource Plan (and operational rules), which has virtually all the water in Fairbairn Dam allocated to consumptive uses, and no contingency allocation owned by the State.

DNRW should consider a more equitable balancing of water between consumptive users and the environment, and the provision of State-owned contingency allocation, during the 10-yearly review of the Fitzroy Water Resource Plan that is currently underway and scheduled to be completed in late 2009.

Caretaker of river health

Another important issue that has been highlighted by the current water quality issue is there is no well-defined 'caretaker' of river health in the Fitzroy River catchment, with the legislative authority to adequately protect the aquatic environment. The EPA, DNRW and the Fitzroy Basin Association all appear to have some responsibilities in this regard.

Government should consider the appointment of a 'lead agency' to be the responsible 'caretaker' of river health in the Fitzroy catchment, and for this agency to develop a 'catchment management plan', and a coordinated catchment-wide monitoring and assessment program.

Emergency response

It is clear that the Government processes for addressing the current Ensham emergency could be improved. Given the climate change predictions of greater variability in climate over the next 30-50 years, it is certain that similar emergency situations will occur sometime in the future.

Government should develop a set of Emergency Response Principles relevant to the mining industry to be applied in future situations, such as the current Ensham emergency. The Emergency Response Principles should include the need to: identify a lead agency, undertake a risk assessment, coordinate key agencies, develop an action plan, develop a community communications plan, and identify a key spokesperson.

Recommendations

Transitional Environment Program Process

- Rec 1: that EPA undertake a review of the procedures used to develop TEPs and publish the results (a new set of guidelines) on the EPA web site. This review should consider the need for (a) criteria for prioritising the importance of the TEP, (b) undertaking a risk assessment to assist in developing the TEP, (c) a checklist that ensures that all beneficial uses of the receiving waterbody are explicitly considered, (d) a better process for identifying and including key stakeholders in the TEP process, (e) better processes for ensuring the quality of the TEPs developed (e.g. documenting the reasons for various decisions or judgements), and (f) a process for informing the community of the situation associated with potentially controversial TEPs.
- Rec 2: that EPA introduce a process where they undertake random audits of the laboratories being used by mining companies for their ability to adequately sample, process and analyse water quality samples for heavy metals at trace concentrations.

Monitoring & assessment

- Rec 3: that EPA include the review comments in revising the draft Project Plan (Fitzroy Basin Water Quality Monitoring: Assessing the impact of Ensham floodwater release), and include a longer timeline for the study (at least 2 years - 3 wet-dry cycles) so that any recovery in the condition of the biota can be measured.
- Rec 4: that the EFAP surveys to be undertaken by DNRW this coming wet season are expanded to ensure that the effects of the flushing of higher salinity water on fish (and particularly Fitzroy Golden Perch) spawning and recruitment are measured and the implications for future years published.
- Rec 5: that the Biosecurity Queensland study of the 'health' of the fish in weirs be repeated, with other fish species and other storages included, and the study design improved.

Management Actions

- Rec 6: that Option A (to address some of the issues in Bedford and Bengegang Weirs) be implemented immediately, given the time for water to get from Fairbairn Dam to dilute that in Bedford Weir (3 weeks).
- Rec 7: that the Central Highland Regional Council establish a Task Force to develop a contingency plan for addressing the drinking water quality issue for Blackwater, Bluff, Tieri, Middlemount and Dysart should the Bedford and Bengegang Weirs not be adequately flushed during this coming wet season.
- Rec 8: that Option C (to address water quality issues in Eden Bann Weir and the Fitzroy Barrage) be implemented immediately.
- Rec 9: that a contingency plan be developed by DNRW during November to handle the possibilities that: (a) additional mine-affected water will be flushed into this system from the Isaac/Connors system, and (b) that the expected normal wet season flows will not

occur and the expected dilution and flushing of mine-affected water from Eden Bann Weir and the Fitzroy Barrage do not occur.

- Rec 10: that an emergency water management plan be developed during November 2008 to improve water quality in the Nogoa-Mackenzie-Fitzroy River system between the storages. This plan will need to be innovative and not constrained by the current restrictive ROP rules.

Fitzroy Water Resource Plan

- Rec 11: that DNRW consider a more equitable balancing of water between consumptive users and the environment, and the provision of State-owned contingency allocation, during the 10-yearly review of the Fitzroy Water Resource Plan that is currently underway and scheduled to be completed in late 2009.

Caretaker of river health

- Rec 12: that Government consider the appointment of a 'lead agency' to be the responsible 'caretaker' of river health in the Fitzroy catchment, and for this agency to develop a 'catchment management plan', and a coordinated catchment-wide monitoring and assessment program.

Emergency response

- Rec 13: that Government develop a set of Emergency Response Principles relevant to the mining industry to be applied in future situations, such as the current Ensham emergency.

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1. Introduction

This Report contains a review of the current situation regarding water quality in the Fitzroy River resulting from the discharge of 138 Gigalitres (130,000 Megalitres or 138 billion litres) of floodwater from the Ensham Resources Pty Ltd (Ensham) coal mine located near Emerald in Central Queensland.

The terms of reference (ToR) for this review are to advise the Queensland Premier on:

- any short and long-term risks to human health, aquatic ecology, agriculture and industry that could result from the mine-affected floodwaters discharged from the Ensham coal mine, and how these should be managed,
- the scope of the water quality and biological monitoring program to be undertaken by the EPA to assess the potential impacts of the mine-affected floodwater discharge from Ensham coal mine,
- any changes that might be made to conditions of Environmental Authorities (for mining activities) and associated statutory documents under the *Environmental Protection Act 1994* in order to ensure that the impacts of discharges of mine-affected waters in Central Queensland are appropriately managed and monitored,
- any other matters that might be of relevance to this issue.

A visit to the region was made in the period 21-23 October 2008, during which time I inspected the Ensham mine site and travelled the length of the Mackenzie/Fitzroy River from Emerald to Rockhampton, had discussions with the Mayor's of the Central Highlands Regional Council and the Rockhampton Regional Council, and attended a meeting of the Fitzroy River Technical Working Group. Also meetings were held with EPA, DNRW and Ensham Resources in Brisbane on 11 November 2008. Additionally, a large number of reports and monitoring data have been reviewed. These are listed in the Reference section.

There are a number of other issues relating to coal mining in the Fitzroy Catchment that are of concern to community groups. These include the cumulative effect of waste discharges from the large number of mines in this catchment, mining on floodplains, mining under rivers, the effect of discharges of floodwater from mines other than Ensham, particularly those in the Isaac-Connors Catchment, and future controls on flood protection measures at Ensham and other mines on floodplains. These issues are not covered in this report, except to comment on the potential impact of mine-affected water currently in the Isaac-Connors system that will eventually be flushed into the lower Fitzroy River just above Tartrus Weir.

This review has identified seven major issues associated with the current water quality issue in the Fitzroy River system:

- the current risks to human health (drinking water), aquatic ecosystems, agriculture and industry as a result of the mine-affected water discharge that has now been in the Nogo-Mackenzie-Fitzroy River system for over 8 months (Section 4 of this report),
- the options available to manage these risks (Section 5),
- the conditions and decision-making processes associated with the discharge license (Transitional Environmental Program - TEP) issued to Ensham by the EPA (Section 3.4),

- the lack of adequate communication about the discharge and its possible consequences to key stakeholders and the community (Section 7),
- the lack of adequate monitoring (particularly biological) of the impacts of the mine-affected water in the system – a new monitoring program being coordinated by the EPA is addressed in Section 6 of this report,
- the lack of a ‘caretaker’ of river health and a ‘catchment management plan’ to guide the TEP process (Section 7),
- Government response to this emergency situation, and arrangements that need to be put in place to ensure that future emergencies in the mining industry are better handled (Section 7).

2. Background

Significant rainfall fell over much of the Bowen Basin area of Central Queensland in January 2008, resulted in major local flooding (BoM, 2008). In particular, the regional towns of Emerald, Moranbah and Mackay were flooded, as were a number of coal mines in the region.

The focus of this report is the Ensham coal mine, an open cut thermal mine located approximately 35 km east of Emerald, which was inundated by floodwaters from the Nogoia River when a levee bank overtopped and then failed on the 19 January 2008. A total of approximately 150 GL of floodwater entered the mine pits during this flood.

Ensham produces 8 - 9 million tonnes of coal per annum for the domestic and export Thermal Coal markets. The company is also responsible for the direct and in-direct employment of over 3,000 people in the Central Queensland Region, providing a significant annual contribution to the local, regional and Queensland State economy through employment and support services, royalties and use of numerous services.

Following the flooding events of January 2008, Ensham sought the necessary approvals required to remove the estimated 150,000 ML of mine-affected floodwater and to secure on-going flood protection for the mining operation in order to: protect the safety of the mine and its employees from further flooding, recover Ensham's capacity to supply customers and restore its economic contribution to Central Queensland, and to safeguard over 3,000 Queensland jobs.

The Environmental Protection Agency (EPA) provided authority for the discharge of the mine-affected floodwater through the issuance of a Transitional Environmental Program (TEP) under the *Environmental Protection Act 1994*. The TEP is covered more fully in Section 3.3.

It should also be noted that a number of other coal mines were flooded during January 2008, and discharged various volumes of mine-affected water into tributaries of the Fitzroy River system under TEP's or existing Environmental Authorities (EA) issued by the EPA.

Ensham discharged 138 GL of mine-affected floodwaters into the Nogoia-Mackenzie-Fitzroy River system over a 7-month period (February to September 2008). Details of the quality and quantity of the discharged water are provided in Section 3.2, and an assessment of the impacts of this mine-affected floodwater on downstream uses (drinking water, aquatic ecosystem, agriculture, industry) is contained in Section 4.

There has been intense community and media interest in the impacts of the mine-affected water in the Nogoa-Meckenzie-Fitzroy system, commencing around August 2008. The major concerns include:

- Health effect from the elevated sodium levels in drinking water supplied to Blackwater, Bluff and Tieri,
- The poor taste of drinking water supplied to Blackwater, Bluff and Tieri,
- Possible taste and health effects in Rockhampton's drinking water supply,
- Livestock refusing to drink water taken from the river,
- Disruption to Stanwell Power Station's operations due to higher salinity cooling water,
- Adverse effects on the aquatic biota, including fish, macroinvertebrates and turtles,
- The lack of information provided by authorities to the community,
- The EPA's processes in issuing a discharge licence to Ensham.

3. Current situation

3.1 The Fitzroy River system

The Fitzroy River catchment stretches from the Carnarvon Gorge National Park in the West to Rockhampton on the central Queensland coast, encompassing a largely sub-tropical and semi-arid region of Australia (Figure 1). The Fitzroy catchment, at nearly 150,000 km² in area, is the second largest in Australia after the Murray-Darling system.

Agriculture is the major land use in the catchment, with grazing the dominant use (90%) and smaller area of irrigated cotton and horticulture, dryland cropping, forestry, mining and conservation (Christensen and Rogers, 2006). Mining is dominated by coal (production 100 million tonnes/year), magnesite, nickel and historically gold and silver.

Rainfall occurs predominantly in the summer (December – March) and varies from around 800 mm/y at Rockhampton near the coast to around 516 mm/y at Emerald further inland. As a result most of the mean annual discharge of about 5,000 GL in the Fitzroy River occurs in the summer wet season. There are several large sub-catchments, including the Comet, Nogoa, MacKenzie, Connors, Isaac and Dawson contribute flows to the Fitzroy. Many of the streams in the Fitzroy catchment are ephemeral and only flow during the wet season.

The coal-rich Bowen Basin underlays a considerable proportion of the Fitzroy catchment. In total there are 37 existing coal mines in the catchment with a further 17 new mines proposed.

The major rivers that make up the Fitzroy River system include the Nogoa, Mackenzie, Dawson, Isaacs and Connors Rivers (see Figure 1).

This report focuses on the Nogoa-Mackenzie-Fitzroy Rivers, the part of the system affected by the Ensham discharge¹. This stretch of the river is highly

¹ As well as discharge of flood waters from other mining operations into the tributaries of the Fitzroy River, following those same flood events, and in February and March overland flows that occurred during the flood events of early 2008.

regulated, with one major reservoir (Fairbairn), four weirs (Bedford, Bingegang, Tarrus, Eden Bann) and a large Barrage (at Rockhampton) all built on the river (see Figure 2 for a schematic diagram of the system). These reservoirs and weirs can hold a total of 1,660 GL when at full supply level, with Fairbairn Dam by far the largest holding around 90% of the total (Data from DNRW Rockhampton).



Figure 1: Map of the Fitzroy catchment showing the Ensham mine, major towns, major river systems, reservoirs and weirs, and roads

Flow in the Fitzroy River is very seasonal, with most of the flow occurring during the wet season from December to March. Figure 3 shows the monthly mean and median flows in the Fitzroy River at Riverslea. Comparison of these data shows that, while the general picture is of most flow during the wet, this can vary significantly

depending upon the particular year. Additionally, large flows can also occur at other times of the year.

Interestingly, the total storage (1,660 GL) in the Nogoia-Mackenzie-Fitzroy system is close to the total median annual flow (1,151 GL) and about one third the total mean annual flow (4,737 GL) in the system. However, maximum annual flows in this system are over an order of magnitude greater than the mean annual flow.

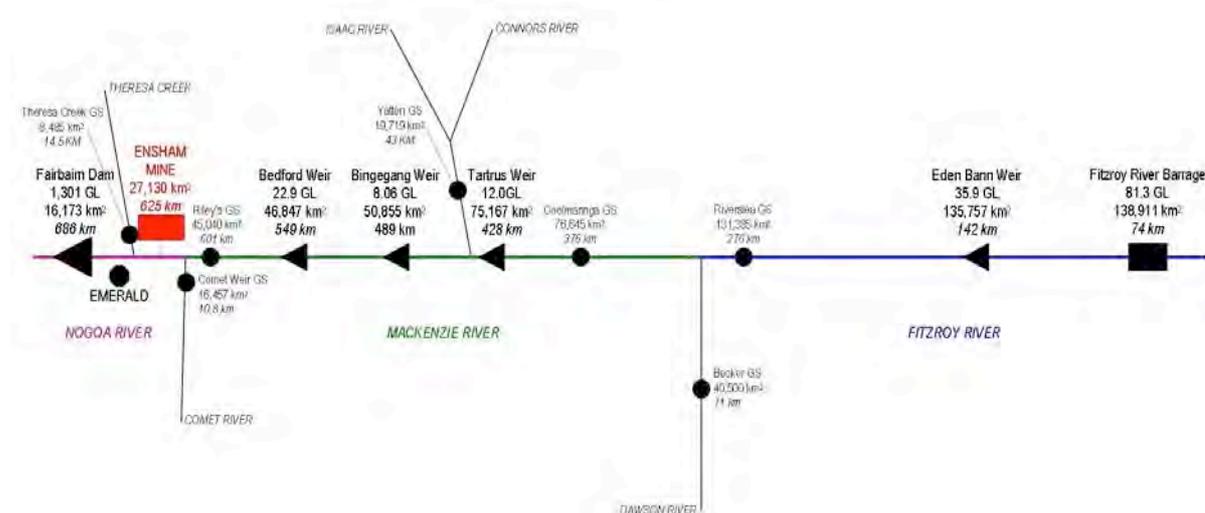


Figure 2: Schematic of the Nogoia-Mackenzie-Fitzroy river system, showing the location and full supply level volume of all weirs and reservoirs

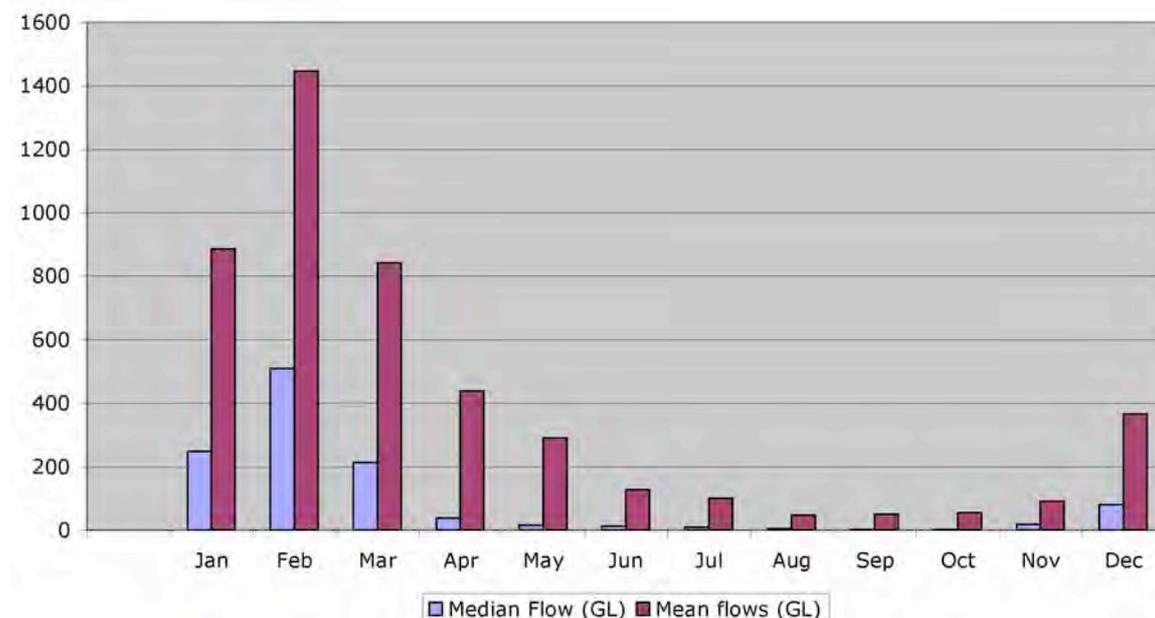


Figure 3: Long term mean and median monthly flows (Gigalitre – GL) in the Fitzroy River at Riverslea

3.2 Quality of the mine-affected water

A total of 138 GL of mine-affected water was discharged to the Nogoia River from the flooded pits over a period of around 7 months (Table 1). The floodwater was in the pits for around 16 days before discharge commenced from Pit B on 3 February 2008,

and during this time (and subsequently) it dissolved a quantity of salts, largely from the overburden². Little of the coal seam was exposed to the floodwaters, a fact that is important regarding the quality of the mine-affected water eventually discharged.

Ensham have monitored the quality of the pit water since the flooding occurred. Table 2 provides a summary of the changes in quality over the period 11 June to 11 September 2008 for Pit B and Pits C & D. Figure 4 provides a map of the Ensham mine site showing the location of the pits, discharge points and monitoring sites.

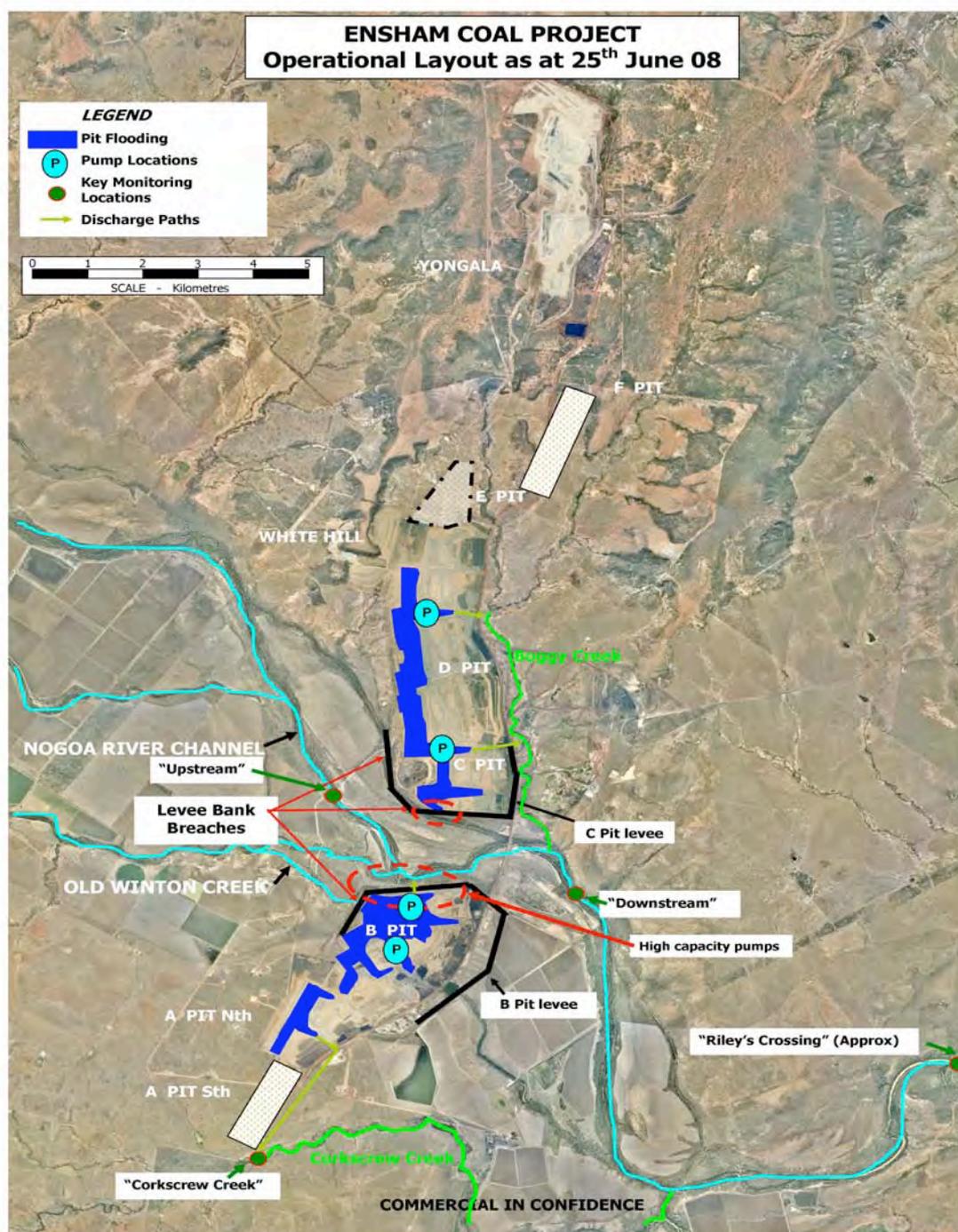


Figure 4: Map of the Ensham mine site showing the location of the pits, discharge points and monitoring sites

² The overburden consists mainly of sandstones and siltstones.

The composition of the dissolved salts is largely sodium chloride (ca. 60%), with smaller amounts of sodium, calcium and magnesium sulfates and bicarbonates, and low concentrations of heavy metals (Table 2). It is also important to note that the high pH (around 8), relatively low sulfate concentration and low heavy metal concentrations are evidence that acid mine drainage, often associated with coal and base metal mines, was not a major issue at Ensham.

A limited review³ of the sampling, treatment and analysis of water samples for heavy metals was undertaken. This revealed a number of issues with the procedures used for filterable or dissolved heavy metals (e.g. samples not filtered and acidified in the field, but in the laboratory; filters were not acid washed; analytical result for ultrapure water and acid blanks not provided; calibration curves appear to be inappropriate for trace level analysis; quality assurance results not reported), so that all filterable metal concentrations must be treated as questionable.

The EPA adequately specified in the TEP(s) issued to Ensham that sampling, processing and analysis should follow procedures outlined in the Queensland EPA Water Quality Sampling and Monitoring Manual, and that the samples should be taken by an appropriately trained person. Equally, Ensham engaged consultants that had the required accreditation (e.g. NATA accredited laboratories) to do this work. However, despite all this it appears that some essential procedures were not followed.

It is recommended that EPA introduce a process where they undertake random audits of the laboratories being used by mining companies for their ability to adequately sample, process and analyse water quality samples for filterable (dissolved) heavy metals at trace concentrations.

The mine-affected pit water was discharged into the Nogoia River over a 7-month period, when the river flow was very low, and there was limited capacity for dilution to occur. Figure 5 is a graph of the flow in the Nogoia River over the period January 2008 to October 2008, measured at Riley's Crossing downstream of the mine. The discharge from Ensham is also shown (in red), and obviously makes up most of the river flow during the period April to early September 2008⁴.

Table 1: Volumes of mine-affected water discharged from the Ensham mine

Location	Duration of discharge (2008)	Total volume discharged (GL)
Pit A	7 June – 9 September	8.7
Pit B	3 February – 2 September	58.1
Pits C & D	2 May – 9 September	71.4
Total	3 February – 9 September	138.3

³ Through Ensham I asked a series of questions of the laboratory to ascertain the procedures used.

⁴ The discrepancy between the volume pumped from the flooded mine and the actual flow probably represents extraction of water from the river by downstream farmers.

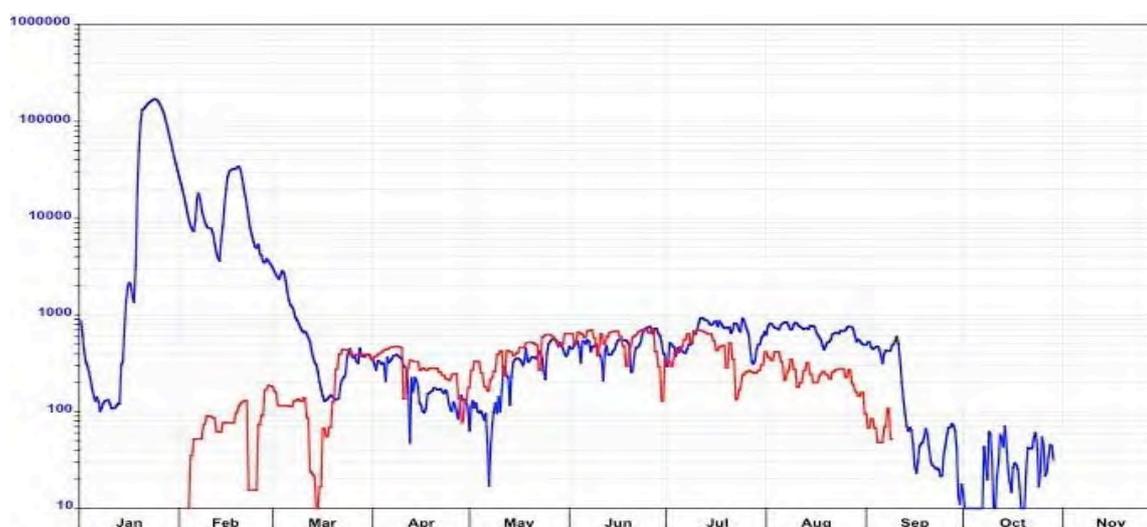


Figure 5: Flow (ML/day) in the Nogoia River over the period January 2008 to October 2008, with the discharge from Ensham also shown (in red)

Table 2: Quality of the Ensham pit water

Parameter	Units	Pit B*				Pit C&D**			
		11-Jun	8-Jul	10-Aug	11-Sep	11-Jun	8-Jul	10-Aug	11-Sep
Conductivity	uS/cm	2460	2780	3780	5320	1120	2020	5220	7660
pH		7.9	7.9	8	7.5	7.9	8.4	7.6	7.4
Turbidity	NTU	7	15	22	10	23	25	14	10
Na	mg/L	412	498	608	920	170	356	900	1390
Ca	mg/L	62	81	93	140	20	40	118	172
Mg	mg/L	62	70	88	138	17	42	126	192
Cl	mg/L	387	450	238	995	177	380	1180	1890
SO ₄	mg/L	409	464	315	820	90	197	579	886
HCO ₃	mg/L	309	182	198	567	146	232	490	604
Heavy metals***									
Aluminium	ug/L	120	280	50	80	450	180	30	90
Arsenic	ug/L	<1	1	1	3	5	5	3	4
Cadmium	ug/L	0.3	0.4	0.3	0.2	<0.1	0.5	0.4	0.4
Chromium	ug/L	<1	<1	<1	<1	1	<1	2	<1
Copper	ug/L	2	4	2	2	3	4	4	3
Lead	ug/L	<1	2	<1	1	<1	2	<1	2
Mercury	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	ug/L	10	10	10	9	15	18	19	15
Nickel	ug/L	3	5	4	6	2	2	5	7
Selenium	ug/L	<10	<10	<10	<10	<10	<10	<10	<10
Uranium	ug/L	4	5	6	6	2	4	9	8
Zinc	ug/L	<5	12	8	12	<5	15	12	13

* Pit B, Ramp 24; ** Pits C&D, Ramp 6, *** Total (unfiltered) heavy metal concentrations reported. The analytical methods used to obtain the filterable (dissolved) heavy metal concentrations are questionable (see text).

To ensure that water discharge approval specifications were met, Ensham purchased sufficient 'Seasonal Water Allocation' from water allocation holders, to dilute the floodwater discharged from the mine. The appropriate dilution of the floodwater discharge was then obtained by controlling the daily release rate of the 69.3 ML of purchased water, with the pumping rate of the mine floodwater discharge. This Fairbairn Dam water was released over the period 19 June to 8 September 2008. Twice daily sampling at the Ensham 'Upstream' and 'Downstream' monitoring points was used to provide control, monitoring and reporting of this process.

In terms of loads of salt added to the River system, I have estimated that the entire release from Ensham contributed around 100,000 tonne of salt to the system⁵. This compares with a load of around 184,000 tonne⁶ transported in an average year by the Nogoia River and 850,000 tonne⁷ transported by the Fitzroy system. Thus, the discharged load from the mine represented an additional 55% over that transported annually by the Nogoia River. However, this statistic under-represents the magnitude of the actual change in the Nogoia River during 2008, since the discharge occurred during the dry season when there was little natural flow (and hence little salt transport) in this river.

3.3 Quality of the river water

Table 3 provides a summary of the water quality in the Nogoia-Mackenzie-Fitzroy system over the period July to October 2008, as illustrated by the quality of water in Bedford and Tarrus Weirs. These data were supplied by Ensham.

As expected, the conductivity and major ions are all elevated, the turbidity is low (water clear) and the pH is elevated (possibly because of high algal productivity). The heavy metal concentrations are all very low and all (except aluminium) are below the ANZECC (2000) trigger levels for 95% ecosystem protection.

Monitoring of the conductivity (salinity) in the river system over the discharge period shows that the mine-affected water is moving very slowly through the system as a 'slug' of poor quality water of around 400 km in length. Figure 7 shows the progress of the mine-affected water through the Nogoia-Mackenzie-Fitzroy system between June and October 2008. The downstream extent of the slug is currently (end of October 2008) the Rockhampton Barrage.

It is significant that the volume of mine-affected water discharged from the Ensham mine (138 GL) is almost the same as the volume of water (117 GL) estimated to be present in the Nogoia-Mackenzie-Fitzroy system during the dry season (Data from DNRW Rockhampton)⁸.

⁵ Assume average concentration 720 mg/L (1,200 uS/cm) and a volume of 138 GL.

⁶ Assume average concentration 180 mg/L (300 uS/cm) and an annual average volume of 1020 GL at Riley's Crossing.

⁷ Assume average concentration 180 mg/L (300 uS/cm) and an annual average volume of 4,700 GL at Riverslea.

⁸ Assumes all weirs and Barrage are at full supply level.

Table 3: Quality of the river water in Bedford and Tartrus Weirs

Parameter	Units	Bedford Weir*				Tartrus Weir**		ANZECC***
		7-Jul	9-Aug	11-Sep	1-Oct	11-Sep	1-Oct	
Conductivity	uS/cm	1250	980	1190	1060	1190	1060	20-250
pH		8.9	8.1	9.0	8.4	9.0	8.9	6.0-8.0
Turbidity	NTU	7.2	53	7.4	9.2	6.3	7.4	
Na	mg/L	236	150	197	165	196	164	
Ca	mg/L	29	27	34	32	32	28	
Mg	mg/L	24	21	29	25	27	23	
Cl	mg/L	208	181	203	196	200	185	
SO ₄	mg/L	152	106	142	119	141	117	
HCO ₃	mg/L	181	134	142	159	132	155	
Heavy metals****								
Aluminium	ug/L	100	1300	90	250	60	160	55
Arsenic	ug/L	2	<1	1	1	<1	1	24
Cadmium	ug/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Chromium	ug/L	<1	1	<1	<1	<1	<1	1.0
Copper	ug/L	2	2	2	2	2	1	1.4
Lead	ug/L	<1	<1	<1	<1	<1	<1	3.4
Mercury	ug/L	<0.1	<0.1	1.1	<0.1	<0.1	<0.1	0.6
Molybdenum	ug/L	13	4	3	3	4	4	*****
Nickel	ug/L	1	3	2	2	1	1	11
Selenium	ug/L	<10	<10	<10	<10	<10	<10	11
Uranium	ug/L	2	2	1	1	1	1	*****
Zinc	ug/L	<5	<5	<5	<5	<5	<5	8.0

Site 500m upstream of wall, ** Site 100m upstream of wall, *** ANZECC Guidelines (2000) - thresholds for 95% protection level, **** Total (unfiltered) heavy metal concentrations reported. The analytical methods used to obtain the filterable (dissolved) heavy metal concentrations are questionable (see text), ***** no trigger value provided due to inadequate data available

3.4 Discharge licence (Transitional Environmental Program – TEP)

The EPA has issued five approvals to Ensham to permit the discharge of floodwater from the mine. These include:

- Emergency direction to discharge from mining pits B, C and D on ML7459 Ensham coal mine, 1 February 2009.
- Emergency direction to discharge from mining pits B, C and D on ML7459 Ensham coal mine, 15 February 2009.
- Draft Transitional Environmental Program for pit dewatering at ML7459, TEP Certificate of Approval number EMD 001-08, 6 March 2008⁹.
- Transitional Environmental Program - Amended Certificate of Approval number EMD 001-08, 28 April 2008.

⁹ This TEP was issued in response to a submission from Ensham (29 February 2008) for a TEP to permit dewatering of the flooded Ensham mine.

- Transitional Environmental Program - Amended Certificate of Approval number EMD 001-08, 2 June 2008.

The TEP Certificates of Approval were modified over time, presumably as a result of operational difficulties faced by Ensham in discharging such a large quantity of mine-affected water.

The Certificates of Approval specify (a) where the discharges can occur, (b) that the volumes released must not cause downstream flooding, (c) that physical damage to the rivers must be minimised, (d) the water quality monitoring (parameters, frequency, locations) that must be undertaken, and (e) the conditions under which the discharge must cease¹⁰.

My assessment is that the EPA process for determining the Ensham TEP was less than adequate for the following reasons:

- There was no written assessment of the risks to the downstream water users, including aquatic ecosystems, town drinking water or industry, before the TEPs were issued¹¹.
- Inadequate account was taken of the impact of the mine-affected water upon any downstream values (apart from agriculture), despite the obvious fact that a very large volume of mine-affected water was to be discharged to the river system largely during the time (dry season) when there would be very low flows and limited dilution or flushing¹²,
- The monitoring required of Ensham was inadequate.
 - Until the 2 June TEP monitoring was limited to surface water quality and only extended to a monitoring site in the Nogoia River just downstream of the mine lease boundary¹³,
 - In the 2 June TEP, Ensham were also required to monitor surface water quality at Riley's Crossing on the Nogoia River¹⁴,
 - I find it surprising that Ensham were not required to monitor conductivity continuously, particularly at the downstream sites¹⁵,

¹⁰ The latest TEP (2 June 2008) requires that discharge must cease if the rolling median value for the most recent five weeks (of weekly) water monitoring data at compliance points 2 (Nogoia River), 3 (Corkscrew Creek) and 4 (Riley's Crossing) exceed specified limits.

¹¹ Ensham did obtain advice in June 2008 on possible environmental impacts from the discharged flood water (4T Consultants, 2008), but it appears that this information was not provided to the EPA.

¹² The TEP issued on 6 March 2008 contained Condition 7 that aimed to limit heavy metal concentrations such that aquatic life was protected. However, this was removed in the TEP issued on 28 April 2008 and replaced with a Condition (7) that refers only to agricultural water quality. EPA provided me with an internal report (Review of Water Quality Guideline Values and Implications for Discharge Limits, by Glen Shultz, Ian Ramsay and Neil Tripodi, 8 May 2008) that they assert was used to inform the last of the TEPs issued to Ensham.

¹³ EPA have informed me that this is normal EPA practice with discharges from mines. However, this was not a 'normal' situation.

¹⁴ Since 10 September 2008, Ensham have voluntarily extended their monitoring program beyond Bedford Weir to include all downstream weirs to the Rockhampton Barrage. Ensham have also voluntarily conducted one set of sediment samples in each of the weirs from Bedford Weir to the Rockhampton Barrage.

¹⁵ The Department of Natural Resources & Water now have continuous recording conductivity meters located at Theresa Creek (located at Gregory Highway, operating since 10 Feb 1994), Nogoia River (Duckponds, 2 April 1993), Mackenzie River (Riley's Crossing, 15 July to 9 October 2008), Isaac River (Yatton, 11 September 1995), Mackenzie River (Coolmaringa, 10 November 1999), Dawson

- There was no requirement for the company (or the EPA) to undertake any biological monitoring despite the fact that the discharge was to occur during the dry season when dilution was minimal and the potential impact on the aquatic biota was high.
- The conditions under which the discharge was required to cease - if the rolling median value for the most recent five weeks (of weekly) water monitoring data exceeds specified limits - allows large fluctuations in the measured parameters to occur, and potentially short-term spikes in salinity and toxicant concentrations, which could be detrimental to the downstream aquatic biota. The large fluctuations that did occur in conductivity measured continuously at Riley's Crossing are shown in Figure 6. Use of a rolling median value for compliance, rather than an absolute value to relate to each sampling occasion, is sensible. The issue is the large time period for the median – a more sensible time period would have been a weekly.

Additionally, my assessment is that EPA did not adequately consult with key stakeholders in establishing the TEPs, or inform the community generally about what was happening and what the possible effects could be.

The issue with poor drinking water quality in Tieri and Blackwater was identified through the CHRC regular monitoring program; they appear not to have been informed that this could happen as a result of the mine-affected water discharge. Also I have not been supplied with any evidence of EPA discussions with stakeholders responsible for, or interested in, protecting the health of the aquatic biota in this system.

The lack of general information about what was happening and what the possible effects could be, that was available to the community lead to suspicion and distrust, and eventually to the development of a number of 'conspiracy' theories.

It is my belief that the EPA underestimated the scale of this emergency situation (discharge of a very large volume (138 GL) of mine-affected water over a period of 6-8 months to a river system that was largely not flowing), and as a result misjudged the community reaction to what was happening.

It is recommended that EPA undertake a review of the procedures used to develop TEPs and publish the results (a new set of guidelines) on the EPA web site. This review should consider the need for (a) criteria for prioritising the importance of the TEP, (b) undertaking a risk assessment to assist in developing the TEP, (c) a checklist that ensures that all beneficial uses of the receiving waterbody are explicitly considered, (d) a better process for identifying and including key stakeholders in the TEP process, (e) a process for informing the community of the situation associated with potentially controversial TEPs, and (f) better processes for ensuring the quality of the TEPs developed (e.g. documenting the reasons for various decisions or judgements).

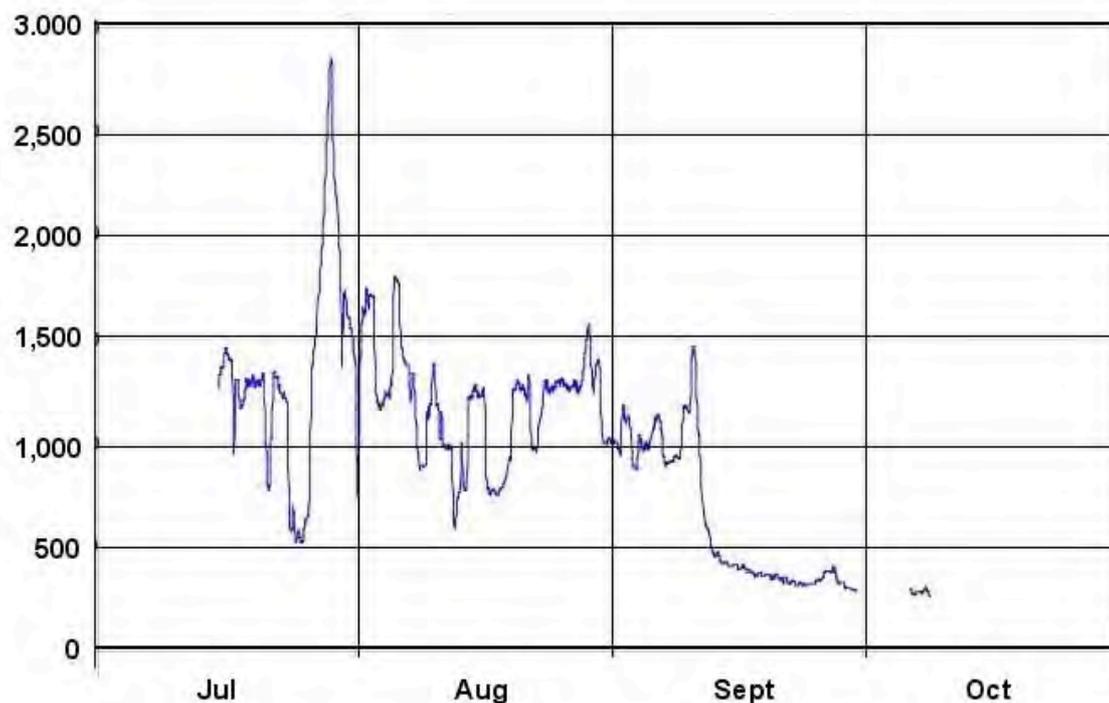


Figure 6: Continuous conductivity (uS/cm) measurement at Riley's Crossing between mid June 2008 and mid October 2008 (data provided by DNRW Rockhampton)

4. Assessment of current risks

This section contains my review of the risks to human health, aquatic ecology, agriculture and industry as a result of the mine-affected water in the Nogo-Mackenzie-Fitzroy River system.

4.1 Human health

Blackwater, Bluff, Tieri, Middlemount and Dysart

Water is taken from weirs along the Nogo-Mackenzie River to supply drinking water for a number of small towns. Blackwater, Bluff and Tieri obtain their water from Bedford Weir, while the towns of Middlemount and Dysart obtain their water from Bingegang Weir. The water is mostly treated (coagulation, filtration, chlorination) before use, but this treatment does not remove any dissolved material (such as sodium).

Residents of Blackwater and Tieri first expressed concern about the poor taste of the water. Subsequently, it was assessed that there could also be health problems for vulnerable members of the community due to elevated sodium levels.

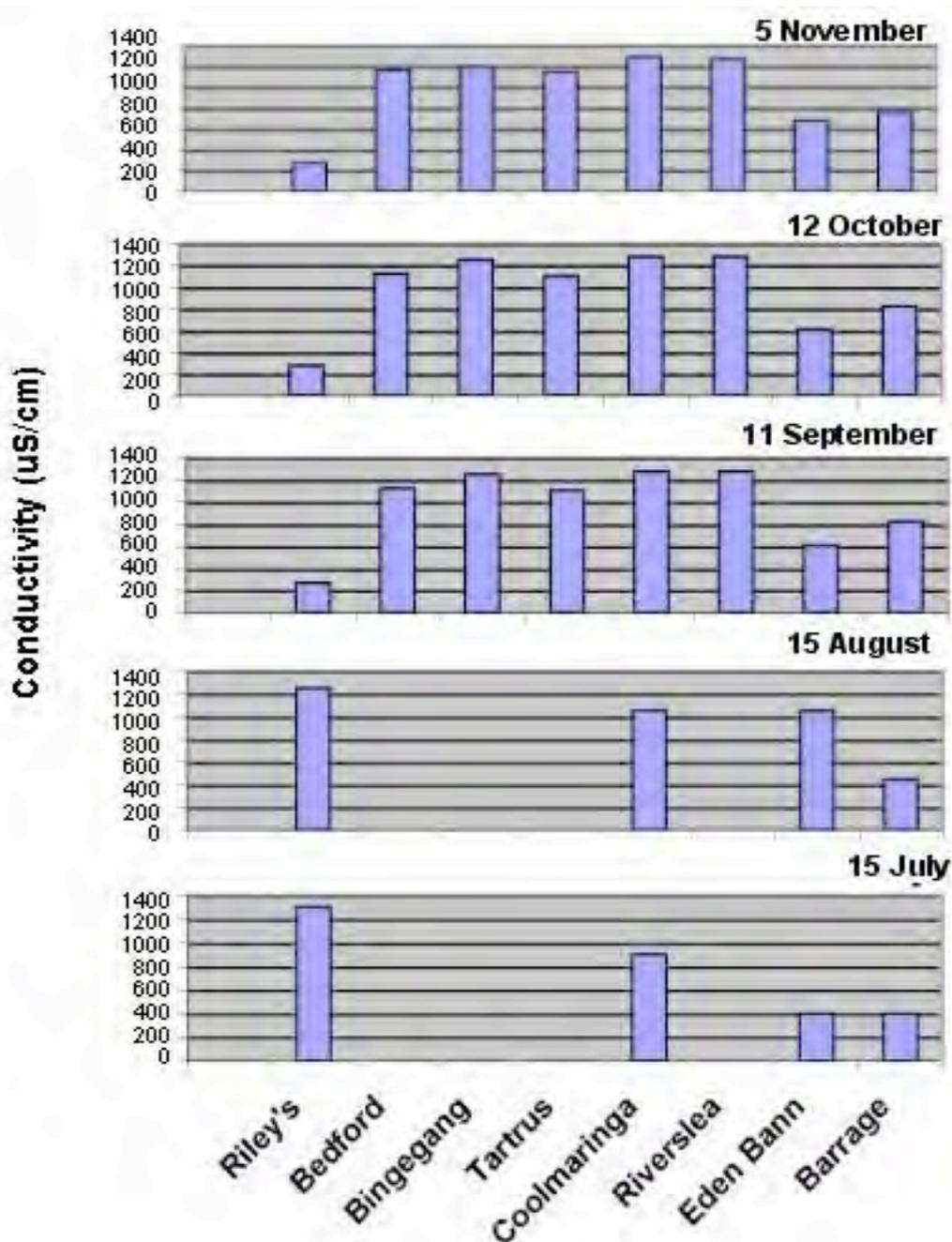


Figure 7: Plot of conductivity verses distance in the Nogoia-Mackenzie-Fitzroy river system over the period July to November 2008. The rise in conductivity at Eden Bann in August is the result of a high flow (41 GL) from the Isaac/Connors system between 20 July and 30 August 2008, that displaced mine-affected water from Tartrus Weir and water holes in the Mackenzie River and pushed this water through to Eden Bann and the Barrage.

On 26 August 2008, very soon after they were advised of the situation, Queensland Health (2008) issued a media-release advising residents of Blackwater, Bluff and Tieri that the mine-affected water had resulted in an increase in sodium concentrations to levels (around 200 mg/L). And that this could cause problems for a small number of susceptible people (e.g. those with high blood pressure, cardiovascular disease or chronic kidney failure). Further, Queensland Health sensibly recommended that these residents used bottled water until the situation had normalised.

The Australian Drinking Water Guidelines (ADWG, 2004, p442-443) recommend that based on taste considerations, sodium concentrations in drinking water should not exceed 180 mg/L. Further, while they do not propose any health-based guidelines, they do advise that *'people with severe hypertension or congestive heart failure may need to restrict their overall dietary intake of sodium further if the concentration of sodium in drinking water exceeds 20 mg/L'*.

Sodium levels in these drinking waters have exceeded the 180 mg/L level for a considerable period of time, possibly from as early as July 2008, although they appear to have dropped since the discharge ceased in early September 2008¹⁶.

Additionally, some residents have complained to Central Highland Regional Council (CHRC) of problems with scaling on pots and hot water services (CHRC Submission, 30 October 2008).

In response to a question from me, namely have there been any reported health effects on residents of Blackwater, Bluff and Tieri exposed to drinking water with elevated sodium concentrations, Queensland Health (Paul Florian, submission 7 November 2008) provided the following response: *'Around this time (late August 2008), the Communicable Disease Control Section of the Central Queensland Population Health Unit was aware of outbreaks of viral gastroenteritis in several communities across Central and Central West Queensland, but not specifically Blackwater. Following the release of the advisories, CHRC experienced an increase in complaints, specifically alleging a link between the water and outbreaks of disease in the community. These claims were followed up then and over the following three weeks by the Public Health Physician in contact with Blackwater Hospital.*

There had indeed been an increase in presentations to hospital with vomiting and diarrhoea, with sudden onset and short duration of illness. Unfortunately, no pathological diagnosis was made, as no samples of vomitus or faeces were collected and submitted for laboratory analysis.

It is likely that viral gastroenteritis was responsible for the symptoms. It is highly likely that the decrease in palatability of the water aggravated symptoms and susceptibility to dehydration.'

Assessment

It does not appear that there have been any serious health problems in the townships of Blackwater, Bluff, Tieri, Middlemount and Dysart due to the elevated sodium levels in their drinking water supply. Sodium levels in Tieri's drinking water supply¹⁷ were in excess of 180 mg/L between early June and late October 2008 (CHRC monitoring data). The small number of people concerned about the possible impact of elevated sodium levels on their blood pressure were advised to use alternative drinking water.

Queensland Health has advised that it is possible that the poor quality water did increase the effects of a viral gastroenteritis outbreak in the region in late August 2008.

Additionally, there is considerable evidence that the residents have been adversely affected by the poor taste of their drinking water supply. The conductivity (salinity) of drinking water supplied to the residents of Blackwater, Bluff, Tieri, Middlemount and

¹⁶ Note that while Bedford Weir had received the mine-affected water by as early as March 2008, this water would not have been supplied to the residents of Tieri, Blackwater or Bluff until some 3-4 months later because there is considerable water storage capacity between the Weir and the treatment plants.

¹⁷ And presumably also Blackwater, Bluff, Middlemount and Dysart.

Dysart was in excess of 1,000 uS/cm (600-700 mg/L) for around 6 months (June – November 2008).

Given the poor tasting water, it is reported that many residents resorted to bottled water for drinking. This has potentially cause hardship for particular sectors of these communities (e.g. lower socio-economic group, elderly) who may have been seriously disadvantaged in being able to access and pay for bottled water. The question of who should pay the increased cost is a relevant one.

Additional major concerns are that: (a) downstream drinking water supplies appear not to have been considered by the EPA in issuing the TEP, (b) neither the Central Highlands Regional Council, Queensland Health nor the residents were informed of the situation early enough¹⁸, and (c) media reports indicate significant community concern about this issue, a lack of trust in Government to fix the issue, and resentment with Ensham.

Rockhampton

Drinking water for the Rockhampton community is taken from the Fitzroy Barrage and treated at the Glenmore Water Treatment Plant before distribution to approximately 66,000 residents. The treatment process involves coagulation, flocculation, sedimentation, filtration and disinfection; activated carbon treatment is sometimes used to remove tastes, odours and potential algal toxins.¹⁹ These processes do not reduce conductivity and activated carbon does not remove a mineral taste.

It appears that the mine-affected water reached the Fitzroy Barrage in early September 2008, and during October essentially stabilised at a conductivity of around 825 uS/cm and sodium concentration around 120 mg/L (Figure 8).

Given the conductivity of the upstream water (around 1,200 uS/cm), it is inevitable that the conductivity (and sodium concentration) of water in the Barrage will increase during November 2008. However, just when the peak will occur and for how long it will last will depend upon when the wet season rains commence.

Rockhampton Regional Council issued media releases on 9 September and 14 October 2008, advising residents of the situation. Additionally, the Mayor and Councillors have also given a number of radio and television interviews.

Queensland Health (submission by Dr Paul Florian, 30 October 2008) have also expressed concern over the deteriorating quality of Rockhampton's water supply and its possible affects on the Rockhampton Hospital and its Dialysis Clinics and Home Dialysis Patients. Haemodialysis units require virtually pure water with very low ionic concentration. Complex water treatment systems are used to achieve this purity, and if the feed water quality changes significantly, there is a real probability that the product water will also change in quality.

Another area of concern is the Central Sterilising Supply Department at Rockhampton Base Hospital, where recently problems have been experienced with a residue forming on Operating Theatre equipment that has passed through the disinfection units. The residue is most likely calcium carbonate. If this persists, the hospital will need to invest in a small treatment plant.

¹⁸ The Central Highland Regional Council only became aware of the poor quality water around 21 August 2008, through their routine monitoring of the Tieri water supply (CHRC Submission, 30 October 2008).

¹⁹ See www.rockhamptonregion.qld.gov.au

Assessment

It seems unlikely that any serious health problems will arise as a result of the current (October 2008) increased conductivity and sodium concentrations in Rockhampton's drinking water supply.

These concentrations are likely to increase further during November (and even December if there is a lack of rain). But again, provided medical practitioners and the small number of vulnerable people are well informed, and there is access to bottle water, serious health problems are unlikely to occur.

It is quite possible however that Rockhampton Regional Council will experience a large increase in complaints about the poor taste of the drinking water.

If Rockhampton's water supply decreases further in quality, problems are also expected at the Rockhampton Hospital and its Dialysis Clinics and Home Dialysis service.

Given that water in the Fitzroy Barrage is considerably clearer than normal (due no doubt to coagulation of colloidal particles by the higher calcium and magnesium concentrations), there is a real possibility that algal blooms will occur in the Barrage. The Rockhampton Regional Council are aware of this possibility and have contingency measures in place to minimise the risks to human health from blue-green algal toxins in drinking water supplies.

Additional concerns are that: (a) downstream drinking water supplies for the major population centre of Rockhampton appear not to have been considered by the EPA in issuing the TEP, (b) neither the Rockhampton Regional Council, the Health Department nor the residents were informed of the situation early enough, and (c) media reports indicate significant community concern about this issue, a lack of trust in Government to fix the issue, and resentment with Ensham.

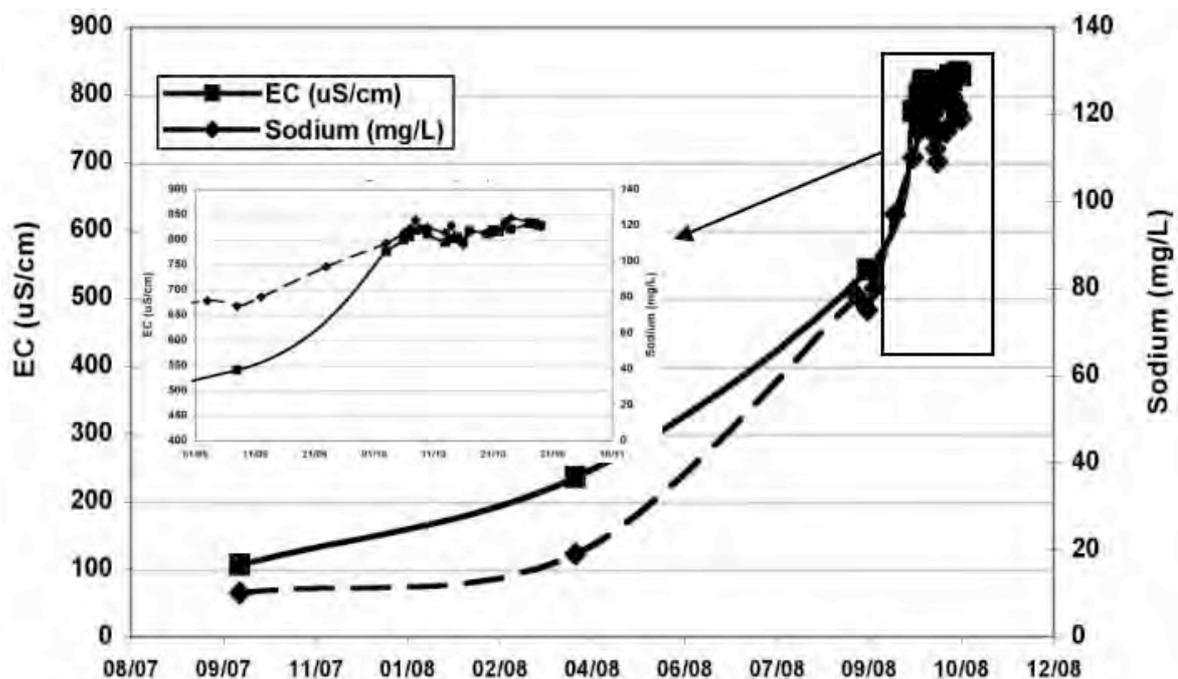


Figure 8: Conductivity and sodium concentration in the Rockhampton Barrage over the period September 2007 to October 2008. The insert shows the situation between September and late October 2008.

4.2 Aquatic ecosystems²⁰

The ecological functioning in the Fitzroy Basin is primarily driven by flow, which is characterised by two main phases - wet season monsoon flood events between December and March, and low or no flow periods during the rest of the year. The wet season monsoon flows are the most dominant feature of the flow regime in the Fitzroy catchment. These flows are highly variable and unpredictable (amongst the highest variability of any rivers in the world) and as a consequence the biota has evolved a number of strategies to adapt to this environment.

The **wet season flow events** serve a number of ecological functions including:

- fish migration – flow events enable dispersal past minor barriers (e.g. shallow riffles) and into temporary marginal habitats within the high flow channel. Studies have shown a number of fish species, such as Hyrtls tandan (*Neosilurus hyrtlilii*), respond to early wet season flow events for migration into suitable spawning grounds,
- fish spawning – the spawning of a number of fish species, such as the endemic Fitzroy golden perch (*Macquaria ambigua orientalis*) and Leathery Grunter (*Scortum hillii*), are triggered by wet season flow events (spawning may occur over only 1-2 flow events) (Roberts et al., 2008),
- fisheries recruitment – the recruitment of a number of diadromous and marine fish species (e.g. Barramundi (*Lates calcarifer*) and Threadfin Salmon (*Polydactylus macrochir*)) and prawn (*Penaeus merguensis*) populations has been demonstrated to be highly correlated with high flow events,
- reproduction of other aquatic organisms – major breeding events of many animals, such as waterbirds, are associated with extensive floodplain flows rather than elevated in-stream flows,
- primary and secondary production - temporary expansion of river into marginal habitats brings additional nutrients and organic material into the river system stimulating additional production. The wetting of marginal habitat also leads to germination of flood-dependant vegetation (e.g. Coolibah (*Eucalyptus coolabah*) and paperbarks (*Melaleuca* spp.)),
- mixing of the water column and flushing and refreshing of waterholes – larger flow events flush out large waterholes common in the Fitzroy Basin. These flushes refresh waterhole water quality and reset many algal and zooplankton populations,
- temporal diversity in aquatic habitat – temporary expansion of river into marginal habitats provides a diversity of refugia habitats utilised by many animals, including fish larvae and zooplankton (e.g. Fabbro and Duivenvoorden 1996).

Low and no flow periods, which characterise the flow regime for much of the year, also influence a number of ecological functions including:

²⁰ The description of the ecological functioning of the Fitzroy River was supplied by Dr Bernie Cockayne (DNRW) and Dr Leo Duivenvoorden (Central Queensland University)..

- fish spawning – stable low flow conditions provide ideal conditions for many fish species, particularly small bodied fish which attach eggs to structures, such as river bank edges, macrophytes and woody debris,
- reproduction of other aquatic organisms – many turtle species utilise sand banks exposed during low/no flow periods as egg laying sites,
- waterholes as refugia – almost all in-stream plants and animals rely on waterholes during some stage of their lifecycle. Waterholes provide a refuge against drought conditions, high water temperatures and predation from other animals, and are a dominant feature during the low - no flow period,
- riffles as habitat – riffles are generally the most productive of habitats and support a high diversity of plants and animals common in the Fitzroy River system (e.g. the ‘bum breathing’ Fitzroy River turtle (*Rheodytes leucops*),
- water quality decrease during low flow conditions can occur, particularly in the smaller streams of the catchment as pools start to dry up.

There are a number of **man-made issues** potentially threatening the aquatic ecology in the Fitzroy River system, including:

- changes to the flow regime – regulation of the Fitzroy River system has had a major effect on the magnitude, duration, timing and frequency of flows during the low flow period, and to the small to medium flow events during the wet season,
- barriers to fish migration – weirs and dams can interfere the migration of fish species, and have caused reduction (and possible extinction) of some fish species in certain regions of the river system (e.g. barramundi to many areas upstream of the Fitzroy Barrage and Golden Perch to many areas of the Nogoa-Mackenzie River system),
- changes to habitat – the water impoundments behind the dams and weirs built on the Nogoa-Mackenzie-Fitzroy River system have drastically reduced the habitat available for many native species, while at the same time providing ideal conditions for many exotic species (e.g. *Hymenachne amplexicaulis*),
- invasion of weeds – these have had a dramatic effect of riverine biodiversity (Houston and Duivenvoorden, 2003; Duivenvoorden et al., 2008),
- Water quality contamination - through both mining (e.g. acid mine drainage and agricultural activities (Dr Leo Duivenvoorden, Central Queensland University, Personal Communication, November 2008).

Thus, the mine-affected water discharged to the Nogoa-Mackenzie-Fitzroy River system, largely during the dry season of 2008, added an additional threat to the aquatic ecosystem, which has already been modified by the above pressures.

The ‘health’ of an aquatic ecosystem is generally assessed by undertaking a biological monitoring program, most often in Australia using macroinvertebrates as the biological indicators, and less commonly other biological indicators, such as algae, fish, platypus, turtles and bacteria.

In attempting to review the potential adverse effects of the mine-affected water on the aquatic biota in the Nogoa-Mackenzie-Fitzroy River system, I have been severely hampered by a serious lack of biological-ecological information. In particular, there is very limited baseline information on this river system, and there was no biological

monitoring undertaken during the period the Ensham mine-affected water was discharged²¹.

Given the lack of biological monitoring data for this system, I have had to resort to other less satisfactory information sources to assess the current situation. A report by 4T Consultants (2008) (commissioned by Ensham) has been quite helpful.

Fish populations

No comprehensive surveys of the fish populations in the Fitzroy River system appear to have been undertaken. Biosecurity Queensland undertook a limited survey of the health of fish in Bedford and Tartrus Weirs in September 2008, the results of which are discussed below.

DNRW scientists have been studying the spawning requirements of the endemic flow-spawning fish species Fitzroy Golden Perch (*Macquaria ambigua orientalis*) and Leathery Grunter (*Scortum hillii*) since 2003 as part of the Fitzroy environmental flows assessment program (EFAP) activities²².

Monitoring has been undertaken during wet seasons in response to natural and artificial flood events, such as the first post winter flow event. Both regulated and unregulated sections of the river system are being studied. Important outcomes of this work are: (a) small flows at the beginning of the wet season are critical for spawning migration and potentially effect subsequent spawning success, (b) spawning occurs only in response to flow events when water temperatures are greater than 23.5°C, (c) spawning also only occurs during 1 or 2 events per year, (d) no spawning occurred in the regulated sections of the Nogoa-Comet-Mackenzie River system (possibly because there a very few adult fish in these sections).

Salinity effects

The available evidence (e.g. Hart et al., 1990, 1991) suggests that most Australian fish species are relatively tolerant of salinity increases, and certainly adult fish in the Nogoa-Mackenzie-Fitzroy system would be unlikely to be adversely affected by salinities up to around 1,500 µS/cm.

Unfortunately, the effects of higher salinity on spawning, survival of eggs and larvae, and migration cues of fish present in the Fitzroy River system are not known. However, it is expected that such effects would occur at lower salinity levels than effects on adult fish (ANZECC, 2000; Dr Ben Kefford, personal communications, November 2008). Tolerance studies on other fish species (trout cod, Murray cod) suggest that adverse effects are likely on early life stages (eggs, larvae) at salinities around 1,000-1,500 µS/cm (Dr Ben Kefford, Personal Communication, November 2008).

For Fitzroy Golden Perch, no work has been done on the salinity sensitivity of this fish species, or the effects of higher salinity on spawning, eggs and larvae and migration cues (Dr Bernie Cockayne, Personal Communication, November 2008). However, given that this species spawns in the very early part of the wet season, it seems quite possible that this coming wet season could result in serious adverse effects on Fitzroy Golden Perch spawning success because of the poor water (high salinity) that will be flushed out of the river.

Also of concern is the possible effect of the higher salinity water on other more

²¹ A biological monitoring program, coordinated by the EPA, is now (November 2008) underway in the Nogoa-Mackenzie-Fitzroy system.

²² Dr B. Cockayne, DNRW, Personal Communication, November 2008.

abundant fish species in the Fitzroy catchment, particularly the smaller bodied fish species. These species rely on both good water quality and stable low flow conditions for successful spawning.

Toxic effects

Resulting from a report of catfish in Tartrus Weir with redness of all fins, Biosecurity Queensland undertook a limited survey of Blue Catfish (*Arius graeffei*) from Bedford and Tartrus Weirs in September 2008 (Biosecurity Queensland, 2008).

The fish species were subject to pathological analysis and for exposure to heavy metals and pesticides.

The results indicated that the fish from these Weirs were in poor health. The gill pathology was consistent with poor water quality, possibly exposure to elevated heavy metal concentrations, and not to infectious bacterial or viral fish disease. The fish tissue was found to contain elevated levels of iron, aluminium and zinc. There was no evidence of exposure to a range of pesticides (organochlorines, pyrethroid, endosulphan).

It is not possible to relate the results of this study back to the mine-affected water because there is no information on: (a) water quality in the weirs at the time of sampling (e.g. was dissolved oxygen concentration low?), (b) the age of the fish, necessary to assess the potential bioaccumulation of heavy metals, (c) the health or heavy metal concentrations of the fish species before the mine-affected water was added to the system.

Macroinvertebrate populations

Macroinvertebrate surveys are conducted annually by the Aquatic Ecosystems Unit of the Department of Natural Resources and Water (DNRW). The latest report of the situation in 2007 has not yet been publically released, but a draft was made available for this review (Steward, 2008).

During 2007, macroinvertebrates were sampled once in May-June at 25 sites (8 reference sites, 16 test sites, 1 long-term site) in the Fitzroy basin. These regional surveys are designed to provide an assessment of the biological condition of large bioregions, and not individual catchments or rivers. Hence, the use of this biological information for assessing the ecological condition of these rivers prior to the mine-affected water discharge is questionable.

Based on available information on the sensitivity of macroinvertebrates to increased salinity levels (Hart et al., 1990, 1991; Kefford et al., 2008; Dunlop & McGregor, 2007), it seems that adverse effects on macroinvertebrates are unlikely to occur at levels below around 1,000 $\mu\text{S}/\text{cm}$. However, this statement is based on data that mostly relate to short-term studies, and not to continual exposure over a 7-8 month period.

Advice from Dr Ben Kefford (RMIT University, Melbourne, November 2008) suggests that given the quite low salinity (200-300 $\mu\text{S}/\text{cm}$) normally in this system, a rise to levels of 1,000-1,500 $\mu\text{S}/\text{cm}$ would adversely affect macroinvertebrate community structure, especially if examined at the species level. The taxa most affected would be EPT species, especially mayflies.

Other biota

No information was available to assess the possibility that other biota (e.g. frogs, platypus and turtles) have been adversely affected by the mine-affected water.

Ecosystem changes

The clarity of the river water has increased since mine-affected water has been released to the Nogoia-Mackenzie-Fitzroy river system. This reduced turbidity (increased clarity) is the result of coagulation and settling of particulate matter responsible for the turbidity, due to the elevated concentrations of calcium and magnesium in the mine-affected water. Grace et al. (1997) found that calcium and magnesium concentrations in excess of around 30 mg/L clarified water in the Darling River.

The increased clarity of the water in the river system could potentially have resulted in major changes to the aquatic ecology, including increased algal production, increased predation and changes to important food webs (what eats what). Unfortunately, again there is no information on which to make an assessment of whether any such changes have occurred and if they did just how important they are.

Assessment

It is clear that there have not been any catastrophic effects (e.g. major fish kills) on the fish population in the Nogoia-Mackenzie-Fitzroy River system during the time the Ensham mine-affected discharge occurred. This is consistent with the available evidence suggesting that most Australian adult fish species are relatively tolerant of increased salinity, and unlikely to be adversely affected by salinities up to around 1,500 $\mu\text{S}/\text{cm}$.

However, this is not true for the effects of increased salinity on the early life stages of fish (e.g. survival of eggs and larvae), where the small amount of available evidence suggests that salinities of 1,000-1,500 $\mu\text{S}/\text{cm}$ are likely to cause adverse effects.

It seems quite possible that this coming wet season could result in serious adverse effects on the spawning success of Fitzroy Golden Perch because of the poor water (high salinity) that will be flushed out of the river during the early part of the wet season, exactly the time when this species spawns.

It is recommended that the EFAP surveys to be undertaken by DNRW this coming wet season are expanded to ensure that the effects of the flushing of higher salinity water on fish (and particularly Fitzroy Golden Perch) spawning and recruitment are studied.

The available information on the sensitivity of macroinvertebrates to increased salinity levels suggests that adverse effects are unlikely to occur at levels below around 1,000 $\mu\text{S}/\text{cm}$. However, this level is based on data that mostly relate to short-term studies, and not to continual exposure over a 7-8 month period. Advice has been obtained suggesting that, given the quite low salinity (200-300 $\mu\text{S}/\text{cm}$) normally found in this system, a rise to levels of 1,000-1,500 $\mu\text{S}/\text{cm}$ would adversely affect macroinvertebrate community structure, especially if examined at the species level. The taxa most affected would be EPT species, especially mayflies.

The results of a study by Biosecurity Queensland indicated that catfish sampled from Bedford and Tartru Weirs were in poor health. However, it was not possible to relate these back to the mine-affected water discharged to the river system.

It is recommended that the Biosecurity Queensland study of the 'health' of the fish in

weirs be repeated, with other fish species and other storages included, and the study design improved.

There is insufficient information available to make an assessment of potential adverse effect on other biota, such as frogs, platypus and turtles.

Again there is insufficient information available to assess whether the increased clarity of the water in the river system as a result of the mine-affected discharge, has resulted in major changes to the aquatic ecology, including increased algal production, increased predation and changes to important food webs (what eats what).

The response of relevant Government agencies to assessing the possible impacts of the mine-affected water on the riverine biota has been tardy to say the least. The EPA is currently (end October) gearing up to undertake a comprehensive study of the water quality, sediments and biota in the system (see Section 6 for discussion).

4.3 Agriculture

The mine-affected water is currently being used for two main agricultural activities – stock watering and irrigation.

Stock watering

It is highly unlikely that the salinity levels experienced in the Nogoa-Mackenzie-Fitzroy system over the past 8 months have caused any major problems for stock. However, the reports that stock has been reluctant to drink the mine-affected river water are probably well founded given the very low salinity the animals would have been used to.

Irrigation

It is unlikely that the salinity levels experienced in the Nogoa-Mackenzie-Fitzroy system over the past 8 months have caused any major problems for irrigated agricultural enterprises. This aspect is well discussed in the 4T Consultants (2008) report.

Assessment

My assessment is that it is unlikely that the Ensham mine-affected water has caused any major problems for agriculture. The salinity levels were not high enough to cause any long-term problems.

4.4 Industry

Two main industries are using the mine-affected water – the coal mines and the Stanwell Power Station.

Coal mines

Coal mines in the Bowen Basin use water for four main purposes: coal handling and preparation plants, dust suppression, in underground mining and in industrial areas. Recently, Moran et al. (2006) surveyed water and salt management in a number of coal mines in the northern Bowen Basin, and concluded that (a) there was no evident relationship between coal production and the use of fresh or re-cycled water, and (b) there was considerable potential for improved water management.

Some 8 of the 15 largest coal mines in the Bowen Basin obtain their water from the Nogo-Mackenzie-Fitzroy river system (Table 4).

*Assessment*²³

Coal processing

It seems there would be no significant constraints to this use at EC levels up to around 1,500 $\mu\text{S}/\text{cm}$. Most plant operators prefer to have a consistent water quality and are somewhat less concerned about the actual values. There is some evidence that the flotation process can be adversely impacted by increased concentrations of specific ions (e.g. magnesium) as opposed to the overall salinity. A salinity of around 1,300 $\mu\text{S}/\text{cm}$ should not cause problems, provided it was not dominated by magnesium ions. Additionally, increased salinity of the raw water will increase maintenance costs. There is some evidence suggesting that the increase in maintenance cost is linear with increase in salinity (Moran et al., 2008).

Table 4: Coal mines sourcing raw water from the Nogo-Mackenzie-Fitzroy river system

Mine	Company	Primary water source
Blackwater	BHP Billiton Mitsubishi Alliance	Bedford Weir
Curragh/Curragh North	Wesfarmers Curragh	Bedford Weir
Peak Downs	BHP Billiton Mitsubishi Alliance	Bingegang Weir
Ensham	Ensham Resources Ltd	Nogo River below Fairbairn Dam
Oaky Creek, No 1 & North	Xstrata Coal Queensland	Bedford Weir
German Creek/Capcoal	Anglo Coal	Bingegang Weir
Norwich Park	BHP Billiton Mitsubishi Alliance	Bingegang Weir
Saraji	BHP Billiton Mitsubishi Alliance	Bingegang Weir

Source: Mining 2006 Update - Queensland Mining and Petroleum, November 2006.

Dust suppression

Many mine sites routinely use water with considerably higher salinity than that currently in the Nogo-Mackenzie-Fitzroy system. Thus, it is not considered there would be any problems in using this currently higher salinity water for dust suppression.

Underground use

All underground coal mines in Australia use raw water (in some cases potable water) and not re-cycled water, for three reasons: (a) worker safety, (b) corrosion both inside and outside machines (most underground machinery is cooled with flow through water systems), and (c) hydraulic ram (roof support) performance.

It seems unlikely that use of raw water with salinity around 1,300 $\mu\text{S}/\text{cm}$ for less than 12 months would cause major problems with underground mines. However, increased costs due to increased corrosion could be a problem.

²³ This assessment has been informed by the ACARP report prepared by Moran et al. (2008) and discussions with Colin Moffett (General Manager Technical, Ensham Resources).

Stanwell Power Station²⁴

Stanwell Corporation relies on good quality water from the Fitzroy River Barrage for its evaporative cooling towers. The Corporation holds an annual allocation of 24 GL located in Eden Bann weir, with the water pumped to the Stanwell Power Station site from a pump station located on the Barrage at Laurelbank. Since the power station was constructed, annual usage has been typically in the range of 18 to 20 GL.

The mean conductivity (weekly records) of the raw Fitzroy River water delivered to the power station site was 213 $\mu\text{S}/\text{cm}$ (maximum 406 $\mu\text{S}/\text{cm}$) over the period March 1993 to December 2007. These salinity levels have allowed the cooling systems to be operated with recycling levels of between seven and ten. This has allowed SPS to comply with the water discharge Development Approval (DA) limits for total dissolved salts of 1,450 mg/L and chloride concentration of 400 mg/L for the 'blowdown' or 'bleed' water released from the site. Typically, 1,500 to 2,500 ML of 'blowdown' water is released annually to Quarry Creek – equivalent to a daily release rate of between 4 and 7 ML/day. Water from Quarry Creek flows on to Neerkol Creek and typically disperses onto the flood plains around Gracemere.

An increase in the salinity of the input water supply results in fewer cycles of concentration being achievable in the cooling systems within the water quality constraints of the DA. Consequently, to achieve the same levels of electricity generation, larger volumes of blowdown are required along with an equivalent increase in the volumes of raw water sourced from the Fitzroy River.

When it was identified that higher salinity levels were likely to be seen in the raw water supplied to the power station, Stanwell Corporation sought a Transitional Environmental Program from the EPA to allow higher salinity 'blowdown' water to be discharged from their site.

Currently, Stanwell Power Station is operating within the limits of the TEP. The current levels of electricity generation, using raw water at the plant (November 2008) with a conductivity of 820 $\mu\text{S}/\text{cm}$, are producing daily cooling water blowdown volumes in the order of 30 ML – significantly above the original DA limit of 18 ML/day. A number of mechanical modifications have been made to the cooling system plant to allow these volumes to be handled. Since the raw water conductivity has not exceeded 1000 $\mu\text{S}/\text{cm}$, no changes have been made to the chemical characteristics of the cooling water blowdown.

To date, there has been no impact on electricity generation activities and, while it is unclear how high raw water salinity levels may rise, Stanwell Corporation do not expect any impact on electricity generation in the near future (Stanwell Corporation submission, 5 November 2008).

As part of the TEP, Stanwell is also undertaking extensive environmental monitoring of impacts of the changed blowdown arrangements within the Quarry, Neerkol and Scrubby Creek catchment. This includes independent monitoring of physical and chemical parameters in surface and ground waters in the catchment and at background locations. Detailed biological assessment is also being conducted including at a number of locations throughout the catchment. Hydrology, groundwater recharge and any associated impacts that may be associated with irrigation of various crops with this water is also being considered. This monitoring is being completed in consultation with the EPA and is intended to run until April 2009.

²⁴ This assessment has been informed by information provided by Steve Kerr (Principal Chemist, Stanwell Power Station, 4 November 2008).

Stanwell is also communicating regularly with the broad community and with specific stakeholders who may be impacted as a result of higher discharge volumes.

Assessment

There has been no impact on electricity generation activities to date. Additionally, Stanwell Corporation expect to be able to handle likely salinity increases in their raw water over the next month or so, and do not expect any impact on electricity generation.

However, it is an unsatisfactory situation that Stanwell Power Station has had to apply for a TEP to accommodate the higher volumes and increased salinity in their 'blowdown' water discharge because of a situation that has arisen further upstream.

5. Assessment of possible management options

A number of options have been proposed to manage the current water quality problems in the Nogoia-Mackenzie-Fitzroy system²⁵. These are presented in Appendix A, together with the advantages and disadvantages of each.

The most feasible options are discussed in this section.

5.1 Options to improve town water supplies for Blackwater, Bluff, Tieri, Middlemount and Dysart

Option A – Dilution of existing water in Bedford and Bingegang Weirs

This Option (Option 2a in Appendix A) would see the normal ROP normal ROP operating arrangements for Fairbairn Dam and downstream weirs applying, but with (a) additional management of released from Bedford and Bingegang weirs to improve water quality, and (b) small scale releases from Fairbairn Dam to dilute the water that is already present in the weirs.

The first part of this Option would see as much as possible of the lower quality water stored at depth in the weirs released through regulation of flow from the outlet works of weirs. This strategy would apply for releases associated with: (a) topping up downstream storages, and (b) natural inflows that trigger seasonal base flow environmental releases including overflows. Details of this Strategy are contained in the Interim Operational Strategy for the Nogoia Mackenzie Water Supply Scheme - 31 October 2008.

Added to this strategy would be the release of relatively small quantities of seasonally assigned water (water that is ordered but not used) from Fairbairn Dam to improve the quality of water in the weirs. These releases would not flush the weirs, but would certainly improve the quality.

Small natural inflows are also likely in the short term. Historically, by end of December there is about a 36% chance of 30,000 ML natural inflow to Bedford Weir and a 25% chance of 60,000 ML.

Assessment

This is a sensible and feasible Option, and should be implemented as soon as possible, given the time for water to get from Fairbairn Dam to dilute that in Bedford

²⁵ I am indebted to DNRW Rockhampton staff for producing many of these options and the list of advantages and disadvantages.

Weir (3 weeks). Implementation of this Option would have community support in that the Government would be seen to be doing something positive

If summer rains do not occur it will be necessary to invoke other Options (see Appendix A, Options 4 or perhaps even Option 3) to ensure the township water supplies do not deteriorate further.

Option B – Emergency options

Three options have been identified that could be implemented if the water quality in Bedford and Bingegang Weirs deteriorates further. These are:

- Pump poorer quality water from Bedford Weir and store in private farm dams for later use or release back when flows are higher (Appendix A - Option 4),
- Trucking 'drinking' water supply supplies (Appendix A - Option 5a),
- Mobile desalination plant (Appendix A - Option 5b).

These are fully discussed in Appendix A.

5.2 Options for the lower Fitzroy and the Fitzroy Barrage

Option C – Normal ROP operational arrangements, with additional release management of Eden Bann Weir (Appendix A – Option 6b)

This Option aims to achieve better water quality at the intake works for Rockhampton Regional Council and Stanwell Power Station than would be achieved if just the normal operational rules applied, and may result in operation outside the existing ROP rules.

The normal ROP operating arrangements for Eden Bann Weir and the Fitzroy Barrage would apply, except where it is otherwise determined that a release: (a) should be delayed because it was likely that it would worsen the quality of water at the Rockhampton Regional Council and Stanwell Power Station intakes, or (b) should occur because it was likely that the release would improve the quality of water at the Rockhampton City Council and Stanwell Power Station intakes. The strategy details are contained in the Interim Operational Strategy for the Lower Fitzroy and Fitzroy Barrage water supply schemes dated 28 October 2008.

The water quality in Eden Bann Weir and the Fitzroy Barrage, while elevated compared to normal water quality levels, has been and remains considerably better than the quality in the Mackenzie River Weirs. However, it appears that there has been no consideration of other possibilities that could result in more mine-affected water from upstream being flushed into Eden Bann Weir and the Fitzroy Barrage, for example a small flow event in the Isaac/Connors system could flush mine-affected water reportedly in that system (S. Christensen, Personal Communication, October 2008) into Tartrus Weir, and then flush this water plus the mine-affected water current in Tartrus Weir further downstream.

Based on historical data there is a quite reasonable probability that large natural flows will occur in this system. For example, by end of December there is about a 50% chance of in excess of 122 GL natural inflow to Eden Bann Weir²⁶, a 75% chance of 162 GL by end of January, and 75% chance of about 440 GL by end of February.

²⁶ Note – Eden Bann Weir retains a volume of 40 GL at full supply level.

Assessment

This is a sensible and feasible Option and should be adopted now.

It is also recommended that a contingency plan be developed during November to handle the possibilities that: (a) additional mine-affected water will be flushed into this system from the Isaac/Connors system, and (b) that the expected normal wet season flows will not occur and the dilution and flushing of mine-affected water from Eden Bann Weir and the Fitzroy Barrage does not occur.

5.3 Options for reducing the risk to the aquatic biota

The Options discussed in the Sections above all focus on management actions to improve water quality in the various storages, mainly with the aim of improving drinking water quality.

As discussed in Section 4.2, the Nogoia-Mackenzie-Fitzroy River system currently has mine-affected water in over 400 km of its length from at least Bedford Weir to the Fitzroy Barrage. Unfortunately, the lack of data and information has made it difficult to properly assess the effects of this mine-affected water on the aquatic biota in the system. However, the small amount of evidence available suggests that there will have been adverse impacts of the macroinvertebrate communities and probably of some fish species. The increased clarity of the water currently in the river system will have resulted in changes to the aquatic ecology, but the implications of these changes can only be speculated at this stage.

Obviously, the management options being considered will result in some improvement in the quality of the water in the river system between the storages, although the actual level of improvement has not been quantified.

Assessment

It is both surprising and disappointing that no Options have been formulated that specifically target the improvement of water quality in the Nogoia-Mackenzie-Fitzroy River system, such that the risks to the aquatic biota are minimised.

It is recommended that options to improve water quality in the Nogoia-Mackenzie-Fitzroy River system, not just the storages, be developed with some urgency during November 2008.

5.4 Recommended management options

A number of sensible and feasible management options have been identified by the Technical Working Group (TWG) to address the current water quality problems in the Nogoia-Mackenzie-Fitzroy system. If implemented these management actions will have some positive effect on both drinking water quality and river health, and will show to the community that Government is serious about this issue and prepared to do something positive about it.

However, the ultimate flushing of the mine-affected water currently in the Fitzroy system will only occur with the large flows normally expected in the wet season (December-March).

It should be noted that all the management options currently being considered to alleviate the current water quality problems are restricted to a very large extent by the water use rules (ROP) for the Nogoia-Mackenzie River system, rules that appear to

be largely dictated by agricultural and industrial use of the water. *These rules may need to be modified in the future to consider other legitimate users of water, such as the environment and townships, and the possible need for a State-owned contingency licence to a certain proportion of the water in Fairbairn Dam.*

It is recommended that Option A be implemented as soon as possible, given the time for water to get from Fairbairn Dam to dilute that in Bedford Weir (3 weeks). Implementation of this Option would have community support in that the Government would be seen to be doing something positive.

It is recommended that the Central Highland Regional Council establish a Task Force to develop a contingency plan for addressing the drinking water quality issue for Blackwater, Bluff, Tieri, Middlemount and Dysart should the Bedford and Bengegang Weirs not be adequately flushed during this coming wet season. Such a contingency plan will involve more detailed examination of Option B above, and Options 4 or perhaps even Option 3 in Appendix A.

It is recommended that Option C be implemented as soon as possible.

Additionally, it is recommended that a contingency plan be developed by DNRW during November to handle the possibilities that: (a) additional mine-affected water will be flushed into this system from the Isaac/Connors system, and (b) that the expected normal wet season flows will not occur and the dilution and flushing of mine-affected water from Eden Bann Weir and the Fitzroy Barrage does not occur.

It is recommended that an emergency water management plan be developed with some urgency during November 2008 to improve water quality in the vast bulk of the Nogoia-Mackenzie-Fitzroy River system between the storages. This plan will need to be innovative and not constrained by the current restrictive ROP rules.

6. Assessment of the proposed EPA monitoring program

The response of relevant Government agencies to assessing the possible impacts of the mine-affected water on the riverine biota has been tardy, so much so that the Premier, in October 2008, directed the EPA to establish a whole-of-government monitoring program to assess the potential impacts of mine-affected floodwater discharged from the Ensham mine on the Nogoia-Mackenzie-Fitzroy River system.

A draft Project Plan (Fitzroy Basin Water Quality Monitoring: Assessing the impact of Ensham floodwater release, Version 1.0, 28 October 2008) has been prepared. The stated purpose of the monitoring program is *'to assess the potential impact(s) of mine water discharged from the Ensham Resources coal mine on waterways and related environmental values in the Fitzroy Basin; the environmental values of particular interest include: aquatic ecosystems, primary industries (irrigation and stock watering), and drinking water.'*

I have reviewed the draft and provided comments to the EPA (29 October 2008). aimed at strengthening the program. The most relevant comments were:

- The study design is a traditional one, and includes sampling of water quality, sediment and biological indicators at a number of control and impacted sites over time,
- The selection of water quality, sediment and biological (macro-invertebrates, fish) indicators is sensible, although the use of turtle indicators needs to be better justified,

- The suggested frequency of sampling (WQ - fortnightly; sediments – quarterly; biology – quarterly) is reasonable,
- The selected indicators and the frequency of sampling should be reviewed after the first full round of measurement of all indicators is completed,
- There is a need for a conceptual diagram indicating how the study will be able to assess any potential impacts from the mine (compared with effects due to other influences),
- The selection of the location of the control and test site needs further justification,
- The analysis of the collected data to show whether adverse effects have (or are) occurred is too vague. Additional information on the following is required:
 - *Surface water* - It is proposed to compare the surface water quality with ANZECC Guidelines for the Protection of Aquatic Life and with the Australian Drinking Water Guidelines for drinking water to decide if adverse effects have occurred. This should be sufficient provided that the uncertainty in the measured indicators is available – this will require that replicate water samples are collected and analysed.
 - *Sediments* - It is proposed to compare the sediment quality with the ANZECC guidelines. This should be sufficient to assess whether heavy metals levels in the sediments are such that they could cause toxic effects to the biota. Again, the comparison of measured data with the guidelines (thresholds) would be more robust if the uncertainty in the measured indicators is available.
 - *Biological indicators* – This is the area that still needs considerable work. Just how the data from the test sites will be assessed is still unclear. Comparison with control (reference) sites is commonly employed, however the draft has little detail on how this will be done and whether the data will be sufficient to be able to detect ecologically meaningful effect sizes. Power analysis was mentioned in the draft but no detail was provided.
- It is not clear in the draft who (agency) will be doing what work and what their credentials are.
- It would be useful to list who has been consulted in developing this program.
- It is not clear how this monitoring program with other monitoring that is also going on in the Fitzroy catchment (e.g. DNRW, FBA).
- The timescale of the study is unclear.
- As noted above, because there is little baseline information available, this study will be challenged in determining if any short-term biological impacts have occurred due to the mine-affected water. For this reason, *it is recommended that the study continues for at least 2 years (3 wet-dry cycles) so that any recovery in the condition of the biota can be measured.* The information on the system that will be collected during this time will also be vital in the development of a more comprehensive Fitzroy catchment-wide monitoring and assessment program.

A full assessment of the final monitoring and assessment program will be made in a separate report.

7. Conclusions

The conclusions of this review are summarised below under each of the Terms of Reference. Additionally, I have provided comments in Section 7.4 on the adequacy of Government actions in addressing this issue, and on what changes might be needed in those cases where Government response was less than adequate.

7.1 Risks to human health, aquatic ecology, agriculture and industries

Human health

Blackwater, Bluff, Tieri, Middlemount and Dysart

There is no evidence of any serious health problems in the above townships due to the elevated sodium levels in their drinking water supply. However, it is possible that the poor quality water did increase the effects of a viral gastroenteritis outbreak in the region in late August 2008.

There is considerable evidence that the residents have been adversely affected by the poor taste of their drinking water supply.

Additional major concerns are that: (a) downstream drinking water supplies appear not to have been considered by the EPA in issuing the TEP, (b) neither the Central Highlands Regional Council, Queensland Health nor the residents were informed of the impending problems early enough²⁷, and (c) media reports indicate significant community concern about this issue, a lack of trust in Government to fix the issue, and resentment with Ensham.

Rockhampton

It seems unlikely that any serious health problems will arise as a result of the current (October 2008) increased salinity and sodium concentrations in Rockhampton's drinking water supply. These concentrations are likely to increase further during November (and even December if there is a lack of rain), but provided medical practitioners and the small number of vulnerable people are well informed, and there is access to bottled water, serious health problems are unlikely to occur.

It is quite possible that Rockhampton Regional Council will experience a large increase in complaints about the poor taste of the drinking water, at least until the Fitzroy Barrage is fully flushed.

If Rockhampton's water supply decreases further in quality, problems are also expected at the Rockhampton Hospital and its Dialysis Clinics and Home Dialysis service.

There is a real possibility that blue-green algal blooms will occur in the Fitzroy Barrage in the next month or so, given that water in the Barrage is considerably clearer than normal. However, the Rockhampton Regional Council are aware of this possibility and have contingency measures in place to minimise any risks to human health from blue-green algal toxins in drinking water supplies.

Additional concerns are that: (a) downstream drinking water supplies for the major population centre of Rockhampton appear not to have been considered by the EPA in issuing the TEP, (b) neither the Rockhampton Regional Council, Queensland

²⁷ The Central Highland Regional Council only became aware of the poor quality water around 21 August 2008, through their routine monitoring of the Tieri water supply (CHRC Submission, 30 October 2008).

Health nor the residents were informed of the situation early enough, and (c) media reports indicate significant community concern about this issue, a lack of trust in Government to fix the issue, and resentment with Ensham.

Aquatic biota

Review of the possible effects on river health has been hampered by a dearth of relevant information.

It is clear that there have not been any catastrophic effects (e.g. major fish kills) on the fish population in the Nogoa-Mackenzie-Fitzroy River system during the time the Ensham mine-affected discharge occurred. This is consistent with the available evidence suggesting that most Australian adult fish species are relatively tolerant of increased salinity, and unlikely to be adversely affected by salinities up to around 1,500 $\mu\text{S}/\text{cm}$.

However, this is not true for the effects of increased salinity on the early life stages of fish (e.g. survival of eggs and larvae), where the small amount of available evidence suggests that salinities of 1,000-1,500 $\mu\text{S}/\text{cm}$ are likely to cause adverse effects. *It seems quite possible that this coming wet season could result in serious adverse effects on the spawning success of Fitzroy Golden Perch because of the poor quality water (high salinity) that will be flushed out of the river during the early part of the wet season, exactly the time when this species spawns.*

The results of a study by Biosecurity Queensland indicated that catfish sampled from Bedford and Tartrus Weirs were in poor health. However, it was not possible to relate these back to the mine-affected water discharged to the river system. This study should be repeated with other fish species and other storages included and a better study design.

There is no evidence of adverse effects on the aquatic biota due to heavy metals in the mine-affected water.

The available information on the sensitivity of macroinvertebrates to increased salinity levels suggests that adverse effects are unlikely to occur at levels below around 1,000 $\mu\text{S}/\text{cm}$. However, this level is based on data that mostly relate to short-term studies, and not to continual exposure over a 7-8 month period. Advice has been obtained suggesting that a rapid rise in salinity to levels of 1,000-1,500 $\mu\text{S}/\text{cm}$ would adversely affect macroinvertebrate communities (particularly mayflies), given the quite low salinity (200-300 $\mu\text{S}/\text{cm}$) they normally experience.

There is insufficient information available to make an assessment of potential adverse effect on other biota, such as frogs, platypus and turtles.

Again there is insufficient information available to assess whether the increased clarity of the water in the river system as a result of the mine-affected discharge, has resulted in major changes to the aquatic ecology, including increased algal production, increased predation and changes to important food webs (i.e. what eats what).

The response of relevant Government agencies to assessing the possible impacts of the mine-affected water on the riverine biota has been tardy to say the least. The EPA is currently (November 2008) coordinating a comprehensive monitoring and assessment program (water quality, sediments and biota) to determine if there have been adverse effects in the Fitzroy River system due to the mine-affected water.

Agriculture

It is unlikely that the Ensham mine-affected water has or will cause any major problems for agriculture.

Industry

Coal industry

The coal industry is the major industrial user of water in the Fitzroy catchment. Water is used for coal processing, dust suppression, in underground operations and in industrial areas. It is unlikely that water with conductivities to around 1,500 uS/cm would cause any major problems to the coal industry. However, there is evidence that an increase in raw water salinity can lead to increased maintenance costs.

Stanwell Power Station

The mine-affected water has had no impact on electricity generation activities to date. Additionally, Stanwell Power Station expects to be able to handle likely salinity increases in their raw water over the next month or so, and do not expect any impact on electricity generation.

7.2 Options available to manage these risks

A number of sensible and feasible management options have been identified by the Technical Working Group (TWG) to address the current water quality problems in the Nogoia-Mackenzie-Fitzroy system. If implemented these management actions will have some positive effect on both drinking water quality and river health, and will show to the community that Government is serious about this issue and prepared to do something positive about it.

However, the ultimate flushing of the mine-affected water currently in the Fitzroy system will only occur with the large flows normally expected in the wet season (December-March).

It should be noted that all the management options currently being considered to alleviate the current water quality problems are restricted to a very large extent by the water use rules (ROP) for the Nogoia-Mackenzie River system, rules that appear to be largely dictated by agricultural and industrial use of the water. These rules may need to be modified in the future to consider other legitimate users of water, such as the environment and townships, and the possible need for a State-owned contingency licence to a certain proportion of the water in Fairbairn Dam.

Option A (to address some of the issues in Bedford and Bingegang Weirs) should be implemented as soon as possible, given the time for water to get from Fairbairn Dam to dilute that in Bedford Weir (3 weeks). Implementation of this Option would have community support in that the Government would be seen to be doing something positive.

Further, it is recommended that the Central Highland Regional Council establish a Task Force to develop a contingency plan for addressing the drinking water quality issue for Blackwater, Bluff, Tieri, Middlemount and Dysart should the Bedford and Bingegang Weirs not be adequately flushed during this coming wet season.

Option C (to address water quality issues in Eden Bann Weir and the Fitzroy Barrage) should be implemented as soon as possible.

Additionally, a contingency plan should be developed by DNRW during November to handle the possibilities that: (a) additional mine-affected water will be flushed into this system from the Isaac/Connors system, and (b) that the expected normal wet season flows will not occur and the dilution and flushing of mine-affected water from Eden Bann Weir and the Fitzroy Barrage does not occur.

An emergency water management plan should be developed by DNRW during November 2008 to improve water quality in the Nogoia-Mackenzie-Fitzroy River system between the storages. This plan will need to be innovative and not constrained by the current restrictive ROP rules.

7.3 Review of the EPA-coordinated monitoring & assessment program

The response of relevant Government agencies to assessing the possible impacts of the mine-affected water on the riverine biota has been tardy, so much so that the Premier, in October 2008, directed the EPA to establish a whole-of-government monitoring program to assess the potential impacts of mine-affected floodwater discharged from the Ensham mine on the Nogoia-Mackenzie-Fitzroy River system.

A draft Project Plan (Fitzroy Basin Water Quality Monitoring: Assessing the impact of Ensham floodwater release, Version 1.0, 28 October 2008) to undertake a comprehensive study of the water quality, sediments and biota in the system has been developed.

This review provided comments to the EPA (29 October 2008) aimed at strengthening the program. A full assessment of the final monitoring and assessment program will be made in a separate report.

Because there is little baseline information available, this study will be challenged in determining if any short-term biological impacts have occurred due to the mine-affected water. For this reason, the study should continue for at least 2 years (3 wet-dry cycles) so that any recovery in the condition of the biota can be measured. The information on the system that will be collected during this time will also be vital in the development of a more comprehensive Fitzroy catchment-wide monitoring and assessment program.

It is recommended that the EPA include the review comments in revising the draft Project Plan (Fitzroy Basin Water Quality Monitoring: Assessing the impact of Ensham floodwater release), and include a longer timeline for the study (at least 2 years - 3 wet-dry cycles) so that any recovery in the condition of the biota can be measured.

7.4 Assessment of the Government actions to manage the Fitzroy water quality issue

This current water quality issue in the Nogoia-Mackenzie-Fitzroy River system arose as a result of an emergency situation caused by flooding of the Ensham coal mine in January 2008, the desire by Ensham and Government to get the mine back into production as rapidly as possible, and the decision by the EPA to grant Ensham a Transitional Environmental Program (TEP) to discharge a very large volume (138 GL) of mine-affected water into the Nogoia River.

Given all the factors, the decision by the EPA to issue Ensham with a Transitional Environmental Program for the mine-affected water was justifiable.

However, my assessment is that the EPA process for determining the Ensham TEP was less than adequate (for the reasons outlined in Section 3.4), and that EPA did not adequately consult with key stakeholders in establishing the TEP, or inform the community generally about what was happening and what the possible effects could be. The whole process lacked transparency.

My assessment is that the EPA underestimated the scale of this emergency situation (discharge of a very large volume (138 GL) of mine-affected water over a period of 6-8 months to a river system that was largely not flowing), and as a result misjudged the community reaction to what was happening.

Adequacy of the current Government actions

Government actions since late August have been mixed in their responsiveness and effect, and include the following:

- Both the CHRC and Queensland Health acted promptly and appropriately when the drinking water quality issue at Blackwater and Tieri became known in late August 2008, and have issued adequate warnings and advice to residents.
- Further, the Rockhampton Regional Council acted swiftly in hosting a multi-agency meeting on 12 September 2008, and in providing adequate warnings and advice to residents, when it became clear that further releases of water from Weirs upstream could compromise drinking water quality in the Rockhampton region.
- The multi-agency meeting, coupled with political representation to the Premier, resulted in the establishment of the Fitzroy River Water Quality Technical Working Group (TWG, 19 September 2008) and my appointment as independent reviewer (14 October 2008).
- The Fitzroy River Water Quality Technical Working Group is chaired by DNRW, with members from EPA, Primary Industries and Fisheries (DPI&F), Queensland Health, Central Highlands Regional Council, Isaac Regional Council, Rockhampton Regional Council, Ensham Resources, Stanwell Corporation, SunWater, Fitzroy Basin Association, Local conservation council and Central Queensland University. The TWG was established *to coordinate the evaluation of key water quality monitoring data within the Fitzroy River system and facilitate interagency communication, collaboration and advice on management strategies to return water quality to normal conditions with an initial focus on the region between Emerald and the Fitzroy Barrage*²⁸. They have provided a very informative 'Weekly Update' bulletin since 20 October 2008.
- The EPA are currently (November 2008) coordinating a monitoring and assessment program aimed at assessing the potential impact(s) of mine-affected water discharged from the Ensham coal mine on environmental values (aquatic ecosystems, irrigation, stock watering and drinking water) in the Fitzroy Basin.

²⁸ The specific functions of the TWG are: (a) identify the water quality data that the members are collecting, (b) establish the data sets to focus on for alerting decision makers to water quality concerns, (c) collate data, (d) review/analyse the data, (e) make recommendations based on the review/analysis of the data, including management strategies and any additional monitoring required, (f) communicate data and any recommendations/outcomes within their relevant agencies, including any subsequent public advice, and (g) assist in ensuring a coordinated approach to communication to the community

The somewhat cynical community view of the current Government response to this issue is: (a) that the establishment of the TWG and my review are welcome initiatives but they will be too late to result in any management actions to solve the immediate problem, (b) that the Government is waiting for the wet season rains to 'solve' the problem, and (c) that nothing will be learned from this issue to change Government response processes

While it is true that flushing of the mine-affected water currently in the Fitzroy system will really only occur with the large flows normally expected in the wet season (December-March), the management actions recommended in Section 5 of this report will have some positive effect on both drinking water quality and river health. If initiated, these management actions will show to the community that Government is serious about this issue and prepared to do something positive about it.

The establishment of the TWG has been a very positive move. The TWG has significantly improved the level of knowledge and data sharing, and has provided a forum for sensible discussion about possible management actions.

The EPA-coordinated monitoring and assessment program is also a welcome initiative. However, as noted in the report this would not have been needed if adequate monitoring had been required as part of the Ensham TEP. Also, it is disappointing that it has taken until November for this to have been established when the issue was well appreciated as long ago as late August.

Change needed to manage the Fitzroy water quality situation going forward?

There appears to be little more the Government can do about this current water quality issue, assuming that decisions are made quickly to initiate the recommended management actions. However, this water quality issue has highlighted a number of broader issues that need to be addressed in the longer term.

TEP process

The most obvious is the deficiencies in the TEP process (lack of adequate consultations between the EPA and key stakeholders, lack of transparency in the process, poor communication with the key agencies and the community about the reality of the water quality issue, and what could be done about it). Largely because of the poor communications, but also because of the lack of credible monitoring information, a range of 'conspiracy' theories arose and escalated the issue.

A review of the EPA procedures for developing TEPs has been recommended, with the results (a new set of guidelines) to be published on the EPA web site.

Monitoring and assessment

There are a number of monitoring programs being undertaken in the Fitzroy Basin (TWG Document), but it is clear they are largely focused on the specific responsibilities of particular agencies, are not well coordinated, and are not comprehensive.

This review has identified an urgent need for the establishment of comprehensive and well coordinated long-term monitoring and assessment program to assess the ecological health of the Fitzroy River system²⁹.

²⁹ DNRW does survey the Fitzroy River system annually through the Statewide Ambient Biological Monitoring and Assessment Program. However, while useful this program based as it is on one biological component of the ecosystem (macroinvertebrates) is far from comprehensive.

Fitzroy Water Resources Plan

The available options to manage this water quality issue are all severely constrained by the current Fitzroy Water Resource Plan (and operational rules), which has virtually all the water in Fairbairn Dam allocated to consumptive uses, and no contingency allocation owned by the State.

It is recommended that DNRW consider a more equitable balancing of water between consumptive users and the environment, and the provision of State-owned contingency allocation, during the 10-yearly review of the Fitzroy Water Resource Plan that is currently underway and scheduled to be completed in late 2009.

Caretaker of river health

Another important issue that has been highlighted by the current water quality issue is there is no well-defined 'caretaker' of river health in the Fitzroy River catchment, with the legislative authority to adequately protect the aquatic environment. The EPA, DNRW and the Fitzroy Basin Association all appear to have some responsibilities in this regard.

It is recommended that Government consider the appointment of a 'lead agency' to be the responsible 'caretaker' of river health in the Fitzroy catchment, and for this agency to develop a 'catchment management plan', and a coordinated catchment-wide monitoring and assessment program.

Emergency response

It is clear that the Government processes for addressing the current Ensham emergency could be improved. Given the climate change predictions of greater variability in climate over the next 30-50 years, it is certain that similar emergency situations will occur sometime in the future.

Government should develop a set of Emergency Response Principles relevant to the mining industry to be applied in future situations, such as the current Ensham emergency. The Emergency Response Principles should include the need to: identify a lead agency, undertake a risk assessment, coordinate key agencies, develop an action plan, develop a community communications plan, and identify a key spokesperson.

8. Recommendations

Transitional Environment Program Process

- Rec 1: that EPA undertake a review of the procedures used to develop TEPs and publish the results (a new set of guidelines) on the EPA web site. This review should consider the need for (a) criteria for prioritising the importance of the TEP, (b) undertaking a risk assessment to assist in developing the TEP, (c) a checklist that ensures that all beneficial uses of the receiving waterbody are explicitly considered, (d) a better process for identifying and including key stakeholders in the TEP process, (e) better processes for ensuring the quality of the TEPs developed (e.g. documenting the reasons for various decisions or judgements), and (f) a process for informing the community of the situation associated with potentially controversial TEPs.
- Rec 2: that EPA introduce a process where they undertake random audits of the laboratories being used by mining companies for their ability to adequately sample, process and analyse water quality samples for heavy metals at trace concentrations.

Monitoring & assessment

- Rec 3: that EPA include the review comments in revising the draft Project Plan (Fitzroy Basin Water Quality Monitoring: Assessing the impact of Ensham floodwater release), and include a longer timeline for the study (at least 2 years - 3 wet-dry cycles) so that any recovery in the condition of the biota can be measured.
- Rec 4: that the EFAP surveys to be undertaken by DNRW this coming wet season are expanded to ensure that the effects of the flushing of higher salinity water on fish (and particularly Fitzroy Golden Perch) spawning and recruitment are measured and the implications for future years published.
- Rec 5: that the Biosecurity Queensland study of the 'health' of the fish in weirs be repeated, with other fish species and other storages included, and the study design improved.

Management Actions

- Rec 6: that Option A (to address some of the issues in Bedford and Bengegang Weirs) be implemented immediately, given the time for water to get from Fairbairn Dam to dilute that in Bedford Weir (3 weeks).
- Rec 7: that the Central Highland Regional Council establish a Task Force to develop a contingency plan for addressing the drinking water quality issue for Blackwater, Bluff, Tieri, Middlemount and Dysart should the Bedford and Bengegang Weirs not be adequately flushed during this coming wet season.
- Rec 8: that Option C (to address water quality issues in Eden Bann Weir and the Fitzroy Barrage) be implemented immediately.
- Rec 9: that a contingency plan be developed by DNRW during November to handle the possibilities that: (a) additional mine-affected water will be flushed into this system from the Isaac/Connors system, and (b) that the expected normal wet season flows will not occur and the expected dilution and flushing of mine-affected water from Eden Bann Weir and the Fitzroy Barrage do not occur.

Rec 10: that an emergency water management plan be developed during November 2008 to improve water quality in the Nogoa-Mackenzie-Fitzroy River system between the storages. This plan will need to be innovative and not constrained by the current restrictive ROP rules.

Fitzroy Water Resource Plan

Rec 11: that DNRW consider a more equitable balancing of water between consumptive users and the environment, and the provision of State-owned contingency allocation, during the 10-yearly review of the Fitzroy Water Resource Plan that is currently underway and scheduled to be completed in late 2009.

Caretaker of river health

Rec 12: that Government consider the appointment of a 'lead agency' to be the responsible 'caretaker' of river health in the Fitzroy catchment, and for this agency to develop a 'catchment management plan', and a coordinated catchment-wide monitoring and assessment program.

Emergency response

Rec 13: that Government develop a set of Emergency Response Principles relevant to the mining industry to be applied in future situations, such as the current Ensham emergency.

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Appendix A: Advantages and disadvantages of the potential management options

A.1 Options for the Mackenzie River Weirs

Option 1: No intervention – Normal ROP Operational Arrangement

Under this option there would be no intervention, with weirs drawn down to nominal operating level and water supplied to the townships from the weirs with no further dilution. Releases from Fairbairn Dam will occur under normal operating rules to maintain weir levels at nominal operating level. In summary the Nogoia-Mackenzie Water Supply System would be operated in accordance with current arrangements in the Fitzroy ROP, no specific arrangements would be made to enable additional releases from Fairbairn Dam to create inflows to Bedford Weir, no specific arrangements would be made to enable additional releases from Mackenzie River weirs.

This option includes the previous implemented modifications to town water supply intake works to ensure that better quality water near the surface can be accessed.

Under normal operating arrangements, DNRW do not anticipate that releases from Fairbairn Dam will be required to top up Bedford Weir before the end of the wet season, even without any natural inflows.

Assessment

This is essentially a 'business as usual' option with the hope for a good wet season.

Option 2: Normal ROP Operational Arrangement (Option 1), except also apply additional release management arrangements for Bedford and Bingegang weirs to manage water quality (this is the Interim Operational Strategy dated 31 October 2008)

This Option would see the normal ROP operating arrangements for Fairbairn Dam and downstream Weirs applying, and as much of the lower quality water stored at depth in the Weirs as possible released through regulation of flow from the outlet works of Weir storages.

This release strategy applies for releases associated with: (a) topping up downstream storages, and (b) natural inflows that trigger seasonal base flow environmental releases including overflows. Details of this Strategy are contained in the Interim Operational Strategy for the Nogoia Mackenzie Water Supply Scheme - 31 October 2008.

This Option 2 seeks to achieve better water quality in the Weirs than achieved under Option 1, when the opportunity arises. Under low to medium flow conditions, it is anticipated that poorer quality water at depth in the weir storages will persist until there is a larger flushing flow event. Operationally, this Option would aim to (a) scour as much of the poorer quality water in the weirs as possible under normal operating arrangements and low to medium flow conditions, without worsening downstream quality, and (b) reduce the risk of water quality deterioration as the weirs draw down, prior to significant natural flushing flows.

DNRW do not anticipate that releases for topping up downstream storages will be required for several months, as the storages are currently full or near full. Releases associated with small natural inflows are the most likely in the short term. Historically,

by end of December there is about a 36% chance of 30,000 ML natural inflow to Bedford Weir and a 25% chance of 60,000 ML.

Assessment

This is a sensible and feasible Option. However, if summer rains do not occur it may be necessary to invoke other Options (e.g. Option 2a and Option 4) to ensure the township water supplies do not deteriorate further.

Option 2a: Same as Option 2, except also apply small scale release from Fairbairn Dam if water quality in weirs worsens to intolerable levels

This is an extension of Option 2, to provide for the possible situation that the water quality in the weirs worsens to 'intolerable' levels. In this case small releases would be made from Fairbairn Dam to improve the quality of water in the Weirs available to the townships. The releases are much smaller than the releases proposed for Option 3, and are not intended to flush the weirs.

The water available for release is seasonally assigned and is located between Fairbairn Dam wall and the upstream limit of Bedford Weir. Seasonally assigned water is water that is ordered but not used (i.e. is allowed to flow through the system).

Assessment

This is a sensible and feasible Option. It could be argued that the drinking water currently supplied to Blackwater, Bluff and Tieri is already 'intolerable', and given the 3-7 week time for water to get from Fairbairn Dam to dilute that in Bedford Weir, this should be being planned for now.

Option 3: Release of water from Fairbairn Dam to flush Mackenzie River weirs

This Option would see the release of 30,000 to 70,000 ML from Fairbairn Dam (volume required is dependant on the mixing dynamics in Weirs) at about 1,500 ML/day to flush Bedford and Bingegang Weirs. The water available for release is seasonally assigned and is located between Fairbairn Dam wall and the upstream limit of Bedford Weir. Seasonally assigned water is water that is ordered but not used (i.e. is allowed to flow through the system).

If this Option was adopted, the Weirs on the Mackenzie River should be operated in accordance with the arrangements in Option 2.

The Fairbairn Dam is capable of releasing up to 1,500 ML/day, although the flow reaching Bedford Weir will be dependent on upstream consumptive usage. Under the existing ROP rules, Fairbairn Dam only releases water to top up Bedford Weir if this Weir is at or below its nominal operating level. Currently, the level in Bedford Weir is well above this level.

A seasonal assignment arrangement similar to that adopted by Ensham for diluting its releases would be required to implement this Option. Assuming the market price for seasonal assignment water in this system is say \$100 per ML, a volume of 30,000 ML would cost about \$3 million, although the actual cost will depend on market forces, including the presence of willing sellers.

Assessment

At this stage it does not seem that Option is feasible. I understand that the maximum amount that could be seasonal assigned into the Bedford Weir pond within the current ROP rules is in the order of 3,450 ML. It would therefore require considerable expenditure to secure the 30,000-70,000 ML required.

However, this Option should remain as a contingency Option should the wet season rains be less than required, and be re-evaluate (against the trucking and desalination Options (5 and 6) if needed in March 2009

Option 4: Pump poorer quality water from Bedford Weir and store in private farm dams for later use or release back when flows are higher

This option involves pumping poorer quality water out of Bedford Weir into nearby farm dams. There is a 5,400 ML storage adjacent to Bedford Weir, which is currently empty. If Option 4 was implemented, this would need to be coupled with (a) Option 2 and wait for natural inflows, or (b) Option 3 with release of water from Fairbairn Dam to top up Mackenzie River Weirs and improve water quality.

Although pump and diversion works have been installed at Bedford Weir, only small pump capacity (45 ML/day) is understood to be currently operational. Other works capable of 450 ML/day are currently not operational.

Water pumped out of Bedford Weir would need to be seasonally assigned. Assuming the market price for seasonal assignment water in this system is say \$100 per ML, 5,000 ML will cost about \$0.5 million.

While the Fitzroy ROP provides for seasonal assignment into the Bedford Weir pond, as at 23 October 2008, the maximum amount that could be seasonal assigned into the Bedford Weir pond within the ROP rules is in the order of 3,450 ML.

Assessment

This is a sensible and feasible Option. It is also the preferred option of the Central Highland Regional Council, the authority responsible for providing safe and palatable drinking water to the communities of Blackwater, Bluff and Tieri.

The main objections to this Option appear to be the result of the rather restrictive water use rules for this Nogoia-Mackenzie River system, rules that appear to be largely dictated by agricultural and industrial use of the water. These rules may need to be modified in the future.

However, given the current situation of less than adequate drinking water for the three towns in question, it is recommended that this option be further developed during November 2008 and implemented as soon as possible. Implementation of this option would have community support in that the Government would be seen to be doing something positive

A.2 Options for town water supplies

Option 5a: Trucking 'drinking' water supply supplies

This option considers supplementing the supply to Middlemount, Dysart, Blackwater, Bluff and Tieri from Bedford and Bingegang Weirs with an additional 'drinking' water supply trucked from another nearby town's water supply

Dysart and Middlemount currently obtain their town water supplies from Bingegang Weir, while Blackwater, Bluff and Tieri obtain their water supplies from Bedford Weir. The Emerald Town Water Supply is not affected by the poorer quality water currently affecting Bedford Weir and Bingegang Weir.

The cost to truck water from Emerald at a rate of 10 litre/person/day to Dysart, Middlemount, Tieri and Blackwater (total population 11,700) has been estimated be around \$100,000 per month. Some temporary storage infrastructure would also need to be installed to store the trucked water (not connected to town water supply network).

Assessment

This is a sensible and feasible Option that could be implemented rapidly if the water quality in the two Weirs deteriorates further. Obviously funding would have to be found to implement this Option. It is recommended that this option be part of a contingency plan should the water quality deteriorate further.

Option 5b: Mobile desalination plant

This Option would involve installation of a mobile desalination plant to supply either: (a) supplemented 'drinking' water only (would require residents to collect the water), or (b) desalinated town water through the existing town reticulation system.

Desalination plants to provide an output of about 100 kilolitre/day (or equivalent to about 9 litre/person/day for the total populations of Dysart, Middlemount, Tieri and Blackwater) are available and multiple units of this capacity can increase the capacity. The combined lease, operation and maintenance cost for such a plant would be about \$20,000 per month. Company's that set up these plants can monitor the plants performance remotely and will provide technical backup advice if required.

For comparative purposes, a reverse osmosis desalination plant providing an output of about 1.5 ML/day (1,500 kilolitre /day or equivalent to 130 litre/person/day for the total populations of Dysart, Middlemount, Tieri and Blackwater) would cost about \$100,000 per month (\$66,000 per month leasing plus \$30,000 per month operation and maintenance) plus the cost of brine disposal. Such plants are available commercially, generally in a transportable container and are used for mining and construction camps.

Assessment

This is a sensible and feasible Option. Obviously funding would have to be found to implement this Option. It is recommended that this option be part of a contingency plan should the water quality deteriorate further.

Option 5c: Other Town Water Supply Options

A number of pipeline options have been considered, including: (a) extension of Gregory Pipeline to Tieri, (b) extension of Burdekin to Moranbah Pipeline to Tieri, (c) extension of Pipeline from German Creek Mine to Tieri, and (d) reverse flow reticulation system to supply these towns from either the Eungella pipelines or the Burdekin/Moranbah pipeline.

Generally, these options involve the extension of existing pipelines, which involves major capital expenditure and a delay for procurement and construction. By their nature such works are permanent capital works.

The existing pipelines generally deliver untreated water, and to supply the townships with drinking water, the raw water could be delivered to the existing water treatment plants in each town, treated and reticulated through the town.

An alternative to supplying the whole town water supply from these pipelines, would be to supply a supplemented 'drinking' water supply only to the towns, requiring lower capacity pipelines which could be installed at a significantly lower cost. Such an arrangement might require a new low capacity treatment plant to be installed in each town. Alternatively, the raw water might be stored to allow the treatment plant to operate for periods at its minimum capacity. Storage of this treated water stored then allows residents to collect this drinking water from distribution points.

Complications arise from the need to treat this drinking water and keep it separate from the existing town water supply networks that continue to treat and supply the poorer quality water for purposes other than drinking.

Assessment

This is not a feasible Option at this stage. Preliminary cost estimates suggest that extensions of existing pipes, even for drinking water supply only, is cost prohibitive compared to other options as a solution to this temporary problem.

A.3 Options for the lower Fitzroy and the Fitzroy Barrage

Option 6a: No intervention – normal ROP operational arrangements

Under this Option, the Lower Fitzroy and Fitzroy Barrage water supply schemes would be operated in accordance with arrangements in the Fitzroy ROP. In summary, each storage supplies consumptive water from its pond, Eden Bann Weir would supply the reach upstream of the Fitzroy Barrage pond by releases, and when the Fitzroy Barrage falls to its nominal operating level (0.4 metres below full supply level), releases would be made from Eden Bann Weir to maintain the level in the Fitzroy Barrage at its nominal operating level.

The water quality in Eden Bann Weir and the Fitzroy Barrage, while elevated compared to normal water quality levels, has been and remains considerably better than the quality in the Mackenzie River Weirs.

Monitoring of water quality in Eden Bann Weir and Fitzroy Barrage has indicated that the water quality is highly variable throughout both storages.

Assessment

This is essentially a 'business as usual' option with the hope for a good wet season.

Option 6b: Same as Option 6a, except apply additional release management arrangements for Eden Bann Weir (the Interim Operational Strategy dated 31 October 2008)

This Option aims to achieve better water quality at the intake works for Rockhampton Regional Council and Stanwell Power Station than would be achieved under Option 1 if the opportunity arises. Implementation of this option may result in operation outside ROP rules

Under this Option, normal ROP operating arrangements for Eden Bann Weir and the Fitzroy Barrage would apply, except where it is otherwise determined that a release: (a) should be delayed because it was likely that it would worsen the quality of water

at the Rockhampton Regional Council and Stanwell Power Station intakes, or (b) should occur because it was likely that the release would improve the quality of water at the Rockhampton City Council and Stanwell Power Station intakes. The strategy details are contained in the Interim Operational Strategy for the Lower Fitzroy and Fitzroy Barrage water supply schemes dated 28 October 2008.

The water quality in Eden Bann Weir and the Fitzroy Barrage, while elevated compared to normal water quality levels, has been and remains considerably better than the quality in the Mackenzie River Weirs. However, it appears that there has been no consideration of other possibilities that could result in more mine-affected water from upstream being flushed into Eden Bann Weir and the Fitzroy Barrage, for example a small flow event in the Isaac/Connors system could flush mine-affected water reportedly in that system (S. Christensen, Personal Communication, October 2008) into Tartrus Weir, and then flush this water plus the mine-affected water current in Tartrus Weir further downstream.

Based on historical data there is a quite reasonable probability that large natural flows will occur in this system. For example, by end of December there is about a 50% chance of in excess of 122 GL natural inflow to Eden Bann Weir³⁰, a 75% chance of 162 GL by end of January, and 75% chance of about 440 GL by end of February.

Assessment

This is a sensible and feasible Option, and should be adopted. Additionally, I recommend that a contingency plan be developed during November to handle the possibilities that: (a) additional mine-affected water will be flushed into this system from the Isaac/Connors system, and (b) that the expected normal wet season flows will not occur and the dilution and flushing of mine-affected water from Eden Bann Weir and the Fitzroy Barrage does not occur.

Option 6c: Release of water from Fairbairn Dam to improve water quality in Eden Bann Weir and Fitzroy Barrage

This Option would involve the release between 150 GL and 250 G of waterL from Fairbairn Dam (at about 1,500 ML/day) to flush mine-affected water from Eden Bann Weir and the Fitzroy Barrage. It should be noted that this water is seasonally assigned (i.e. ordered but not taken up by irrigators) and would be located between Fairbairn Dam wall and the upstream limit of Bedford Weir.

If this Option was adopted, Eden Bann Weir should also be operated in accordance with the arrangements in Option 6b above.

DNRW Rockhampton have assessed that this Option is unlikely to significantly improve the quality of water in Eden Bann Weir for the following reasons: (a) Fairbairn Dam is only capable of releasing a maximum of 1,500 ML/day, with the flow reaching Bedford Weir and downstream Weirs dependent upon upstream consumptive usage and the state of downstream storages and waterholes, (b) the volume required to flush Eden Bann Weir and the Fitzroy Barrage will be dependant on the mixing dynamics in these storages, but could be in excess of 200 GL³¹, (c) the release of 100 GL at 1,500 ML/day will take more than 2 months (mid January),

³⁰ Note – Eden Bann Weir retains a volume of 40 GL at full supply level.

³¹ The capacity of Bedford, Binegang, Tartrus and Eden Bann weirs plus waterholes is estimated to be approximately 110 GL, and with the Fitzroy Barrage the total volume is in excess of 190 GL.

while the release of 200 GL will take more than 4 months (mid March), and (d) it is probable based on historical records that significant natural inflows would have occurred by the end of February.

A seasonal assignment arrangement similar to that adopted by Ensham for diluting its releases would be required. The cost of 200 GL of water has been estimated to be in excess of \$20 million. Additionally, removal of 200 GL of water from Fairbairn Dam would mean significantly less water for farmers around Emerald with considerable socio-economic impacts on the Emerald and surrounding communities.

Assessment

This is not a feasible Option at this stage given: (a) the time for water to travel from Fairbairn dam to Eden Bann Weir and the Fitzroy Barrage, (b) the cost to purchase the water, and (c) the reasonable probability that the impending wet season flows will flush the system. However, this Option should remain as a contingency Option should the wet season rains be less than required to flush the storages, particularly given that if this occurs the large Rockhampton community will face the prospect of drinking water that is less than adequate.

Appendix A: Advantages and disadvantages of the potential management options*

Option	Identifier	10. Advantages	Disadvantages
1	No intervention – Normal Resource Operation Plan (ROP) arrangements	<ul style="list-style-type: none"> • In accordance with the ROP • No impact on water entitlement security • Low cost 	<ul style="list-style-type: none"> • Requires a significant natural flow event for flush weirs and make a difference • If no natural inflows occur, the stored water quality will deteriorate as the better quality surface waters are drawn off for consumptive purposes and through evaporation • Water will not be released from Fairbairn Dam to top up Bedford Weir before end of wet season, even without any natural inflows
2	Option 1, with additional release management arrangements for Bedford and Bingegang Weirs to manage water quality (the Interim Operational Strategy 31 October 2008)	<ul style="list-style-type: none"> • In accordance with the ROP • No impact on water entitlement security • Low cost – only requires some additional operational and monitoring effort • Improved stored water quality for small to medium flow events in the short term • Limits downstream progression of poorer water quality 	<ul style="list-style-type: none"> • Requires a significant natural flow event for flush weirs and make a difference • If no natural inflows occur, stored water quality will deteriorate as the better quality surface waters are drawn off for consumptive purposes and through evaporation
2a	Option 2, with small scale release from Fairbairn Dam if water quality in weirs worsens to intolerable levels	<ul style="list-style-type: none"> • If water quality worsens to ‘intolerable’ levels, will improve quality of water available to towns • Delays need to secure seasonal assignment water compared to option 3, therefore increased opportunity for natural flows to improve water quality • Small volume of seasonal assignment water may be easier to secure than larger volume for Option 3 • High cost if needed, but likely to be lower than cost for large flushing release under Option 3, because of delayed need for releases and therefore increased opportunity for natural 	<ul style="list-style-type: none"> • Preparatory planning required to establish level at which water quality is ‘intolerable’ • Uncertainty over volume and rate of releases • Increasing public concern as water quality worsens to intolerable levels

		flows to flush without need for releases, and cost of seasonal assignment likely to be lower because of smaller volume sought	
3	Release of water from Fairbairn Dam to flush Mackenzie River weirs	<ul style="list-style-type: none"> • May make substantial improvement to water quality in Bedford and Bingegang Weirs within 3-7 weeks of commencement of releases (time depends on mixing dynamics) • Will improve quality of water at town water supply intakes 	<ul style="list-style-type: none"> • Quantity of water required to be seasonally assigned is not certain because of the uncertainty re mixing dynamic. This uncertainty is lessened by the release of poorer quality water through the weir outlets as part of this option • Water released will not be available for productive use (e.g. irrigation etc) in Nogoia system – potential socio economic impacts on Emerald community • Poorer quality water currently in Bedford and Bingegang Weirs will be flushed downstream • Need for willing sellers in market already subject to previous seasonal assignment • High cost • Reasonable prospects of natural inflows to Bedford by January 2009, making release of water from Fairbairn Dam unnecessary • Probability of substantial inflows into Fairbairn to 'replace' the released water is much less than at locations further downstream.
4	Pump poorer quality water out of Bedford Weir and store water in private farm dams for use by owner(s) of these dams	<ul style="list-style-type: none"> • Will achieve more rapid water quality improvement in the weirs than natural inflows into a full storage or releasing to a full storage • The pumped water may be able to be productively used (from the farm dam) • Would removal of some of the poorer quality water from the Mackenzie River, reduce the extent of poorer quality water passing downstream 	<ul style="list-style-type: none"> • Will require securing arrangements with owner of farm dam(s), and securing seasonal assigned water in market that has already experienced seasonal assignment of water • High cost • ROP may limit extent that this option may be implemented • Reasonable prospects of natural inflows to Bedford by January 2009 in which case pumping water out of the storage not needed
5a	Trucking 'drinking' water supply supplies	<ul style="list-style-type: none"> • Low cost Option (relative to other options) that 	<ul style="list-style-type: none"> • Possible adverse public perception

		<p>can be easily terminated when water supplies return to normal</p> <ul style="list-style-type: none"> • Low capital cost – preliminary estimate of cost of storage facilities might be in range of \$100,000 to \$200,000 • If water quality deteriorates in any town and can't be used for drinking, supplies can be obtained quickly • Reduces urgency to address water quality in Bedford and Binegang Weir 	<ul style="list-style-type: none"> • Residents would need to collect water from distribution points in town rather than having water delivered to homes
5b	Mobile desalination plant	<ul style="list-style-type: none"> • Desalination plants can be leased until no longer required • Cost is comparable to cost of trucking water and lower than other options 	<ul style="list-style-type: none"> ▪ For drinking water not connected to town water supply network, likely that temporary storage infrastructure needed to store the desalinated water ▪ For drinking water, residents would need to collect water from distribution points in town rather than having water reticulated to homes. ▪ Requirements in relation to disposal of brine
5c	Other Town Water Supply Options	<ul style="list-style-type: none"> • Provides an alternative/additional supply if future water supply and water quality problems occur 	<ul style="list-style-type: none"> • Very high cost of extending existing major pipelines • Uncertainty with availability of water allocations at critical periods • For low capacity drinking water supply pipelines, method of treating alternate raw water sources not clear • Potential to contaminate supplemented drinking water if use existing treatment works to treat both supplemented drinking water from alternate source and a larger volume of raw poorer quality water for purposes other than drinking
6a	No intervention – normal ROP operational arrangements	<ul style="list-style-type: none"> • In accordance with the Resource Operation Plan. • No impact on water entitlement security. • Low cost. • High probability of significant natural flow event by January 	<ul style="list-style-type: none"> • Water quality continues to deteriorate, affecting town water supplies • A significant natural flow event required for significant flushing of Eden Bann Weir and Fitzroy Barrage. <p>If no natural inflows occur, stored water quality will</p>

6b	Option 2, except apply additional release management arrangements for Eden Bann Weir (the Interim Operational Strategy 31 October 2008)	<ul style="list-style-type: none"> • No impact on water entitlement security. • Low cost – only requires some additional operational and monitoring effort. • Potential improved water quality at the Rockhampton Regional Council and Stanwell Power Station intakes if opportunity presents. • High probability of significant natural flow event by January. 	<p>deteriorate through evaporation.</p> <ul style="list-style-type: none"> • A significant natural flow event required for significant flushing of Eden Bann Weir and Fitzroy Barrage. <p>If no natural inflows occur, stored water quality will deteriorate through evaporation.</p>
6c	Release of water from Fairbairn Dam to improve water quality in Eden BannWeir and Fitzroy Barrage	<ul style="list-style-type: none"> ▪ May improve quality of water in Eden Bann Weir and Fitzroy Barrage in 4 to 5 months if wet season essentially fails. BOM forecasting suggests failure of wet season unlikely at this time. 	<ul style="list-style-type: none"> ▪ The quantity of water required to be seasonally assigned is substantial and would be expected to have a significant impact on production in the Nogoia Mackenzie system -potential socio economic impacts on Emerald community ▪ Extremely unlikely required volume will be available for seasonal assignment ▪ Need for willing sellers, in market already subject to previous seasonal assignment ▪ Very high cost ▪ Good prospects of natural inflows to Eden Bann Weir by January 2009, and release of water from Fairbairn Dam not needed/not beneficial ▪ Probability of necessary substantial inflows into Fairbairn to “replace” released water much less than at locations further downstream. ▪ Poorer quality water stored in Bedford and Bingegang weirs passes downstream - may be an initial worsening of water quality before any improvements

* This information was provided by DNRW Rockhampton.



Procedural Guide

Incident Response

2.10 – Mine industry incidents

Procedural guides further define complex decision-making processes or requirements of the Department of Environment and Resource Management. Procedural guides provide guidance and information to assist staff in the completion of specific tasks or in making certain judgments. Procedural guides are for internal use only.

Purpose and scope

This document guides DERM personnel on the issues, responsibilities and roles in responding to releases of hazardous and toxic materials such as chemicals and wastes from mine sites to places where they may cause environmental harm.

Background

Mine activities often involve the use of large quantities of hazardous materials such as explosives and mineral processing chemicals, as well as large volumes of wastes in the form of waste rock, tailings, process water or air emissions that contain hazardous materials. The consequences of releases of these potentially hazardous materials as a result of accidents, process failures or extreme weather events can range from minimal to severe depending on the toxicity and quantity of materials released and site specific circumstances such as proximity of residents, environmental values affected and dilution in the atmosphere and waterways.

While many mine sites are located in remote area with minimal immediate risk to high density populations, they are often adjacent to waterways where releases may pose a risk to downstream ecological values and catchment uses over very large areas. Impacts may include: contamination of land and waters; acute and chronic toxic effects to biota and productivity of plants, fish, animals (including livestock) and birds; and public health risks such as contaminated drinking water, fires, explosions, and fumes.

Mine sites operate under environmental authorities with conditions that may include stated measures for carrying out the activity and any authorised levels of releases. Mine sites must have appropriate emergency response and recovery plans relevant to the specific risks for the site and the adjacent environment. Site owners are responsible for these incident plans, responses and clean up activities for any associated pollution incidents.

The extent of the impacts from mine site releases will depend on a range of factors including the contaminant type, release quantity, the area of impact, the rate of the release and site specific circumstances such as the proximity of sensitive environmental values, populated areas, seasonal conditions, level of dilution in water bodies and the capacity of the environment to absorb impacts.

Contaminants of concern can include:

- Process chemicals (e.g. cyanide residues)
- Acid mine drainage (e.g. from mine pits or waste dumps or tailings dams)
- Saline waters (e.g. salty, sulphate or mineral rich waters)
- Mineral releases (e.g. heavy metals leaching or controlled or uncontrolled releases)
- Bulk sediments (e.g. fines from coal washing or tailings or site erosion)
- Explosives (e.g. large volumes of ammonium nitrate)

This procedure is intended to cover mine site releases of short duration and acute impacts that require immediate response action and are not intended to cover chronic releases even though they may be related to an initial acute incident.

Releases can be in the form of a specific incident such as spills, a dam failure or protracted discharges due to prolonged wet weather causing over-topping of containment structures. All releases to waters should be considered as having the potential for adverse impacts given the sensitivities of aquatic ecosystems and downstream water users.

Procedure

Initial Incident Classification

The following initial classifications are to be used as a general indication only. Specific determination of the incident classification level will be determined on a case-by-case basis considering:

- Specific contaminant toxicity and reactivity
- Amount/volume of release
- Proximity to populated areas
- Proximity, size, value and sensitivity of adjacent environmental areas (considering habitat type, area at risk, threatened species, downstream users, etc)
- Mitigating factors (e.g. seasonal conditions or dilution)
- Rate of the release (e.g. short intense slug or spread over time)
- Extent of area impacted
- Pathways for spill to enter a waterway or an area where the public may be exposed.

The following thresholds can be used as an *initial guide* to classifying incidents.

Minor Incident
Release to land of small quantities of low-risk chemicals, explosives, flammable or hazardous materials on or beyond the boundaries of the mine site, with no release to a waterway
Release to waterways of small quantities or low concentrations of contaminants for a short period that are unlikely to cause acute harm in the adjacent environment and will have no discernable effects on overall or downstream water quality or use

Medium Incident
Release to land of moderate quantities or concentrations of contaminants on or beyond the boundaries of the mine site that may cause acute or long-term environmental harm.
Release or potential release to a waterway of moderate quantities or concentrations of contaminants that may cause acute harm in the adjacent environment and may have an effect on downstream water quality and use. Contaminants may include chemicals, explosives, flammable or hazardous materials.

Major Incident
Release to land of large quantities or concentrations of contaminants on or beyond the boundaries of the mine site that may cause wide-spread environmental harm.
Release to waterway of large quantities or concentrations of contaminants that are expected to cause acute harm in the adjacent environment and will have an effect on downstream water quality. Contaminants may include chemicals, explosives, flammable or hazardous materials.

Actions

Minor Incidents - Business Hours & After Hours

- Regions to manage any response requirements.
- Responses only during normal business hours.
- Contact mine site/manager directly.

- All reasonable measures need to be taken to minimise the release of contaminants.
- Mine site/manager will need to provide incident notification reports.
- Regional staff may attend as is appropriate.
- Regional Managers can escalate Minor incidents to a Medium classification based on environmental risk matrix assessment.
- DERM to provide advice on minimising environmental harm generally.
- All incidents to be recorded.

Medium Incidents

Business Hours

- Regions to manage any response requirements.
- Regional staff to be mobilised and attend as required.
- Regional may contact SIRN for technical support and direction.
- Contact mine site/manager to arrange a response.
- All reasonable measures need to be taken to minimise the release of contaminants.
- DERM to provide advice on minimising environmental harm generally.
- All incidents to be recorded.
- Regional Manager to be advised and brief upwards as appropriate.

After Hours

- SIRN to manage initial assessment and decide on any response requirements.
- Regional staff to be mobilised and attend as recommended by SIRN (24 hour response capacity may be required).
- Contact mine site/manager directly to arrange a response.
- Regional staff to act as field support for SIRN with technical support and direction from SIRN.
- Regional Manager to be advised and brief upwards as appropriate.
- All reasonable measures need to be taken to minimise the release of contaminants.
- DERM to provide advice on minimising environmental harm generally.
- All incidents to be recorded.

Major Incidents

Business Hours & After Hours

- Incident Response Unit (IRU) to manage initial assessment and decide on any response requirements within the constraints of any disaster or safety declarations.
- SIRN staff to be mobilised on site to manage DERM response (24 hour response capacity required).
- Regional staff may be mobilised and attend to bridge time required for IRU/SIRN to attend (24 hour response capacity may be required).
- Contact mine site/manager directly to arrange a response.
- Regional staff to act as field support for SIRN with technical support and direction from SIRN.
- Regional Manager to be advised and brief upwards as appropriate.
- All reasonable measures need to be taken to minimise the release of contaminants.
- DERM to provide advice on minimising environmental harm generally.
- All incidents to be recorded.

Issues to consider

Tactical Options

1. Confirm MSDS information considering:
 - Safety warnings;
 - PPE requirements;
 - Reactivity Alerts and Profiles;
 - Air and Water Reactions;
 - Health Hazards from fumes and contact;
 - Response Recommendations:
 - Fire Fighting;
 - Containment, neutralising and cleanup;
 - First Aid;
 - Disposal requirements.
2. Identify environmental threat considering:
 - Proximity to human communities;
 - Habitat type;
 - Size/area of habitat at risk;
 - Sensitivity of the area to threat;
 - Listed threatened status of habitat;
 - Wildlife species at risk;
 - Wildlife numbers at risk;
 - Wildlife diversity at risk;
 - Threatened status of wildlife;
 - Environmental toxicity issues;
 - Potential for impacts on downstream water supply / beneficial uses.
3. Response options:
 - Secure area;
 - Stop or minimise the flow or escape of material from primary source;
 - Minimise or stop the movement of contaminants by appropriate containment;
 - Look at soaking up contaminants with sand, earth, cement or other absorbents;
 - Construct earthen bunds in catchments as primary and secondary containment options;
 - Implement other containment devices (e.g. booms);
 - Use vacuum trucks and tip trucks to remove contaminants;
 - Look at dilution and neutralisation options;
 - Minimise mixing of contaminants with other reactive sources;
 - Minimise generation of excess contaminated soil or water;
 - Manage fire and fire risks;
 - Consider burning as a disposal option.
4. Contact the owner of the site or transport company for a copy of their emergency response plan.
5. Notify compliance investigators.
6. Request sampling activity for evidence and recovery purposes.
7. Internal Agency briefings (potentially) include:
 - Office of Water Supply Regulator, Water authorities and Users
 - Regional Manager (Regional Service Delivery and QPWS)
 - Regional Service Director (Regional Service Delivery and QPWS)
 - State Compliance Unit
 - Assistant Director-General (Regional Service Delivery and QPWS)
 - Media Unit
 - Director Generals Office
 - Minister's Office
 - Premier's Office

- State Disaster Management Group
 - Contaminated Lands Unit
 - Petroleum and Gas Group
 - Regulated Dams Group
8. External agency briefings (potentially) include:
- Emergency Services
 - Qld Fire and Rescue Service
 - Queensland Police Service
 - Queensland Ambulance Service
 - Emergency Management Queensland
 - Local Authorities
 - Water supply authorities
 - Downstream water users / stakeholders
 - Qld Health
 - Biosecurity Queensland
 - Transport and Main Roads
 - Mines and Energy
 - Maritime Safety Queensland
 - Great Barrier Reef Marine Park Authority
 - Australian Maritime Safety Authority
9. Private industry support for:
- Waste transport
 - Waste storage
 - Waste treatment
 - Response support

Roles and Responsibilities

DERM

Provides advice and support on environmental protection issues; risk assessment; cleanup; recovery and waste disposal.

- Ensure that cleanup is to an appropriate standard.
- Provide regulatory oversight and supervision as necessary.
- Compliance role including evidence collection as necessary.
- Ensure a proper transition from the initial emergency response phase to the longer-term recovery phase (administered by the Region) including management of acute and chronic impacts.
- Ensure that recovery phase planning and implementation occurs in accordance with the documented *Policy principles - mining industry incidents*.

QPWS

- Response combat support as determined on a case-by-case basis.
- Provide flora and fauna advice for impacted areas.

Office of Water Supply Regulator, Water authorities and Users

Where there is the potential for contaminants to adversely affect public drinking water supplies, for both surface and groundwater situations, the Office of Water Supply Regulator and relevant water authorities and users should be contacted.

- Office of Water Supply Regulator, in conjunction with Queensland Health, may provide; public health advice and direction, interpretation of laboratory results and advice on safe levels of contaminants.
- Water supply authorities are responsible for water impoundments, water treatment and supply.
- Stakeholders within the likely affected downstream areas should be notified of the incident and advised the necessary precautionary actions to take.

Qld Police Service (QPS)

Where the *Public Safety Preservation Act* has been declared the responsibilities of the QPS are to provide:

- Control and coordination of the incident (including the on-site and off-site emergency environment);
- Coordination of the efforts of contributory agencies;
- Securing the incident scene from unauthorised entry or departure;
- Crowd and traffic control.

Additional Police responsibilities include:

- Establish and maintain Police Forward Command Post (PFCP) including the media centre;
- Security support for Queensland Ambulance Service casualty collection, treatment and transport loading areas;
- Facilitating resource supply through State Crisis Centre (when applicable);
- The rendering safe of explosive devices;
- Establishing registration of evacuees;
- Establishing victim registration both deceased and alive;
- Controlling entry/egress points from the cold zone and outer cordon;
- Staging and marshalling areas off-site for supporting agencies and resources;
- Coordination of public protection strategies including evacuation and adjacent refuge;
- Liaison with QFRS/QAS/QH (at on and off-site locations);
- Evidence security – where criminal or negligence origins are evident;
- Engaging with the Media in concert with the QFRS Incident Controller.

Queensland Fire & Rescue Service (QFRS)

QFRS has lead responsibility for protection of persons, property and the environment from fire and hazardous materials emergencies. It also provides an advisory service, and other measures to promote safety and protect property if a fire or hazardous materials emergency happens.

The QFRS will act as the lead Chemical/HazMat combat agency and will:

- Identify, contain and mitigate the hazard;
- Identify Chemical/HazMat operating zones for the safety of personnel including those of other agencies;
- Rescue and decontamination of persons who are not fully ambulant and are known to be contaminated;
- Engage with the media in liaison with the Police Forward Commander.

Additional QFRS responsibilities may include:

- Establish and maintain incident hot/warm/cold zones with controlled entry/egress points;
- Maintain appropriate Chemical/HazMat Control Procedures;
- Identify and tag contaminated articles including clothing;
- Decontaminate incident personnel and the public;
- Assist in off-site decontamination where possible;
- Control entry operations within the hot zone such as rescue and identification;
- Provide a Liaison Officer to interact with the Police Forward Command Post;
- Provide Chemical/HazMat assistance to other responding agencies where biological or radiological hazards are present.

The QFRS HazMat function is supported by the Response Advice to Chemical Emergencies (RACE) team. RACE support includes:

- An expert mobile advisory service on and off site in respect to chemical incidents;
- Specialist training for emergency services for response to Chemical/HazMat Incidents;
- Carrying out on-site tests to determine the type, concentration and distribution of the hazardous substance involved;
- Providing expert advice to the QFRS Controller and QAS Commander and liaison with Qld Health in respect to determining the threat from the particular hazard;
- Providing information and advice to the QFRS Controller and the Police Forward Commander and the QAS Commander, about Chemical/HazMat implications for management of the incident. This advice may be about the degree of threat from the hazard, the location and dimensions of the spread of the hazard and assistance in establishing Chemical/HazMat Control Zones and Public Protection Strategies;
- Sample management that may include retrieval and liaison with Qld Health and other agencies.

Queensland Ambulance Service (QAS)

QAS is responsible for on site medical care in consultation with Qld Health including establishment of casualty collection, triage, treatment and assessment areas and transportation of patients to appropriate health facilities. Additional Responsibilities include:

- Maintain casualty collection, triage and treatment areas;
- Establish and maintain ambulance transport area;
- Establish the casualty collection post adjacent to the decontamination corridor exit (on advice from the QFRS Controller);
- Establish the casualty triage and treatment areas at a distance, which will provide optimum protection to casualties and personnel (on advice from the QFRS Controller);
- Provide a Liaison Officer to the Police Forward Command Post;
- Estimate and obtain on and off-site medical and health resources as required;
- Notify Multi-Casualty Incidents (MCI) to Queensland Health.

Queensland Health (QH)

QH provides public health advice and direction including advice to the Medical and Ambulance Commanders on the clinical management of casualties as well as:

- Hospital or other health facility casualty response as required;
- On-site medical team support in consultation with Ambulance Commander;
- Off-site laboratory analysis of materials, including biological samples;
- Advice on decontamination.

Biosecurity Queensland

Biosecurity Queensland is the lead combat agency for emergency animal and plant diseases that occur in Queensland. Biosecurity may become involved in a mine site release incident when:

- The release of a pollutant may destroy or render livestock or agricultural products unsafe for use as food for humans or other livestock;
- The release of a pollutant may destroy, damage or render unusable land or waters that are used for farming or fishing related purposes;

Any of the above situations can present a serious threat to the food chain and the natural environment and are guided under arrangements outlined in the *Queensland Veterinary Emergency Plan*.

Biosecurity may provide; advice and direction on agricultural issues, interpretation of laboratory results and advice on safe levels of contaminants.

Mines and Energy (M&E)

The M&E Gas Examiner's duties as outlined under the *Petroleum & Gas Act, 2004* and the Explosives Inspectorate as outlined in the *Explosives Act, 1999*. M&E provide safety advice in the areas of explosives, petroleum and gas related incidents including providing advice on explosives issues ranging from commercial high explosives to pyrotechnics and fireworks plus advice on incidents relating to oil production and those involving natural or LP gas.

State Emergency Services (SES)

The SES is a volunteer based organisation providing response personnel support. SES is mobilised by the Department of Emergency Services in times of general emergencies and disasters.

Qld Transport (road)

- May be contacted during incidents;
- Formal requirements and contact systems to be finalised.

Local Authorities

- Councils may need to be contacted also to clean up small amounts of pollutants or be advised of water quality issues that may affect water supply and other beneficial uses.

Utility Companies

- May need to be contacted also to be advised of water quality issues that may affect water supply and other beneficial uses.

Mine Site Owners

- Responsible for contacting those who may be impacted;
- Responsible for clean up costs and arrangements;
- Responsible for meeting conditions of environmental authorities and general environmental duty;
- Responsible for meeting the requirements of any orders and any ongoing monitoring.

Industry Support/Contractors

- Waste Transport
- Waste Storage
- Waste Treatment
- Response Support

Contacts

Refer to Procedural Guides for Environmental Incidents: Appendix 2 - Contact List

Legislation

Public Safety Preservation Act 1986

Ambulance Service Act 1991

Dangerous Goods Safety Management Act 2001 Dangerous Goods Safety Management Act 2001

Environmental Protection Act 1994

Explosives Act 1999

Transport Operations (Road Use Management - Dangerous Goods) Regulation 1998

Fire and Rescue Service Act 1990

Public Safety Preservation Act 1986

Police Powers and Responsibilities Act 2000

Public Health Act 2005

Public Health and Other Legislation Amendment Regulation 2007

Radiation Safety Act 1999

Resource References

- See web site: <http://www.emergency.qld.gov.au/>
- State of Queensland Multi Agency Response Plan to Chemical, Biological Radiological Incidents;
- State of Queensland Chemical/Hazmat Plan;
- Hazardous Materials Incident Recovery Plan 2008;
- Australian Veterinary Emergency Plan
- National Plan to Combat Pollution of the Sea by Oil and other Substances
- EPA Marine Pollution Response Plan
- MOU between EPA and QH
- MOU between QFRS and EPA
- MOU between GBRMPA and EPA
- MOU between QT and EPA
- Environmental authorities for mine sites
- DERM files for mine sites.

Approved by:



Signature



Date

Ian Wilson
Senior Director
Technical Operations Branch



File/Ref CTS 21349/10

Department of
Environment and Resource
Management

24 November 2010

Ms Frances Hayter
Director
Environment and Social Policy
Queensland Resources Council
Level 13
33 Mary Street
BRISBANE QLD 4000

Dear Frances

I refer to the work that the Department of Environment and Resource Management and the Queensland Resources Council have jointly undertaken with respect to the Fitzroy River Basin Model Conditions for Mine Water Management.

Enclosed are two documents - the agreed record of the workshop with the QRC, and the model conditions with amendments that DERM intends to make included in "track changes".

The following is a summary of the changes that have been made to the model conditions in reference to the particular issues identified in the Final Meeting Notes:

(a) Notification timeframes

Condition W12 has been amended as follows:

The authority holder must notify the administering authority as soon as practicable (within no later than 6 hours of having commenced deliberately releasing mine affected water to the receiving environment from an authorised discharge point, and no later than 12 hours after any uncontrolled release from an authorised discharge point). Notification must include the submission of written advice to the administering authority of the following information:

(b) Dilutions and flow rates

Condition W9 and Table 4 have been amended as a result of consultation with Dr Ian Ramsay of Environment and Natural Resource Science who attended the workshop.

The modified explanations to Table 4 and the amendments to Table 4 and condition W9 are believed by DERM to satisfactorily address the issues raised by QRC for the purposes of the model conditions. Condition W9 has been amended as follows:

The volume released through the release point(s) must not exceed the maximum allowable flow at any time determined by multiplying the recorded receiving water flow at the corresponding gauging station in Table 4 with the corresponding percentages for maximum release in Table 4.

As a matter of principle there can not be releases where there is no flow in a river. However the revised provisions give greater flexibility with respect to the calculation of the proportion of that flow that can be taken up by a mine discharge.

(c) Suspended solid limits

Table 2 has been amended to allow for the monitoring of turbidity as a measure of compliance where there is evidence of a correlation between turbidity and suspended solids.

The modified requirements of Table 2 are believed by DERM to satisfactorily address the issues raised by QRC for the purposes of the model conditions.

(d) End of pipe water quality limits

In essence the QRC position on this came down to a request that the model conditions provide for mixing zones in the rivers as a means of achieving water quality outcomes.

No changes have been made to the model conditions in relation to this matter. On review DERM considers that it is open to individual sites to make a case based on toxicity assessment at the end of pipe to deal with this issue.

(e) Distinctions between different types of water releases

QRC provided a detailed paper about ways in which it may be possible to define different types of water on mine sites – worked water and non-worked water. The paper sought to differentiate water that has been affected by mining activities from water that was unaffected.

This is a complex issue that DERM does not believe can be resolved by simple variations to the model conditions. DERM has gone some way towards dealing with part of this matter by including in the explanation to Table 1 some guidance about the exclusion as release points of sediment traps and dams that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan.

Revision of the way in which water on a mine site is classified and regulated should await the further review of the model conditions in the second half of 2011.

It is the responsibility of individual mines to be planning for the management of water in a timely fashion and with sufficient foresight to anticipate what impacts the accumulation and discharge of water may have. There are a range of measures that mines can take through amendments to environmental authorities and Transitional Environmental Programs that can be used to ensure that their operations are compliant with the *Environmental Protection Act 1994*.

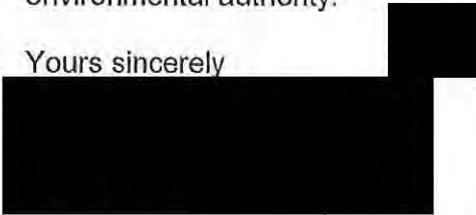
DERM has recently approved a Transitional Environmental Program for Xstrata Coal's Rolleston Mine that goes further than the model conditions and under particular circumstances allows that mine to discharge water held on site thereby providing greater

capacity for the forthcoming wet season. DERM has had discussions with both Macarthur Coal and BMA about a similar approach for their mines. DERM will continue to respond to these issues in a timely and practical way.

I am aware that there is often a reluctance to go down the path of using a Transitional Environmental Program. It is nevertheless an effective lawful mechanism that is available to companies that may have difficult circumstances to manage, and wish to seek some dispensation in the way in which the normal environmental authority conditions apply.

With respect to these revised conditions taking effect, DERM intends to issue a 'letter of comfort' for the notification timeframes in order to minimise amendment application processes for this minor change. This will remain in effect until such time as a company makes an amendment application for other matters. The remaining changes to the model conditions will require evidence based applications and therefore will require an amendment application to be made in the normal way, that is it will be for each company to decide when/if they wish to have any changes made via an application for an amendment to their environmental authority.

Yours sincerely


Anne Lenz
Acting Assistant Director-General
Environment and Natural Resource Regulation

Encl. .

(C)

(C)

Meeting Notes - Final
DERM / QRC Meeting
Model Water Conditions (3 November 2010)

Discussion of Specific Issues

a) Notification timeframes

This item related to model condition W12 which outlined the requirements for the initial notification timeframe and content requirements. Industry representatives indicated that the specified limit of 'no later than 6 hours of having commenced releasing mine affected water' was impractical due to the following reasons:

- Discharges often from overflowing rather than from turning on a valve (eg, from dam spillway or stormwater) – therefore the timing of the discharge not necessarily during business hours or immediately known.. There are also many types of minor 'passive' releases which are not necessarily located at authorised discharge points [as discussed in relation to item (e)].
- Size of some mine sites – some mines are extensive in area and can take best part of an hour or more to drive from one end to the other. In rainfall events, some roads may be inaccessible and therefore total time from commencement of discharge to notification time is likely to be more than 6 hours. In addition, there may be health and safety reasons during or just after severe storm events when personnel either cannot or should not access particular locations (eg, if there has been a landslip).
- When rainfall events commence overnight, this compromises ability to notify within 6 hours given the shortage of appropriately qualified or authorised staff to make a decision whether the condition is triggered or to prepare and issue correspondence.
- It is often impracticable to ascertain all of the content requirements for the notice immediately, for example, it may be difficult to ascertain estimated volume in poor lighting at night, it may be difficult to predict a release cessation timeframe for an overflow when it is uncertain whether a rainfall event will stop, ease or increase and impacts are often not immediately known. It has often not been the experience that DERM officers have been satisfied with initial 'rough estimates' and companies are concerned about appearing to give false and misleading information if they turn out to be incorrect in their forecasts of cessation time (due to uncertainty of forecast), volume or impacts. In addition, the term 'verification' in the condition appears to have led some DERM officers to take a stringent view of the content requirements.

Industry commented that the 6 hour requirement was perceived to be driven by a requirement that the Department receive notification about the discharge in order to 'meet the news cycle and brief the Minister'.

It was clarified that industry did not mean by this that they expected someone else to notify DERM first, but rather, that a 6 hour requirement is not practicable in terms of the content requirements.

Industry also emphasised that this is not a condition about notification of breaches or serious/material environmental harm, but rather, would normally apply to authorised releases. It is seen as unjustifiable to impose a more stringent period of notification for authorised releases, than in relation to the normal standard for notification of breaches or serious/material environmental harm.

Solutions Proposed:

- Industry representatives requested a 24 hour notification timeframe
- Another suggestion was to encourage a staged approach, including:
 - 1st stage :Notification within 6 hours, but without any supporting information [i.e. items for which information is known within 6 hours
 - 2nd stage: Completed notification within 24 hours complete with supporting information [i.e. items W12 a) through to f)]
- Another suggestion was for a 12 hours initial notification period.
- Leaving aside the question of timeframe, it was suggested that the potential for unnecessary over-notification could be minimised by more clearly defining the scope of which releases need to be notified and removing the term 'verification'. Although not included in the model conditions, the actual conditions received by many mines include an ambiguous definition of 'mine water' described as 'process water and contaminated water'. Potentially, this could include a greater range of types of water releases than intended [discussed in more detail at item (e) of the agenda].

Action agreed - there was agreement that DERM would give consideration to a 12 hour timeframe for reporting. The question about definitions was 'parked' until item (e) of the agenda was reached.

- It is noted that use of the word 'verification' in condition W12 has led some DERM officers and industry representatives to be particularly concerned about the extent of information required, particularly in relation to item (f). *'any details (including available data) regarding likely impacts on the receiving water (s).'*

b) Dilutions and flow rates

This issue is primarily about condition W9 of the model conditions: 'Contaminant release flow must not exceed 20% of receiving water flow rate.'

Ian Ramsay explained that, at the time the original model conditions were prepared, there was insufficient scientific data about what rate would be reasonable as a baseline (or in individual circumstances). DERM's intention had been for individual mines to negotiate appropriate flow rates, based on their particular circumstances. The intention to allow for variation in the 20% rate was supposed to be covered by the explanatory notes before Table 4.

Industry commented that this did not appear to have been the way that condition W9 was addressed in practice.

Industry representatives outlined their concern that they were retaining excessive volumes of good quality water given the restrictions on discharge dilutions with the receiving water flows, because the conditions prevent mines from releasing that water in a timely way during the current 'window of opportunity' before the wet season is fully underway, as natural flow rates are not sufficiently high yet. If the

industry cannot take the current 'window of opportunity', then day by day, the quality of the accumulating water is gradually deteriorating. By the time that natural flow rates are sufficiently high for releases to be permitted under the conditions, there will be a very large volume of water that will be released and the quality will be significantly worse.

It was confirmed that this is seen as an industry-wide issue and there were comments that nearly every mine is concerned about this issue.

Jon Womersley suggested that each mine should negotiate different flow rates on a case by case basis. One industry representative commented that they had been told that the 20% figure was a Cabinet decision and could not be varied, notwithstanding that the DERM officers involved said that they accepted that the scientific data provided would otherwise have been relevant.

Other industry representatives explained that negotiation of upstream natural flow rates is particularly difficult if a mine happens to be located at the top of a catchment..

Action agreed – there was agreement to reposition the explanatory notes in the condition (extended W9) to outline the case specific requirements when a 1:4 dilution cannot be achieved. It was proposed to relocate the paragraph within the existing explanatory note #4 '*under certain circumstances.....*'. There was discussion on how this would be reviewed on a case by case negotiation basis, although each and every submission would need to be supported by a characterisation of the quality of the water to be discharged, in particular the electrical conductivity values.

c) Suspended solid limits

Industry representatives outlined concern over the requirements in Table 2 (Contaminant Release Limits) for suspended solids. It is understood that analytical tests for Suspended Solids have a longer laboratory turnaround time given the nature of the test and currently there is no reliable field based test to measure suspended solids.

Industry representatives concerned over inability to ensure compliance prior to discharge. This is because the contaminant release point is at 'end of pipe' and given the restrictions associated with turnaround time and field methods, there is no way to ensure prior to discharge that the suspended solids limit is met.

It was confirmed that this is seen as an industry-wide issue and there were comments that nearly every mine is concerned about this issue.

Solutions proposed included:

- DERM suggested looking at relationship between suspended solids results and turbidity and internally correlating results so that an empirical relationship is developed between two parameters for particular storages; and
- Introduce turbidity limit in place of suspended solids limit; and
- Measure suspended solids concentration, but not have this as part of the Contaminant Release Limits.

Action agreed – that DERM would give consideration to swapping turbidity for suspended solids, so that in table 2 'suspended solids' is 'n/a'. (Industry had no objection to continuing to monitor for suspended solids, provided that this is not a table 2 parameter preventing release.)

d) End of pipe water quality limits

Concern expressed over absence of recognised 'mixing zones' for discharges.

High EC water is being accumulated given restriction on mixing zones.

Preferred DERM position is:

- 'no mixing zone' for acute toxic contaminants;
- No amendment to the model conditions regarding a mixing zone, but that individual mines may still propose a case by case mixing zone, other than for acute toxic contaminants.

Solutions proposed included:

- Review case by case for sites that require mixing zone;
- DERM to provide guidance on toxicity assessment for end of pipe; and
- Consider use of diffusers.
- There was some suggestion by DERM that sites may create their own internal mixing zones, prior to 'end of pipe' discharge. Industry representatives responded that the low water quality parameter for EC means that some mines have had to mix salty water with fresh water on site to create adequate internal dilution, that is, an on-site mixing zone. A number of representatives commented that this leads to: (a) very large storages involving significant additional disturbance and the need for additional mining leases (infrastructure); and (b) high use of fresh water (such as overland flow), which could perhaps be more efficiently used for other purposes. DERM (Ed Donahue) noted the difficulties this is likely to create for water resource management, and that this is the reason for the current exemption for mining EAs under WRPs. There was some suggestion that this could compromise the new Water Resource Plan (due out soon) and also that ultimately applications to harvest fresh water could lead to forced relinquishment of water allocations (from pipelines). QRC suggested that this is an issue for DERM to resolve in a policy sense, between its environment arm and its water resources arm.

Action agreed – that DERM would give consideration to the issues raised and any possible solution.

e) Distinctions between different types of water releases

Industry provided some pre-prepared discussion notes on this matter (refer to these)

Industry concern over:

- confusion in industry and government over existing definitions, and that it would be preferred to have a demarcation with definitions of worked water and other waters;
- need to separate management of authorised releases versus waterflows managed under an erosion and sediment control plan
- too many structures being recognised as a contaminant release point within a mine's catchment. The majority of these releases could be managed via the Erosion and Sediment Control Plan if the water meets standards/outcomes

defined in the Erosion and Sediment Control Plan. The remaining discharge points need separate management that would be specified in Table 1.

- If each minor release (eg, sumps, levees, seepages, 'true' sediment dams) are required to be monitored under Table 2, the unintended consequence would be for mines to consolidate these items into larger storages, but it is better management to have smaller storages and releases.

Action agreed – that DERM would give consideration to the issues raised and propose a solution having:

- worked through QRC discussion notes and come back to QRC with response
- developed a ready reckoner of definitions to avoid confusion around terminology e.g. Passive versus Active, Mine Affected Water, Worked Water
- provided undertaking to provide communication to staff on the issue of 'over-regulating/ over-prescribing' too many discharge points on each and every structure. Instead that the intent of the authorised release points was only to cover controlled discharges, and it was accepted in discussion that this included spillways associated with controlled releases. In particular, the original practical intention was that 'true' sediment dams were intended to function under ESCPs, rather than under authorised discharge points and associated tables.
- Consideration should be given to the requirements for ESCPs, in particular, that sediment dams are properly located, cleaned out and properly maintained.

6. Arrangements for implementing changes to the Model Conditions

DERM committed to providing response to QRC by Friday 11 November 2010. DERM indicated that it would advise QRC if an extra week was needed to prepare the response.

QRC invited DERM to continue to discuss any questions with QRC in the meantime, for example, if further information would be of assistance, or to discuss terminology and definitions.

7. Arrangements for review of Model Conditions post 2011 wet season

DERM indicated that a review of the model conditions would be undertaken following the 2011 wet season once more monitoring data was available and a review of performance against conditions was completed. DERM indicated that it would develop and agree with QRC on a project plan (including terms of reference) for the conduct of that review, and that this would be done mid 2011.

DERM invited the industry to provide interim results in about March/April 2011.

Final Model Water Conditions for Coal Mines in the Fitzroy Basin

Note:

Explanatory notes are in green. DELETE prior to issue of EA.

Insertions required by applicants and or the administering authority are in blue. DELETE prior to issue.

Contaminant Release

W1 Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.

W2 The release of contaminants to waters must only occur from the release points specified in Table 1 and depicted in Figure 1 <this would be a plan or plans locating all monitoring (water quality and flow) and release points> attached to this environmental authority.

Table 1 (Contaminant Release Points, Sources and Receiving Waters)

EXPLANATORY NOTES – Determining Contaminant Release Points:

Contaminant release points should be specified in Table 1 where they represent a potential source of water contaminated by the mining activity. Release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage run-off containing sediment only that is not likely to contain contaminants or have properties that would cause environmental harm, do not need to be separately identified in Table 1.

Release Point (RP)	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Contaminant Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	e.g. Stormwater Dam Spillway Overflow	Dam Spillway	Wet Creek
RP 2	XXXX	XXXX	e.g. Dam overflow pipe	Sampling Tap on pipe where the pipe enters Sandy Creek	Sandy Creek

W3 The release of contaminants to waters must not exceed the release limits stated in Table 2 when measured at the monitoring points specified in Table 1 for each quality characteristic.

Table 2 (Contaminant Release Limits)

EXPLANATORY NOTES – Setting interim release limits for EC:

Option (c) – To negotiate a higher value for end-of-pipe EC limits, it will be necessary to have sufficient background water quality data from historical flow events, ideally above each discharge point. This data should be used to demonstrate that there is sufficient "assimilative capacity" in receiving waters to receive mine discharges of the proposed higher EC levels and maximum flows specified in condition W9. In other words, the limits should be such that the predicted in-stream water quality downstream will always remain below 1000 µS/cm EC (for example, using all historical data and assumptions of complete dilution). Consideration should also be given to the potential impact on any drinking water reservoirs immediately downstream of the discharge and the need to keep in-stream water quality below 750 µS/cm.

Option (d) – To negotiate a stepped approach to achieve Option (b) or (c) it will be necessary to predict the likely downstream receiving water EC as a result of the proposed limits for each step proposed. It will be necessary to

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have sufficient background water quality data from historical flow events, ideally for each discharge point. The data should be used to demonstrate that there is sufficient assimilative capacity to receive mine discharges of the proposed higher EC levels and maximum flows specified in condition W9. The limits should be such that predicted the in-stream water quality downstream is not likely to result in environmental harm from high salinity impacts. Ideally, in-stream EC s should remain below 1000 µS/cm EC (for example, using all historical data and assumptions of complete dilution). Where in-stream EC is likely to be above 1000 µS/cm then a case should be put forward as to why this is required and comments about the likelihood and potential extent of impacts. Consideration should also be given to the potential impact on any drinking water reservoirs immediately downstream of the discharge and the need to keep in-stream water quality below 750 µS/cm.

Quality Characteristic	Interim Release Limits for all mines (limits to apply from the date of issue)	Future Release Limits from XXXX/XXXX (negotiated date) <i>Note: These future limits will apply from a yet to be negotiated date using alternative numbers that will be derived from the information gathered by any combination of the following: (1) the results of near field monitoring, (2) any studies or investigations carried out in accordance with recommendations 2 & 3 of the Cumulative Impact Study on water quality in the Fitzroy River Basin. (3) any review of the QLD Water Quality Guidelines. (4) other relevant information Note: This information should be available by the end of 2011 if not before and when it becomes available limits will be determined for each mine site based on the environmental values to be protected and in accordance with criteria below</i>	Monitoring frequency	Comment
Electrical conductivity (µS/cm)	Hierarchy for determining limits in priority order starting with (a): (a) for mines that do not release contaminants to waters - no conditions are required for release authorisation, then conditions W2, to W15 inclusive, W18, W19 and W43 can be deleted. (b) Current limit for those mine sites not under a TEP or 1500 EC (Maximum)* which ever is lower or (c) a negotiated higher limit value that does not result in the contaminant release exceeding a maximum 1000 EC in the receiving waters and where the mine site demonstrates to DERM that it is unreasonable and impractical to immediately comply with the 1500 EC limit in (b) above	Aquatic ecosystem protection (no drinking water value): An end-of-pipe limit to achieve in the range 0 to 1000 EC in the receiving waters. (Must have natural flow i.e. the 20 th percentile flow trigger and achieve a 1:4 dilution OR for mines in the upper catchments must have natural flow i.e. the 20 th percentile flow trigger. OR Drinking water protection: An end-of-pipe limit to achieve 0 to 750 EC in the	Daily during release (the first sample must be taken within 2 hours of commencement of release)	

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	<p>and supported by a business case and commitment to ongoing environmental improvement on the mine site and with nominated timeframes.</p> <p><i>Note: If the current limit is lower than a limit determined as above then the current limit would initially apply.</i></p> <p>(d) for those other mines which cannot immediately achieve (b) or (c) above a stepped approach within the interim period ending 2011 to achieve (b) or (c) will be required.</p> <p><i>Note: some of these mines may already be under an approved TEP and EC limits and compliance timeframes in the TEP need to be taken into account with the stepped approach.</i></p> <p>To support a stepped approach DERM will require a business case and commitment to ongoing environmental improvement on the mine site to ensure that all reasonable and practicable measures are being/will be taken to prevent and/or minimise environmental harm.</p>	<p>receiving waters. (Must have natural flow, either 1:4 dilution and only release where a 20th percentile flow trigger occurs; OR for mines in the upper catchment must have a natural flow i.e. 20th percentile trigger.</p>		
pH (pH Unit)	<p>6.5 (minimum)</p> <p>9.0 (maximum)</p>	<p>6.5 (minimum)</p> <p>9.0 (maximum)</p>	<p>Daily during release (the first sample must be taken within 2 hours of commencement of release)</p>	
Turbidity (NTU)	<p>Current limit or limit derived from suspended solids limit and demonstrated correlation between turbidity to suspended solids historical monitoring data for dam water*</p>	<p>Limit derived from suspended solids limit and demonstrated correlation of turbidity to suspended solids historical monitoring data for dam water*</p>	<p>Daily during release* (first sample within 2 hours of commencement of release)</p>	<p>Turbidity is required to assess ecosystems impacts and can provide instantaneous results.</p>
Suspended Solids (mg/L)	<p>Current Limit *</p>	<p>Limit to be determined based on receiving water reference data and achievable best practice sedimentation control and treatment*</p>	<p>Daily during release* (first sample within 2 hours of commencement of release)</p>	<p>Suspended solids are required to measure the performance of sediment and erosion control measures.</p>
Sulphate (SO ₄ ²⁻) (mg/L)	<p>Current limit or 1000 (maximum) which ever is the lower</p>	<p>250 (Maximum) (Protection of drinking water Environmental Value) OR 1000 (Maximum) (Protection of irrigation environmental value)</p>	<p>Daily during release* (first sample within 2 hours of commencement of release)</p>	<p>Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC & ARM CANZ 2000 stock water quality guidelines.</p>

*Note: *Limit for suspended solids can be omitted if turbidity limit is included. Limit for turbidity not required if suspended solids limit included. Both indicators should be measured in all cases.*

W4 The release of contaminants to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2 and Table 3.

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Table 3 (Release Contaminant Trigger Investigation Levels)

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level	Monitoring Frequency
Aluminium	100	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	Commencement of release and thereafter weekly during release
Arsenic	13	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Cadmium	0.2	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Chromium	1	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Copper	2	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Iron	300	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Lead	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Mercury	0.2	<i>For aquatic ecosystem protection, based on LOR for CV FIMS</i>	
Nickel	11	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Zinc	8	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Include additional contaminants as required	Include additional contaminants as required		

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

EXPLANATORY NOTES – Table 3 Potential Contaminants:

The quality characteristics listed below should be assessed on a site by site basis by each mine prior to finalisation of amendment applications. Based on this assessment, the quality characteristic should be either disregarded if below trigger levels; or included as priority contaminants in Table 3 if above trigger levels. Assessment should involve comparison of representative data from dams that have historically been discharged or likely to be discharged from contaminant release points in Table 1. Data may include historical results or sampling undertaken for this specific purpose. The intent here is that not all dams on site would need to be sampled but those that would make up the majority of water in dams with release points. It could also be demonstrated based on existing water quality information that the water source and relative water quality of some dam are the same, in which case such dams may not need to be sampled individually. For metals and metalloids, trigger levels apply if dissolved results exceed trigger levels. However, total (unfiltered) results for metals and metalloids can be used to disregard a characteristic for inclusion in Table 3. Terms include SMD – slightly moderately disturbed level of protection, guideline - refers ANZECC & ARMCANZ (2000), LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical methods required to achieve LOR.

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level
Boron	370	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Cobalt	90	<i>For aquatic ecosystem protection, based on low reliability guideline</i>
Manganese	1900	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Molybdenum	34	<i>For aquatic ecosystem protection, based on low reliability guideline</i>
Selenium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Silver	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Uranium	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Vanadium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Ammonia	900	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Nitrate	1100	<i>For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN</i>
Petroleum hydrocarbons (C6-C9)	20	
Petroleum hydrocarbons (C10-C36)	100	
Fluoride (total)	2000	<i>Protection of livestock and short term irrigation guideline</i>

Note:

1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.
2. The list of quality characteristics required to be monitored as per Table 3 will be reviewed once the results of the monitoring data is gathered for the interim period until 31 December 2011 or an earlier date if the data is, or becomes, available and if it is determined that there is no need to monitor for certain individual quality characteristics these can be removed from Table 3.
3. SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARMCANZ (2000).
4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

- W5** If quality characteristics of the release exceed any of the trigger levels specified in Table 3 during a release event, the environmental authority holder must compare the down stream results in the receiving waters to the trigger values specified in Table 3 and:
1. where the trigger values are not exceeded then no action is to be taken; or
 2. where the down stream results exceed the trigger values specified Table 3 for any quality characteristic, compare the results of the down stream site to the data from background monitoring sites and:
 - (a) if the result is less than the background monitoring site data, then no action is to be taken; or
 - (b) if the result is greater than the background monitoring site data, complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W5 2(b)(ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

- W6** If an exceedance in accordance with condition W5 2(b)(ii) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Contaminant Release Events

- W7** The holder must install, operate and maintain a stream flow gauging station to determine and record stream flows at the locations upstream of each Release Point as specified in Table 4 for any receiving water into which a release occurs.
- W8** Notwithstanding any other condition of this environmental authority, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in Table 4 for the contaminant release point(s) specified in Table 1.

Table 4 (Contaminant Release during Flow Events)

EXPLANATORY NOTES – Table 4

Gauging station description:

The intent here is that every release point in Table 1 is associated with a gauging station that measures flow upstream of the discharge point. More than one discharge point may be associated with the same gauging station. The gauging station should be at a minimum distance from the discharge point such that water flow under trigger flow events will not significantly diminish by the time it reaches the discharge point. The location of the gauging station should ideally be such that it is not significantly affected by other upstream point source releases or times of discharge are limited to periods of "natural" flow.

Under certain circumstances it may be appropriate to have a downstream gauging station in addition to or in replace of an upstream gauging station. The location should ideally not be affected by the discharge (e.g. be measured off the main waterway). The need for this must be demonstrated on a case by case basis to show why an upstream gauging station is insufficient. This may be the case when mines are located in the upper parts of catchments or near the downstream confluence or a major waterway. Similarly, the gauging station should be at a distance from the discharge point such that water flow during triggered flow events will not significantly diminish between the discharge point and the measuring point (or the confluence with the creek being measured). For downstream flow triggers, some changes to calculation for flow triggers and maximum release flows would typically be required based on the relative sizes of the waterways involved.

Minimum Flow Trigger:

The intent for the minimum flow trigger is that the times of discharge are limited to times of natural flow events only (for ephemeral receiving waters). Ideally, the flow trigger should be chosen such that it represents, for example, an 80th percentile average daily flow (in m³/s) of a minimum ten year period. This or a similar approach should aim to eliminate discharges during "low flow" periods. The maximum discharge volume can then be calculated by dividing the upstream flow trigger by 4. The intent here is that a minimum dilution 1:4 is always maintained (20% of downstream flow). In some situations, this will not allow the mine to release sufficient quantities of water. Therefore, it is possible to propose more than one flow trigger. For example, a 40th percentile average daily flow trigger may also be used in addition to the initial 20th percentile flow trigger such that above the 40th percentile average daily flow trigger a higher release volume will be allowed during periods of higher in-stream flow (while still maintaining a 1:4 dilution ratio).

Comment [r1]: This number has caused a lot of confusion. The reality is that the number for most mines is close to high flow events which 80th percentile is more representative of. It is just an example anyway.

The expectation is that where flow gauging data is available, it is used to calculate flow triggers. Where gauging data is not available or is insufficient, flow triggers should be based on runoff/stream flow estimates using appropriate hydrological calculations or models and known catchment area, rainfall estimations etc.

Under certain circumstances, such as where a mine is in the upper part of the catchment, achieving a 1:4 dilution with receiving waters as described above may not allow the mine to discharge sufficient volumes. In such a case, a lower flow trigger must still be proposed but the discharge volume will also need to be linked to some downstream flow measure with sufficient dilution (ideally much greater than 1:4 or 20%). The minimum flow trigger would typically be based on a proportional catchment area between the local receiving catchment and the larger downstream catchment. In this case, an additional line is added in Table 4. Note that some flow must be measured in the local stream to permit release. The need for this must be demonstrated on a case by case basis and be supported by various flow calculations to demonstrate feasibility and show minimal environmental impacts.

Other special cases include discharges to creeks below water reservoirs or dams and these should be dealt with on a case by case basis to address the intent described above.

Receiving water description	Release Point	Gauging station description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Minimum Flow In Receiving Water Required for a Release Event	Percentage for maximum release	Flow recording Frequency
Wet Creek		Gauging station 1	XXXX	XXXX	The minimum flow trigger should limit discharge to periods outside of no or low natural flow. The volume of flow can be determined by height of water or flow. The actual flow must be a quantifiable measure. Example: > or = 5 m ³ /sec	20% of flow in receiving water	Continuous (minimum daily)

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Downstream Larger Creek (Delete if not in upper catchment)*	Gauging station 2	XXXX	XXXX	To be included for upper catchment mines only. The minimum flow trigger should limit discharge to periods outside of no or low natural flow. The volume of flow can be determined by height of water or flow. The actual flow must be a quantifiable measure. Example: > or = 5 m ³ /sec	XX% of flow in receiving water (value will be typically much less than 20%)
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***Note: Flow must also be measured at the Wet Creek gauging station for release to be permitted based on this flow trigger.**

- W9** The volume released through the release point(s) must not exceed the maximum allowable flow at any time determined by multiplying the recorded receiving water flow at the corresponding gauging station in Table 4 with the corresponding percentages for maximum release in Table 4.
- W10** The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in Table 1.
- W11** Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

Notification of Release Event

- W12** The authority holder must notify the administering authority as soon as practicable (within no later than 6 hours of having commenced deliberately releasing mine affected water to the receiving environment from an authorised discharge point, and no later than 12 hours after any uncontrolled release from an authorised discharge point). Notification must include the submission of written advice to the administering authority of the following information:
 - a) release commencement date/time;
 - b) expected release cessation date/time;
 - c) release point/s;
 - d) release volume (estimated);
 - e) receiving water/s including the natural flow rate; and
 - f) any details (including available data) regarding likely impacts on the receiving water(s).

Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

- W13** The authority holder must notify the administering authority as soon as practicable, (nominally within twenty-four (24) hours after of cessation of a release) of the cessation of a release notified under Condition W12 and within 28 days provide the following information in writing:
 - a) release cessation date/time;
 - b) natural flow volume in receiving water;
 - c) volume of water released;
 - d) details regarding the compliance of the release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
 - e) all in-situ water quality monitoring results; and
 - f) any other matters pertinent to the water release event.

Notification of Release Event Exceedance

- W14** If the release limits defined in Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.
- W15** The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:
 - a) the reason for the release;
 - b) the location of the release;
 - c) all water quality monitoring results;

- d) any general observations;
- e) all calculations; and
- f) any other matters pertinent to the water release event.

Monitoring of Water Storage Quality

W16 Water storages stated in Table 5 which are associated with the release points must be monitored for the water quality characteristics specified in Table 6 at the monitoring locations and at the monitoring frequency specified in Table 5.

Table 5 (Water Storage Monitoring)

Water Storage Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Monitoring Location	Frequency of Monitoring
XXXX	XXXX	XXXX	To be negotiated- will depend on the individual storage structure volume. This will deal with stratification – depth profiles and be appropriate to in situ quality characteristics.	Quarterly

W17 In the event that waters storages defined in Table 5 exceed the contaminant limits defined in Table 6, the holder of the environmental authority must implement measures, where practicable, to prevent access to waters by all livestock.

Table 6 (Onsite Water Storage Contaminant Limits)

Quality Characteristic	Test Value	Contaminant Limit
pH (pH unit)	Range	Greater than 4, less than 9 ²
EC (µS/cm)	Maximum	5970 ¹
Sulphate (mg/L)	Maximum	1000 ¹
Fluoride (mg/L)	Maximum	2 ¹
Aluminium (mg/L)	Maximum	5 ¹
Arsenic (mg/L)	Maximum	0.5 ¹
Cadmium (mg/L)	Maximum	0.01 ¹
Cobalt (mg/L)	Maximum	1 ¹
Copper (mg/L)	Maximum	1 ¹
Lead (mg/L)	Maximum	0.1 ¹
Nickel (mg/L)	Maximum	1 ¹

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Zinc (mg/L)	Maximum	20 ¹
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Note:

¹ Contaminant limit based on ANZECC & ARM CANZ (2000) stock water quality guidelines.

² Page 4.2-15 of ANZECC & ARM CANZ (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4-9".

Note: Total measurements (unfiltered) must be taken and analysed

Receiving Environment Monitoring and Contaminant Trigger Levels

W18 The quality of the receiving waters must be monitored at the locations specified in Table 8 for each quality characteristic and at the monitoring frequency stated in Table 7.

Table 7 (Receiving Waters Contaminant Trigger Levels)

Quality Characteristic	Trigger Level	Monitoring Frequency	Comments
pH	6.5 – 8.0	Daily during the release	See Table 2 comments
Electrical Conductivity (μ S/cm)	1000		
Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.		
Sulphate (SO_4^{2-}) (mg/L)	250 (Protection of drinking water Environmental Value) OR 1000 (Protection of irrigation environmental value)		

Table 8 (Receiving Water Upstream Background Sites and Down Stream Monitoring Points)

EXPLANATORY NOTES – Selection of monitoring sites:

The intent here is that that each discharge point has both an upstream and downstream monitoring point associated with it. These monitoring points should be located as close as practicable to the release point and the distances should be defined in the footnotes in Table 8. The location of flow monitoring points should also be considered in selecting upstream monitoring points. Other considerations include accessibility, particularly during wet weather conditions.

Monitoring Points	Receiving Waters Location Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)
Upstream Background Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Downstream Monitoring Points			

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Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX

Notes:

- a) The upstream monitoring point should be within Xkm the release point.
- b) the downstream point should not be greater than Xkm from the release point.
- c) The data from background monitoring points must not be used where they are affected by releases from other mines.

W19 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table 7 during a release event the environmental authority holder must compare the down stream results to the upstream results in the receiving waters and:

1. where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or
2. where the down stream results exceed the upstream results complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W19 2(ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

EXPLANATORY NOTES – Designing a REMP:

The intent here is that the REMP will be designed for specific requirements of the mine's releases and the receiving environment. The monitoring within the REMP should not be the primary basis for compliance but will be essential for providing supporting information when incidents may occur or for deriving future license limits. The focus should also be on reporting against water quality objectives for relevant waterways affected by the discharge and be on a longer term basis compared to compliance reporting. The intent is that the REMP is to provide condition assessment of near-field areas, ie. local areas likely to be significantly affected by the mine's releases. To do this, it is necessary that monitoring data is collected during times of natural flow outside of times of release in addition to time of release. The REMP is likely to include monitoring sites and indicators in addition to what is presented in the tables of these conditions. The intent is that far-field areas and cumulative impacts will be monitored as part of regional monitoring described in Condition W43 and assist in providing regional condition assessment and regionally specific reference information.

W20 A REMP must be developed and implemented by XX/XX/XXXX (WITHIN 3 MONTHS OF THE DATE OF ISSUE) to monitor and record the effects of the release of contaminants on the receiving environment periodically and whilst contaminants are being discharged from the site, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water. A copy of the REMP must be provided to the administering authority prior to its implementation and due consideration given to any comments made on the REMP by the administering authority.

For the purposes of the REMP, the receiving environment is the waters of the XX and connected waterways within XX (e.g. Xkm) downstream of the release.

W21 The REMP must address (but not necessarily be limited to) the following:

- a) Description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and
- b) Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the Environmental Protection (Water) Policy 1997); and
- c) Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed; and

- d) Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.
- e) Monitoring for any potential adverse environmental impacts caused by the release;
- f) Monitoring of stream flow and hydrology;
- g) Monitoring of toxicants should consider the indicators specified in Table 3 to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC & ARMCANZ 2000 guidelines for slightly to moderately disturbed ecosystems;
- h) Monitoring of physical chemical parameters as a minimum those specified in Table 2 (in addition to dissolved oxygen saturation and temperature);
- i) Monitoring biological indicators (for macroinvertebrates in accordance with the AusRivas methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;
- j) The locations of monitoring points (including the locations specified in Table 8 which are background and downstream impacted sites for each release point);
- k) The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within 2 years (depending on wet season flows) in accordance with the *Queensland Water Quality Guidelines 2006*. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;
- l) Specify sampling and analysis methods and quality assurance and control;
- m) Any historical datasets to be relied upon;
- n) Description of the statistical basis on which conclusions are drawn, and
- o) Any spatial and temporal controls to exclude potential confounding factors.

W22 A report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with conditions W20 must be prepared and submitted in writing to the administering authority by 1 October 2011. This should include an assessment of background water quality, any assimilative capacity for those contaminants monitored and the suitability of current discharge limits to protect downstream environment values.

Water Reuse

W23 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying stock water to properties directly adjoining properties owned by the environmental authority holder or a third party and subject to compliance with the quality release limits specified in Table 9.

Table 9 (Stock Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	5000

W24 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying irrigation water to properties directly adjoining properties owned by the environmental authority holder or a third party and subject to compliance with quality release limits in Table 10.

Table 10 (Irrigation Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	Site specific value to be determined in accordance with

- W25** Water contaminated by mining activity may be piped or trucked off the mining lease for the purpose of supplying water to a third party for purpose of construction and/or road maintenance in accordance with the conditions of this environmental authority.
- W26** Water contaminated by mining activity may be piped or trucked for the purpose of supplying water to <name adjoining mine> in accordance with the conditions of this environmental authority. The volume, pH and electrical conductivity of water transferred to {name adjoining mine} must be monitored and recorded.
- W27** If the responsibility of water contaminated by mining activities (the water) is given or transferred to another person in accordance with conditions **W23, W24, W25 or W26**:
- the responsibility of the water must only be given or transferred in accordance with a written agreement (the third party agreement); and
 - include in the third party agreement a commitment from the person utilising the water to use water in such a way as to prevent environmental harm or public health incidences and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters.

Water General

- W28** All determinations of water quality must be:
- performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
 - made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual;
- Note: Condition W28 requires the Water Quality Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.*
- collected from the monitoring locations identified within this environmental authority, within XX hour of each other where possible; and
 - carried out on representative samples.
 - laboratory testing must be undertaken using a laboratory accredited (e.g. NATA) for the method of analysis being used.
- W29** The release of contaminants directly or indirectly to waters:
- must not produce any visible discolouration of receiving waters; and
 - must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual Water Monitoring Reporting

- W30** The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:
- the date on which the sample was taken;
 - the time at which the sample was taken;
 - the monitoring point at which the sample was taken;
 - the measured or estimated daily quantity of the contaminants released from all release points;
 - the release flow rate at the time of sampling for each release point;
 - the results of all monitoring and details of any exceedences with the conditions of this environmental authority; and
 - water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with waterways

- W31 Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Water *Guideline - Activities in a Watercourse, Lake or Spring associated with Mining Activities*.

Water Management Plan

- W32 A Water Management Plan must be developed and implemented by **XX/XX/XXXX (WITHIN 3 MONTHS OF THE DATE OF ISSUE)** that provides for the proper and effective management of the actual and potential environmental impacts resulting from the mining activity and to ensure compliance with the conditions of this environmental authority.
- W33 The Water Management Plan must be developed in accordance with DERM Guideline for Preparing a Water Management Plan 2009 (to be developed by 1 October) or any updates that become available from time to time and must include at least the following components:
- Contaminant Source Study;
 - Site Water Balance and Model;
 - Water Management System;
 - Saline Drainage Prevention and Management Measures;
 - Acid Rock Drainage Prevention and Management Measures (if applicable);
 - Emergency and Contingency Planning;
 - Monitoring and Review.
- W34 Each year the holder of the environmental authority must undertake a review of the Water Management Plan prior to the wet season (i.e. by 1 November) and a further review following the wet season (i.e. by 1 May the following year) to ensure that proper and effective measures, practices or procedures are in place so that the mine is operated in accordance with the conditions of this environmental authority and that environmental harm is prevented or minimised.
- W35 A copy of the Water Management Plan and/or a review of the Water Management Plan must be provided to the administering authority on request.

Saline Drainage

- W36 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

- W37 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water sediment controls

- W38 An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of storm water.
- W39 The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any receiving waters.
- W40 Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters.

All Dams

EXPLANATORY NOTES – Dam conditions:

Note: Conditions W41 and W42 to be removed if already conditioned in the authority.

- W41 The hazard category of each dam must be determined by a suitably qualified and experienced person at least once in each two year period.
- W42 Dams having a hazard category determined to be significant or high, must be specifically authorised by an environmental authority.

Fitzroy River Basin Study

- W43 The administering authority and the holder of this environmental authority both acknowledge that the conditions for release of contaminants to the XX River in this environmental authority have been calculated without the benefit of the findings of projects proposed to be undertaken as per recommendations 2 and 3 of the *Study of cumulative impacts on water quality of mining activities in the Fitzroy River Basin* (April 2009). The administering authority may, based on the information provided in the study report when it becomes available, all relevant information available at the time and the regulatory framework applicable at that time, consult with the holder of this environmental authority about the conditions in the environmental authority concerning the treatment and disposal of waste water.

The aim of the consultation shall be the meaningful review of the contaminant release limits imposed in this authority having regard to:

- a) the study results;
- b) near field monitoring results;
- c) QLD Water Quality Guidelines; and
- d) best practice environmental management.

If this review leads to a change in the requirements on this environmental authority holder, this shall be advanced by way of an authority amendment or a Transitional Environmental Program and as is necessary or desirable.

Definitions:

"20th percentile flow" means the 20th percentile of all daily flow measurements (or estimations) of daily flow over a 10 year period for a particular site. The 20th percentile calculation should only include days where flow has been measured (or estimated), i.e. not dry weather days.

"acid rock drainage" means any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining activity.

"administering authority" means the Department of Environment and Resource Management or its successor.

"appropriately qualified person" means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods or literature.

"dam" means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. However; a dam does *not* mean a fabricated or manufactured tank or container designed to a recognised standard, *nor* does a dam mean a land-based structure where that structure is designed to an Australian Standard. In case there is any doubt, a levee (dyke or bund) is a dam, but (for example) a bund designed for spill containment to AS1940 is *not* a dam.

"environmental authority" means an environmental authority granted in relation to an environmentally relevant activity under the *Environmental Protection Act 1994*.

"environmental authority holder" means the holder of this environmental authority.

"flowable substance" means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

"hazard" in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

"hazard category" means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 2.0, 2009) published by the Environmental Protection Agency on its website.

"natural flow" means the flow of water through waters caused by nature.

"receiving environment" means all groundwater, surface water, land, and sediments that are not disturbed areas authorised by this environmental authority.

"receiving waters" means all groundwater and surface water that are not disturbed areas authorised by this environmental authority.

"representative" means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

"saline drainage" The movement of waters, contaminated with salt(s), as a result of the mining activity.

"waters" includes river, stream, lake, lagoon, pond, swamp, welland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, and groundwater and any part thereof.

Enquiries
Telephone
Your reference
Our reference

(07)

31 July 2009

<<title>> <<first_name>> <<sir_name>>
<<organisation>>
<<address>>

Dear <<title>> <<sir_name>>

**RE: FITZROY BASIN MINING CUMILATIVE IMPACT STUDY
RECOMMENDATION 1 – IMPLEMENTATION OF ‘MODEL’ CONDITIONS**

Thank you for your participation in the formulation of the ‘model’ water conditions associated with mine discharges in the Fitzroy Basin. The final conditions are enclosed.

The Department has now formulated a process to facilitate the amendment of relevant mining environmental authorities (EA’s) by December 2009. Please find attached a flow chart detailing this process.

Please note that in order to meet the December 2009 timeframe amendment applications are sought from each mine by 1 September 2009. Where amendments are seeking to deviate from the limits or parameters suggested in the agreed model conditions, applications should be accompanied with supporting information including a detailed, reasoned, evidence-based assessment to support alternative compliance limits, trigger levels and flow triggers.

It is expected that deviations from the agreed ‘model’ conditions will be limited to the above scenarios and noted that sites choosing to vary limits and submit supporting rationale should allow for further time for the assessment of their application.

To expedite this process, please find attached a partially filled application form and information request to assist you in preparing the information that will assist DERM in processing the applications efficiently. The fee for this application is \$250 and is required by the *Environmental Protection Act 1994* to make a valid application. An electronic copy of this form is available on request by contacting [REDACTED] ([REDACTED]@derm.qld.gov.au).

The opportunity for a pre-lodgement meeting is extended and may be useful where you require assistance in the development of the EC compliance limit (if appropriate) and assessment of the potential contaminants of Table 3 and flow triggers.

The assessment of the applications will be prioritised according to the discharge risk levels in the *Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin*.

An internal training package will be undertaken in early August with DERM officers to ensure pre-lodgement meetings, advice and assessment of the amendment applications is efficient and in context with the history of this project.

If you have any questions in relation to this process or would like to arrange a pre-lodgement meeting please contact your sites DERM Project Manager.

If you have any questions in relation to this letter don't hesitate to contact me on ([REDACTED]) ([REDACTED]@derm.qld.gov.au) or [REDACTED] on (07) [REDACTED] ([REDACTED]@derm.qld.gov.au).

Yours sincerely

[REDACTED]
Regional Manager (Whitsunday Coalfields)

Enc.

- 1. 'Model' Water Conditions**
- 2. Flow Chart**
- 3. Amendment Application Form**



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Minister for Climate Change and Sustainability The Honourable Kate Jones

Wednesday, August 12, 2009

Inaugural meeting for Fitzroy Water Quality Advisory Group

A new State Government website has been launched to give central Queenslanders publicly available information on water quality in the Fitzroy River Basin, Climate Change and Sustainability Minister Kate Jones said today.

Ms Jones said the website coincided with the first meeting yesterday of the new Fitzroy Water Quality Advisory Group to tackle the region's water quality issues and proactively plan future management of water quality of the waterway.

She said the group would provide advice to the State Government and ensure information on water quality projects was available to the public.

"The group brings together representatives from a range of organisations, Traditional Owners and State Government departments to ensure co-ordinated management of water quality issues in the Fitzroy River catchment area," Ms Jones said.

"One of the Advisory Group's first tasks is to review and comment on processes already in place to address water quality issues in the Fitzroy River Basin.

"Advice will also be provided on implementation of recommendations of Professor Barry Hart's report on 'Review of the Fitzroy Water Quality Issues' and the Department of Environment and Resource Management's (DERM) report on 'Cumulative Impacts on Water Quality Mining Activities in the Fitzroy Basin'.

"Anyone interested in following up on the issues and outcomes discussed by the group and at future meetings can access the minutes at www.fitzroyriver.qld.gov.au."

Member for Rockhampton Robert Schwarten said the new website would provide up-to-date information to the public on water quality projects being undertaken and progress by the Advisory Group.

"It will also include updates on the Queensland Government's response to the recommendations outlined in Professor Hart's and DERM's reports," Mr Schwarten said.

"Nearly all the recommendations made are being fully supported with many already undertaken or in the process of being implemented."

Ms Jones said DERM was working with the Fitzroy Basin Association to develop environmental values and water quality objectives for the Fitzroy catchment.

"This is a comprehensive project that will include extensive community and stakeholder consultation and input," she said.

"DERM is also working closely with the Queensland Resources Council and mines in the region to review current discharge arrangements in the Fitzroy catchment."

Ms Jones said the amalgamation of the former Environmental Protection Agency and Department of Natural Resources and Water into the newly created DERM meant there was now one lead agency responsible for providing advice and overseeing management of water quality in the Fitzroy Region as well as elsewhere in Queensland.

"This is one of the many recommendations made by Professor Hart which have now been addressed," she said.

"The combined expertise brought together under the one department, allows DERM to undertake additional water quality monitoring across the catchment and share this information with the community."

Ms Jones said DERM would continue to work in conjunction with local communities and the Advisory Group to deliver programs and initiatives that meet the community's expectations related to water quality in the Fitzroy Basin.

12 August, 2009

MEDIA CONTACT: [REDACTED] [REDACTED] or [REDACTED]

Fitzroy Water Quality Advisory Group

Terms of Reference

Aims

- To provide a consultative forum to collect views and information as an input into effective Government decision making on water quality issues in the Fitzroy River Basin.
- To share information with the public, on water quality projects and issues, relating to the Fitzroy River Basin.

Role

FWQAG's role is to:

- provide a forum to enable government to effectively consult with member organisations on the implementation of actions to address community concerns with water quality arising from:
 - the report on the Cumulative Impacts on Water Quality of Mining Activities in the Fitzroy River Basin (DERM)
 - the Review of the Fitzroy River Water Quality Issues (Barry Hart report)
- provide advice to State Government agencies relating to management of water quality in the Fitzroy River Basin.
- inform effective decision making by FWQAG members relating to water quality management in the Fitzroy River Basin.
- act as a coordinating group to provide for the sharing of information on water quality and the progress of water quality projects between stakeholders.
- disseminate information to member organisations and the broader community on approaches to water quality management in the Fitzroy River Basin.

Membership

- Agforce
- Banana Regional Council
- Capricorn Conservation Council
- Central Highlands Regional Council
- Central Queensland University
- Department of Employment, Economic Development and Innovation
- Department of Environment and Resources Management – Chair
- Fitzroy Basin Association
- Fitzroy Basin Elders Committee
- Fitzroy Food and Fibre
- Fitzroy River Fish Stocking Association
- Isaac Regional Council
- Queensland Conservation Council
- Queensland Health
- Queensland Resources Council
- Rockhampton Regional Council / Fitzroy River Water
- Stanwell Corporation Limited
- SunWater

The FWQAG may invite representatives from other groups and organisations to participate as required.

DERM will chair the group and provide secretariat and administrative support.

Communication

The meetings will be organised through email to the nominated contacts for each agency/organisation. An agenda for each meeting will be drafted and distributed by the Chair, 5 to 7 working days before meetings.

The Chair will prepare notes from each meeting, including actions to be undertaken, and distribute the notes to the FWQAG within 5 working days of the meeting.

The FWQAG will meet approximately every six weeks unless otherwise agreed, with alternate meetings held via teleconference.

For phone meetings, a teleconference number will be established.

At the end of each meeting, participants will agree on a set of key messages to be uploaded to relevant websites approximately 3 working days after the meeting.

The Chair will be responsible for briefing the media as required.

Individual members of the FWQAG will be responsible for communicating any recommendations and key messages within their relevant organisation.

Life of FWQAG

FWQAG will operate until a review in June 2010

Conditions for Coal Mines in the Fitzroy Basin

Approach to Discharge Licensing

Department of Environment and Resource Management

1. Introduction

This document describes the proposed approach for deriving consistent and appropriate limits and conditions for Coal mine discharges and supports the draft Conditions for Coal Mines in the Fitzroy Basin. The proposed approach aims to minimise the risk of discharges on downstream environmental values of receiving waters and be consistent with current legislation, departmental policy and State/National water quality guidelines. This includes the department's Policy for wastewater discharges to Queensland waters (<http://www.epa.qld.gov.au/publications?id=2272>), the Queensland Water Quality Guidelines (2006) and the ANZECC/ARMCANZ Fresh and Marine Water Guidelines 2000.

2. Managing and Characterising Discharges

The first step in assessing a licence proposing a wastewater discharges is to demonstrate the unavoidable need for that discharge. Water is a resource and most mines require substantial amounts of water even if for coal washing and/or dust suppression. A well planned and effective water management system is essential for having sufficient water for the mine during dry times but also having sufficient available storage/free-board to ensure discharges are infrequent and only associated with major storm events. Effective water management requires separate storage of water with varying water quality (such as storage of process water/groundwater, surface water runoff), appropriate infrastructure to accommodate sufficient water storage and appropriate flood design and control.

Where the need for a discharge is demonstrated, the next step is to characterise the wastewater and identify the potential contaminants or associated hazards that may exist. This may require an understanding of historical wastewater quality and/or information on local groundwater quality, geology types, the process/treatment systems involved and the broader water management strategies to be adopted. Currently, salinity (measured as electrical conductivity) and suspended sediment (and pH to a lesser extent) are known to be major water quality issues that require regulation. However, for other characteristics such as metals/metalloids, a legitimate need for regulation it is likely to vary from case to case. However, in the majority of cases there is currently a lack of data. Further information needs to be collected on both wastewater and natural waters. An interim approach is required for setting discharge conditions where water quality data insufficient or not currently available.

3. Environmental Values and Ephemeral Streams

After characterising the discharge, the next step requires environmental values and water quality objectives for waterways potentially affected by the discharge to be assessed. Depending on the risks from the discharge (based on its volume, contaminant concentrations, duration and location), this step will need to be done to a lesser or greater spatial extent. With

greater risk, environmental values and potential impacts will need to be considered further a field. Environmental values and water quality objectives specified in the Environmental Protection (Water) Policy 1997 must be considered for assessment of all waterways including ephemeral streams. Environmental values for drinking water, stock watering, irrigation, recreation, industrial use and aquaculture may exist downstream of the discharge depending on the discharge location. The guidelines for these environmental values will form the basis of default water quality objectives and will typically not differ between permanent and temporary flowing streams. Various published guideline values are shown in Tables 1 to 6.

Many coal mines are situated in areas of ephemeral/intermittent streams. Current reference-based water quality guidelines for aquatic ecosystem protection (for example, in the Queensland Water Quality Guidelines, 2006) are available only for permanent flowing streams. Nonetheless, it is proposed that these guidelines be used for impact assessment and licensing discharges to ephemeral streams until local reference information becomes available. In addition, in mining areas it is common that background concentrations may be elevated as a result of historical anthropogenic activities and/or natural causes (certainly the case for some metals). Deriving local guidelines and background data is ideally needed but requires sufficient reliable data from monitoring of appropriate sites. Monitoring of ephemeral streams can be challenging given the infrequent and unpredictable nature of flow and the logistical issues involved with accessing and taking event related sampling. There is currently insufficient information for some contaminants as to how levels change with rainfall and flow. For electrical conductivity (EC) it is unlikely that high EC is associated with high flows in contrast to suspended sediment solids or turbidity which is typically elevated during rainfall-associated events.

For many sites there will be an absence of suitable monitoring data. In this case, reference-based guidelines from permanent flowing streams can be used for deriving end-of-pipe limits or trigger values in a precautionary sense, although consideration needs to be given to the above points. Where good local referenced data has been collected, this could be used to derive local reference-based guidelines (typically 75th percentiles for median EC, 80th percentiles for other reference-based water quality indicators such as pH, turbidity and suspended sediment). Typically at least 18 data points would be required and collected over at least 3 rain events. This may require 2 years of data but is dependant on rainfall frequency. Data from multiple reference sites could be amalgamated in most situations. The Queensland Water Quality Guidelines propose that this approach also be used for metals/metalloids where background conditions may be elevated. However, for regulation purposes at or close to discharge points, 95th percentiles and maximum values of reference/background should also be considered to trigger early warning of elevated levels.

4. Potential Water Quality Impacts

Effects of Salinity on Aquatic Organisms

Salinity has the potential to cause both acute and chronic toxicological effects in aquatic organisms. There is currently no nationally published toxicity trigger for salinity effects in freshwater environments although there is published information on the effects of salinity on fish, macroinvertebrates and other biota. Thus the recommended approach is to consider the ambient reference-based guidelines as discussed in Section 7. Generally, setting EC limits based on reference-based conditions will address potential concerns with toxicity given that discharge levels will typically be below toxicity thresholds. However, for situations where the

stream has assimilative capacity for salinity, it may be possible to have discharge levels at or above toxicity thresholds and through dilution, still meet reference-based guidelines in-stream within a short distance downstream. The general policy position in this case is that the discharge should not result in any toxicity within the initial mixing zone.

Based on the comments by Hart (2008) in a recent review of water quality in the Fitzroy Basin, EC values of less than 1500 $\mu\text{S}/\text{cm}$ are unlikely to affect adult fish although salinity around 1000-1500 $\mu\text{S}/\text{cm}$ may effect early life stages of fish. Macroinvertebrates are unlikely to be affected at below around 1000 $\mu\text{S}/\text{cm}$. However, for those species adapted to quite low salinity (200-300 $\mu\text{S}/\text{cm}$) such as in the south of the Fitzroy Basin, permitting ambient EC concentrations to reach 1000-1500 $\mu\text{S}/\text{cm}$ would adversely affect the community structure, especially at a species level. A conservative trigger used in the ANZECC guidelines (1992) was Total Dissolved Solids (TDS) of 1000 mg/L (this converts to an EC of approximately 1500 $\mu\text{S}/\text{cm}$) which receiving waters should not exceed.

5. Monitoring of Metals/Metalloids

Metals/metalloids have the potential to cause both acute and chronic toxic effects in the short-term and bioaccumulate to have similar effects in the long-term. The comments on measuring EC in receiving waters are also relevant to applying limits to metals/metalloids in receiving waters. There are few examples of where metals/metalloid limits have been applied end-of-pipe at this stage for coal mines and in most cases, further review of data is required for this to be done. Ascertaining end-of-pipe total and dissolved metal concentrations is recommended. Trigger values for receiving environment monitoring can be applied. Trigger values should be based on relevant environmental values. Conservative trigger values are shown in Tables 5 and 6. For aquatic ecosystem protection (Table 5), the default trigger values are for slightly-to-moderately disturbed (SMD) systems protecting 95% of species. For highly disturbed systems (HDS), ANZECC/ARMCANZ (2000) guidelines recommend adopting SMD levels in the first instance but if there are known high levels naturally occurring, lower lesser level of species protection (such as 90% or even 80%) can be adopted. In some situations such as may occur in highly mineralised mining catchments, natural or historical effects have resulted in even higher background levels for some specific metals/metalloids. Guideline adjustment for metals such as aluminium, copper, iron and zinc is sometimes required. If this is the case, background data should be assessed to develop locally-relevant guidelines. Guideline values for long-term medians can be developed from 80th percentiles of background/reference data. It is proposed that local receiving environment triggers for metals/metalloids be developed based on 95th percentiles (or maximums) of historical background/reference data. This would also form the basis for future revision of end-of-pipe triggers and indicators.

For aquatic ecosystems, the metals/metalloid limits could be applied to total (i.e. unfiltered) concentrations. If this is the case and the total concentration exceeds the trigger value, a hardness correction can be applied for some metals (cadmium, chromium III, copper, lead and nickel) up to a salinity of 2500 mg/L. See Table 3.4.3 of ANZECC/ARMCANZ (2000) Guidelines as to how to modify the trigger values for hardness for these metals. However, if exceedances still occur or are likely to occur then dissolved (i.e. filtered) metals/metalloid concentrations should also be measured and compared to the limits. Also note that speciation of some metals/metalloids is usually required for aquatic ecosystem protection (e.g. arsenic and chromium). For event-based sampling, measurement of dissolved metals/metalloids will be more problematic and logistically difficult. Samples need to be filtered, refrigerated and analysed within short time frames and this may not always be possible. However, at this stage

it is proposed that for protection of aquatic ecosystem, metals are measured for dissolved metals/metalloids given the likelihood for exceedance of the guidelines. On the other hand, given the potential addition costs of speciated metals, it is proposed that all samples be analysed for dissolved total species (i.e. all species of the metal/metalloid, or 'total' species) for licensing. Where risks are identified, further assessment of speciated components may be required. For other environmental values, assessment of total metals/metalloids is needed to compare to guidelines but only for those that are specified in the guidelines. Where there is an absence of other information on potential sources or levels of metals/metalloids, a standard set of metals/metalloids is recommended until such information is made available. This might include characterising of the wastewater in dams or potential sources of wastewater (such as groundwater, waste characterisation or geological analysis).

6. Monitoring Receiving Waters

Water Quality Monitoring

Where data is available, background receiving water quality typically does not meet reference-based guidelines for all indicators. This may be due to both differences in natural conditions and from anthropogenic pressures. For this reason, application of guidelines to receiving waters as regulatory limits is likely to result in frequent non-compliance, regardless of whether the mine is discharging or not.

Therefore, receiving water assessments should only be used for triggering reporting (or investigation purposes) and not as a primary mechanism for regulation. This could include reporting of long-term medians of data (reference-based guidelines) or reporting against 95th percentiles (biological effect data/maximums of background). Maximum trigger values for certain indicators may be adopted for some near-field monitoring sites.

Reporting against guidelines for environmental values other than aquatic ecosystem protection should also be done where present. Monitoring should be done when the stream is flowing (this flow trigger would preferably be below the discharge flow trigger) and should ideally be done both when the discharge is and is not occurring. Reporting of the receiving environment monitoring program (REMP) could be done.

Water quality measurements of permanent water holes or other specific downstream environmental values are also appropriate where risks of potential impact are identified. For ephemeral streams, the current science suggests that the permanent and semi-permanent water holes need to be protected as a high priority. The concentrations of some water quality characteristics can increase significantly in water holes with time due to evaporation and no flow conditions whilst others decrease in concentration due to changes in water chemistry. Recent mine discharges have resulted in significant changes to salinity profiles within some downstream drinking water reservoirs and therefore impoundments, storages, weirs, dams, etc. should also be monitored given the potential for impacts.

Biological Monitoring

Biological monitoring (e.g. macroinvertebrate sampling) will generally only be required when the discharge quality and circumstances are such that they are considered to pose a significant risk to the affected receiving waters and associated habitat(s). For instance, this situation might arise when end-of-pipe EC levels are above 1000 $\mu\text{S}/\text{cm}$ and there is a potential for discharge

during times of low flow when limited dilution will be occurring. Having said that, biological monitoring should generally be limited to permanent and semi-permanent water bodies that could be potentially impacted by the discharge (for example, within 50km of the discharge), although this will depend on the quantity and duration of discharge. Note that specific ecosystem-type considerations must be taken into account, for example, in some areas of the catchment even short-term wetting of stream beds can play an extremely important role in the ecological cycle of the system and therefore may warrant biological monitoring.

Monitoring of macroinvertebrates must be carefully designed and interpreted in accordance with (i) the Queensland Australian River Assessment System (AusRivAS) Sampling and Processing Manual (August, 2001) and (ii) Chessman (2003), SIGNAL 2 – A Scoring System for Macro-invertebrate ('Water Bugs') in Australian Rivers, Monitoring River Health Initiative Technical Report no. 31, Commonwealth of Australia, Canberra. Monitoring should be undertaken at both impact and control sites. (For further advice on this issue, contact Neil Tripodi on 3896 9241)

Sediment Sampling

Sediment sampling for toxicants such as metals and metalloids will generally only be required when the discharge quality and circumstances are such that they pose a significant risk to the receiving waters. This may be the case where end-of-pipe metals/metalloid concentrations are significantly above both background/guideline concentrations, discharge has occurred for extended periods of low flow and ANZECC/ARMCANZ (2000) water quality guideline values and background water quality concentrations are exceeded.

Sediment monitoring should be limited to permanent water bodies (such as weirs, water holes etc) that could be potentially impacted by the discharge and that possess the environment where muds (sediment) can accumulate. Sediment monitoring locations may be of similar nature to macroinvertebrate sampling sites (where required).

8. Setting End-of-pipe Limits and Links to Natural Flow

Discharging linked to natural flow in ephemeral streams is an essential mechanism for ensuring any discharge has reduced risk of impact on downstream environmental values. The specification of upstream monitoring sites and start/stop discharge triggers based in the environmental flow is also needed to ensure that this occurs. Large dilutions factors (e.g. 1 to 10 or 1 to 20) would generally result in reduced risk of both water quality and flow impacts, assuming the monitoring of the stream and discharge flow are closely linked and controlled.

The proponent should provide adequate data and modelling of the flow in their part of the catchment to determine the most suitable environmental flow trigger under which a discharge of certain maximum volume and flow rate should occur. The frequency or percentage of wet weather days that this will be possible should be assessed under a range of rainfall scenarios.

As part of the approval, the following will be required:

- A minimum natural receiving environment flow (m^3/s) should be defined at which wastewater discharge can take place – both commencement and cessation. It should be based on historical measurements of upstream natural flow and be designed to avoid times of poor mixing and permit significant post-discharge flushing (such as <20th percentile flow). Ongoing access to data from a suitably situated gauging station will be required.

- The maximum discharge rate should be set so that it does not exceed 20% of the minimum natural receiving environment flow rate (i.e. 1:4 – 1 part discharge wastewater : 4 parts natural flow).
- Daily discharge in cumecs (m³/s) should be reliably measured and recorded.

An interim approach is required when no background receiving environment monitoring data is available. In this case, the dilution factors are not considered in setting limits as background water quality may exceed guidelines (i.e. there would be no assimilative capacity for any contaminant), although a 20 percent dilution with receiving waters will still be required.

Where discharge cannot be linked to sufficient natural flow, more detailed risk assessment should be undertaken for the waterways potentially affected by the discharge as the likelihood of impact is significantly increased. Any permanent water bodies (e.g. weirs or water holes) or locations of other environmental values potentially affected by the discharge should be identified. For such situations, more stringent water quality limits would typically be required such that it meets ambient or background water quality levels. Long-term continuous discharges in ephemeral streams should be generally discouraged. In the case of some mines in upper catchment areas, an interim approach may be adopted where discharge is permitted with flow measurements downstream. This will ensure that potential impacts are limited to near-field. Such an approach may be suitable for a transitional environmental program (TEP) or where the potential effects are considered low risk.

Monitoring of relevant physical chemical and toxicant indicators in Tables 1 to 6 should be undertaken end-of-pipe when a discharge is occurring, ideally coinciding with receiving environment monitoring. The limits/triggers are derived from ambient water quality data of permanent flowing streams in the Fitzroy and from drinking water guidelines. It is proposed that the EC discharge limit should vary depending on geographical location and whether a drinking water reservoir is located downstream of the discharge. Other issues that should be considered in setting end-of-pipe indicators and limits/triggers include laboratory detection limits and the relevance of the indicators to the activity and the risks involved.

End-of-pipe limits are required for EC and pH. The information is not currently available to set maximum values based on acute toxicity. A conservative approach would be to ensure discharge limits for EC end-of-pipe do not exceed 1500 µS/cm. Under certain circumstances, a higher end-of-pipe limit may be applicable where large mixing ratios are achieved and discharge is only for smaller durations/volumes. In these cases, the end-of-pipe limit may be increase up to 2250 µS/cm. The need for this would need to be demonstrated. The pH limits would ideally be between 6.5 and 8.5 when linked to 1:4 dilutions. Higher pH limits (say ≤9.0) end-of-pipe may be negotiated where appropriate dilution will be achieved. Limits for suspended solids concentrations can be negotiated with mines for sediment based on expected sediment removal from settling. Turbidity levels should be measured with the view of setting a relevant limit when sufficient background data is obtained.

In terms of metals/metalloid measurements end-of-pipe, it is recommended that no compliance limit be applied to this end-of-pipe monitoring unless adequate receiving environment data is collected and reviewed. However, trigger limits can be proposed for those metals/metalloids that currently have ANZECC/ARMCANZ (2000) trigger values for freshwater. Such trigger limits, if triggered, would firstly require a comparison of end-of-pipe to background and downstream receiving water quality. If values are within background levels, no further action would be required.

There is a range of other indicators that may be monitored and regulated end-of-pipe (and in receiving waters). These include nutrients (ammonia, nitrate, total nitrogen, total phosphorus, filterable reactive phosphorus, phosphate, chlorophyll-a), sulphate, total hydrocarbons, fluoride and pathogens to mention only a few. Nutrients should be monitored where these are likely to be high in the discharge as a result of the activity, for example, where a sewage treatment plant is adopted or where there is a source of nutrients in the process. Ammonia and nitrate are potential toxicants (with toxicant trigger values) while total nitrogen, total phosphorus, ammonia, organic nitrogen, oxidised nitrogen, and filterable reactive phosphorus are indicators relating to potential eutrophication effects (and have related ambient water quality guidelines). Sulphate is currently regulated as a result of potential effects on drinking water (human and stock). Sulphate has no aquatic ecosystem trigger value although can change the interactions of other water quality contaminants. There are also no aquatic ecosystem guidelines for total petroleum hydrocarbons (TPHs) or polycyclic aromatic hydrocarbons (PAHs) other than naphthalene but this may be required to be monitored where mechanical workshops or petroleum-based chemicals/fuels are used on site.

9. Receiving Environment (RE) Monitoring and Triggers

Monitoring of all indicators listed for relevant environmental values in Tables 1 to 6 should be undertaken in the receiving waters at upstream and receiving environment monitoring points. Metals/metalloids as shown in Table 5 (and Table 6 if relevant) should also be monitored at upstream and downstream receiving environment monitoring points, at least until time where sufficient data is available to revise suitable monitoring indicators. Ideally, both total and dissolved metals should be monitored in the receiving environment relevant to the environmental value that the indicator relates to, e.g. total arsenic is required for assessment against drinking water guidelines.

Ideally, any associated local receiving environment monitoring program should include at least one far-field monitoring point situated much further downstream to represent post-mixing water quality. Note that the far-field monitoring point may be off the mining lease but should remain located within the nearest major flowing stream – this monitoring point should not be assessed for compliance purposes (or maximum triggers). A reference site un-impacted by mining activities (e.g. no mines within 20km upstream) should be identified and monitored for the sub-catchment. In situations where this is not possible, the least affected site, or unaffected site from another nearby sub-catchment should be identified for the purpose of collecting reference or “background” data. Collaborative monitoring programs involving more than one mining company may be applicable for monitoring such sites for local creek catchments.

Upstream and downstream receiving environment monitoring should occur during all flow events, not just during periods when discharges are taking place. This requirement is necessary for a number of reasons:

- To allow for condition assessment of these waterways
- To allow for potential assessing of impacts before and after discharge
- To allow assessment of background to assist with limit setting

Where end of pipe compliance limits apply for physical chemical indicators and are considered low risk, receiving environment monitoring and reporting should be based on long term assessment of consecutive measurements over a twelve month period and compared to

ambient water quality objectives in the Queensland Water Quality Guidelines (2006) and background water quality.

Where end-of-pipe limits are considered to pose some potential risk to receiving waters, trigger values can be applied to sites immediately downstream from the discharge. The trigger values would generally be more stringent than end-of-pipe conditions but be achievable. For example, based on this information available a receiving environment maximum trigger of 1000 $\mu\text{S}/\text{cm}$ EC is proposed for near-field monitoring sites until local background/reference data becomes available. Trigger values for metals/metalloids would typically be ANZECC/ARMCANZ (2000) toxicant trigger values for slightly moderately disturbed systems unless local background/reference data is available.

Exceedance of these trigger values during discharge should require a comparison between discharge, background and downstream water quality. Where downstream water quality is within background measurements, no further action should be required.

10. Modifying Limits and Triggers

Changes to compliance limits and trigger values may be appropriate where adequate and relevant reference monitoring data is made available and assessed as per the allowance in ANZECC/ARMCANZ (2000) and additional information. A reference site can be defined as a site without mine impacts (e.g. no mines within 20km upstream) for the sub-catchment with other requirements as per Appendix C in the QWQG (2006). In some cases it may be the least impacted site, or an unaffected site from another adjacent sub-catchment. An adequate number of valid data points are required to provide a reasonable confidence limit around the percentile based trigger values/guidelines. For example to develop an 80th percentile guideline, a minimum of 18 samples is required to provide a 95% confidence level. A greater number of samples would be required to derive 90th or 95th percentile guidelines. Ideally, samples should be taken from multiple (minimum 3) flow events over at least a one to two year period.

The objective of water sampling for meta/metalloid concentrations discussed above is to help form an acceptable data set to allow site specific license limits or trigger values to be set for end-of-pipe and receiving waters. Elevated background levels of some metals such as aluminium, zinc, iron and chromium have been observed in the Fitzroy Basin.

Where assimilative capacity has been identified as part of monitoring, additional allowance may be incorporated into discharge limits.

Definitions

Background – In terms of water quality, background would typically be obtained by sampling upstream of the mining activity in times of natural flow. Background should not include times of discharges from other mines upstream or times of no flow.

Reference - A reference site is a site whose condition is considered to be a suitable baseline or benchmark for assessment and management of sites in similar waterbodies. The condition of the site is reference condition and values of individual indicators at that site are the reference values. Most commonly, reference condition refers to sites that are subject to minimal/limited

disturbance. The key criteria quoted in the Queensland Water Quality that is applicable for most mining areas in the Fitzroy is that there is no major extractive industry (current or historical) within 20km upstream. Monitoring must occur when the stream is flowing.

Adequate Data – The Queensland Guidelines recommend a minimum of 18 samples collected over at least 12 months for estimates of 20th or 80th percentiles at a site. For 50th percentiles a smaller minimum number of samples (~ 10–12) would generally be adequate. For ephemeral streams, more than one sample should be taken for each flow event and all flow events in the period should be sampled.

Table 1. Reference-based EC guidelines for the protection of aquatic ecosystems in the Fitzroy Catchment (Qld Guidelines 2007). Units in $\mu\text{S}/\text{cm}$.

Sub catchment	95 th Percentile Guideline	90 th Percentile Guideline	75 th Percentile Guideline*
Fitzroy North	1400	1250	720
Fitzroy South	650	510	340

* guideline should be compared to median of long term data set.

Table 2. Guideline Values for EC for other values

	TDS (mg/L)	EC* ($\mu\text{S}/\text{cm}$)
Drinking Water	500	750
Irrigation**		1100
Stockwater***	2400	3600

* using theoretical conversion $\text{mg}/\text{L TDS} = 0.67 \times \mu\text{S}/\text{cm EC}$;

** most stringent field/grass crop trigger - for corn in clay (depends on crop and soil types);

*** for dairy cattle, poultry trigger of 2000mg/L TDS

Table 3. Aquatic Ecosystem Guideline Values (for comparison against long term medians of 10-12 data points)

Parameter	Guideline (lowland)	Guideline (upland)
Ammonia N (ug/L)	20	10
Oxidised N (ug/L)	60	15
Organic N (ug/L)	420	225
Total N (ug/L)	500	250
Filtered Reactive Phosphorus (ug/L)	20	15
Total P (ug/L)	30	10
Chlorophyll-a (ug/L)	5.0	-
Dissolved Oxygen (% saturation)	85 to 110	90 to 110
Turbidity (NTU)	50	25
Suspended Solids (mg/L)	10	-
pH	6.5 to 7.5	6.5 to 8.0

Table 4. Selected Guideline Values for Stock, Crop and Drinking water (units in mg/L).

Parameter	Stock Drinking	Crop Irrigation	Drinking/ Household
Sulfate	1000		250
Chloride		350	
Calcium	1000		
Nitrate	400		
Nitrite	30		

Table 5. Aquatic Ecosystem Protection Toxicant Guideline Values

Parameter	ANZECC Guideline for slightly- moderately disturbed environ. (µg/L)	Comment
Aluminium	55	Trigger value for pH > 6.5
Ammonia	900	Based on a pH of 8
Antimony	9	Low reliability trigger
Arsenic (As III)	24	
Arsenic (As V)	13	
Beryllium	0.13	Low reliability trigger
Boron	370	See Note 1
Cadmium	0.2	
Chromium (Cr VI)	1	See Note 1
Copper	1.4	
Iron	300	Low reliability trigger
Lead	3.4	
Manganese	1900	See Note 1
Mercury (inorganic)	0.06	99% PL as can bioaccumulate
Molybdenum	34	Low reliability trigger.
Nickel	11	
Selenium (Total Speciated)	5	99% PL as can bioaccumulate
Silver	0.05	
Uranium	0.5	Low reliability trigger
Vanadium	6	Low reliability trigger
Zinc	8	See Note 1

Note 1: May not protect key species from chronic toxicity.

**Table 6. Metal Guideline Values for Stock, Crops and Drinking Water
(units in mg/L)**

Parameter	Stock Drinking	Crop Irrigation	Drinking/ Household
Total Aluminium	5	200	0.2
Total Arsenic	0.5	0.1	0.007
Total Boron	5	0.5	4
Total Cadmium	0.01	0.01	0.002
Total Chromium (DW should be Cr (VI))	1	0.1	0.05
Total Cobalt	1		
Total Copper	1	200	1
Total Iron		0.2	0.3
Total Lead	0.1	2	0.01
Total Manganese		0.2	0.1
Total Mercury	0.002	0.001	0.001
Total Molybdenum	0.15	0.01	0.05
Total Nickel	1	0.2	0.02
Total Selenium	0.02	0.02	0.01
Total Zinc	20	2	3

Checklist

Environmental authorities for mining activities

EIS trigger criteria

Environmental Protection Act 1994

EA NO:	
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For all non-code compliant applications, the administering authority must decide whether an environmental impact statement (EIS) is required for the project (s162).

An EIS will be required if any of the following trigger criteria are met. If no criteria are triggered, this does not provide an exemption from having to prepare an EIS if the administering authority or EPA Minister considers that there may be a significant environmental impact, or there is a high level of uncertainty about the possible impacts, or there is a high level of public interest in the proposal.

For exploration permits or mineral development licences, the current policy is not to require an EIS.

For each question, indicate whether the answer is "yes" (column A), or "no" (column B).

Criterion	A Yes	B No
1. Will the project have a significant impact on <u>Category A</u> or <u>Category B</u> environmentally sensitive areas? (refer to Schedule 1A of the <i>Environmental Protection Regulation 1998</i>)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Will the project involve mining in a marine area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Will the project involve mining less than 500 m landward from mean high water?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. Will the project require the construction of more than 150 new dwelling units?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Will the project include an activity that would otherwise be a <u>Level 1 environmentally relevant activity</u> with an annual fee of greater than \$4000?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Will the project involve the mining of more than 2 million tonnes of mineral or run of mine ore per year?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Will the project involve the abstraction of more than 2 million m ³ of water per year from natural surface or groundwater sources?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Will the project result in more than 25 ha remaining post mining in a non-beneficial land capability where an acceptable alternative is considered feasible?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Will the project involve any non-code compliant mining activity less than 2 km from town?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Will the project contain a high hazard dam?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11. Will the project include mining for uranium or asbestos?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12. Will the project trigger a Commonwealth interest in matters of national environmental significance to the extent that an EIS would be required under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Recommendation

After completing the list above, mark which of the following applies:

- (a) If there is a marked box in column A, an EIS is required (unless the application is for an extension to an existing project, and does not constitute a significant increase in environmental harm). Proceed through the non-code compliant assessment process with an EIS.....
- (b) If all boxes in Column B are marked, an EIS is not required. Proceed through the non-code compliant application process without an EIS.....

Assessing Officer Name:

Date:

Notice of Decision – Amendment Application

This notice is issued by the Environmental Protection Agency to advise of a statutory decision made under section 257 of the Environmental Protection Act 1994.

<Insert>

C/c The Mining Registrar
Department of Mines and Energy
PO Box 245
EMERALD QLD 4720

Our Reference: <Insert>

Dear Mr <Insert>

Re: Amendment of environmental authority <Insert> <Insert>

The EPA has assessed the application received on <Insert> to amend environmental authority <Insert> for <Insert> and wishes to advise you that the application has been Granted.

This Notice of Decision and the attached amended environmental authority constitute the permit documentation.

If you require more information please contact <Insert>, the Project Manager, on <Insert>

<Insert> Delegate
Environmental Protection Agency
06-MAR-2009

Enquiries:
Environmental Services
Whitsunday Coalfields- Emerald
PO Box 906
EMERALD QLD 4720
Ph. [REDACTED]
Fax. 4982 2568

Coordinated Assessment Committee Report

This report is prepared by an assessment officer for consideration by the Coordinated Assessment Committee (CAC). Upon determining the next appropriate course of action, the Chair of the Committee completes the 'CAC Recommendation' section of the report and returns it to the assessment officer for action.

Date prepared:

Project details

Permit No.: <Insert>
Project No: <Insert>
EPA Administering District: <Insert><Insert>
EPA Region: <Insert>
Project Name: <Insert>
Project type (may be more than one): Coal Mine
Applicant(s): <Insert>
Project location: <Insert>
Project Description: <Insert>
Permit Application type(s): Level 1 non-code compliant
Application date: <Insert>
Decision required: Assessment level decision (ALD)
Decision Due: <Insert>
Recommended Decision: Other: significant environmental harm unlikely, no EIS
Recommended Project Director: Other: Melissa Wells
Assessing Officer: <Insert>

Additional processes required: (attach details where necessary)

- None
- Other applications received by EPA for project
- Referral Coordination under Integrated Planning Act 1997
- An EIS process under any Queensland Act
- A process under the State Development and Public Works Organisation Act 1971;
- Major works under the Marine Parks Act 1982;
- Commonwealth processes under the Environmental Protection and Biodiversity Conservation Act 1999.
- Other <details>

Special circumstances: (attach details where necessary)

- None
- Affects a sensitive area
- Involves a large number of individual decisions;
- Is likely to generate significant community concern;
- Needs policy change for approval;
- Applicant suitability;
- Involves a make or break issue;
- Involves significant issues with another State/Commonwealth Agency; and
- Another special circumstance which significantly elevates environmental, social or economic risks beyond those usual for this type of project.
- Other: The application to amend Schedule C conditions are in accordance with DERM's document "Conditions for Coal Mines in the Fitzroy Basin - Approach to Discharge Licensing" and the model conditions. These documents have been prepared in implementing recommendation 1 of the *Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin* on 11 May 2009. The study made the following recommendations:
 1. develop appropriate conditions in environmental authorities for mine water discharges.
 2. develop local water quality guidelines; and
 3. develop a model for assessing cumulative impacts across the region.

Indicate the level of impact or significance for each of the following EPA/QPWS interests: [if impact is indicated, notes must be included to describe how]

Biodiversity

- N/A Rare and threatened species and ecosystems
- N/A Vegetation clearing
- N/A Marine systems
- N/A Sustainable use of wildlife
- N/A Riparian buffer zones

Notes:

The amendment application is not changing existing authorised areas of disturbance.

Resource allocation

- N/A Mining
- N/A Dredging
- N/A Occupancy of marine lands (marinas etc)
- N/A Commercial opportunities on national parks and marine parks
- N/A Allocation of public resources (e.g. physical and natural resources environmental capacity),
- N/A National competition policy

Notes:

National and international

- N/A World heritage
- N/A RAMSAR listed wetlands
- N/A Migratory species
- N/A National estate
- N/A Commonwealth marine areas
- N/A Radioactive materials

Notes:

Tenure Issues

- N/A Protected areas
- N/A Native title interests
- N/A Offshore jurisdiction
- N/A Commonwealth jurisdiction
- N/A Inter-State jurisdiction

Notes:

Coordinated Assessment Committee Report

Water Issues

- N/A Quality
- N/A Discharges
- N/A Stream flows (effects in ecology)
- N/A Waterways management
- N/A Hydrology
- N/A Impacts on freshwater and marine systems
- N/A Ground water

Notes:

The applicant has applied to replace the Schedule C conditions in accordance with DERM's letter of 31 July 2009.

Noise Issues

- N/A Community noise
- N/A Transportation noise
- N/A Industrial noise
- N/A Ground vibration
- N/A Airblast overpressure

Notes:

Land Issues

- N/A Contaminated land
- N/A Acid sulphate soils
- N/A Erosion/stability
- N/A Landscapes
- N/A Effects on hydrology
- N/A Sustainable use
- N/A Clearing
- N/A Land use history
- N/A Compliance with planning schemes
- N/A Rehabilitation and subsequent use

Notes:

Impacts on surrounds Issues

- N/A Transportation
- N/A visual impacts
- N/A compatibility with surrounding uses and activities
- N/A neighbours opinions

Notes:

Air Issues

- N/A Air shed management
- N/A Pollution
- N/A Health
- N/A Nuisance
- N/A Ecological impacts

Notes:

Waste Issues

- N/A Solid waste
- N/A Liquid waste
- N/A Gaseous waste
- N/A Dredge spoil disposal
- N/A Energy
- N/A Best practice environmental management

Notes:

Heritage Issues

- N/A Aboriginal and Torres Strait Islander cultural sites
- N/A Historic buildings and locations
- N/A Designated landscape Area

Notes:

Coastal Issues

- N/A Erosion
- N/A Structures
- N/A Reclamation
- N/A Strategic planning

Notes:

Social issues

- N/A Amenity
- N/A displacement of use
- N/A community views
- N/A public safety
- N/A politics/policy

Notes:

Pre-lodgement Advice: [indicate who gave advice and when]

Lindsay Delzoppo is the Project Director and Melissa Wells the Project Manager for Recommendation 1 of the Cumulative Study. The site project manager is <insert> and has provided pre-lodgement advice on <insert>.

Other issues

General comments and additional information:

CAC Recommendation

CAC Recommendation: Significant environmental harm unlikely, No EIS	
Project Director: <Insert>	
Assessment Office: <Insert>	
Project Risk Level: <Insert>	
Signature of Chair:	Date:

- Please attach a contextual map showing the location of the proposed activity.
- If EIS decision to be made, attach EIS trigger checklists.
- If other decisions to be made by Agency attach CEDP decision risk table.

EA/DA Assessment Report:

APPLICATION NOTES:

1. Each assessment report prepared to support recommendations made for decision is to be structured in the format shown below.
2. Explanatory notes for completing the report are given under each heading in brackets.
3. The report is to be completed, where indicated, to confirm conclusion of supervisory review/endorsement, and decision stages of the process.

PROJECT NUMBER: <insert>

FILE NO: <insert>

EPA EA/DA NO: <insert>

DEVELOPMENT APPROVAL NO: N/A

TYPE OF APPLICATION: Application to Amendment Level 1 Non-Code Compliant Environmental Authority (Mining Activity)

APPLICANT: <insert>

TRADING AS: <insert>

ENVIRONMENTALLY RELEVANT ACTIVITY/IES: Schedule 6, Item 5, Mining black coal (EP Reg)

1. Issues

The proponent has applied to replace the Schedule C conditions with the agreed model water conditions. These conditions were agreed to through a consultative working group of DERM, mining company representatives and QRC to implement Recommendation 1 of the *Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin* on 11 May 2009. The study made the following recommendations:

1. develop appropriate conditions in environmental authorities for mine water discharges.
2. develop local water quality guidelines; and
3. develop a model for assessing cumulative impacts across the region.

The DERM has amended the EA to apply the model water conditions with agreed compliance limits, flow triggers and site specific changes to the potential contaminants in table 3.

Assessment Level Decision – No EIS, significant increase in harm is unlikely.

2. Description of Operation

<insert>

Current Project Environmental Authorities:

The environmental authority is held by <insert>

Amendment:

The amendment application was in accordance the DERM letter of 31 July 2009. This letter requested applications to amend the Schedule C conditions by replacing them with the model conditions that have been agreed to by DERM, mining company representatives and the QRC.

The applicant has provided information for compliance limits, flow triggers and site specific information for potential contaminant trigger levels (table 3).

Emissions, Discharges and Environmental Compliance

General Management:

No changes have been made to the environmental authority.

Air:

No changes have been made to the environmental authority.

Water Management:

Schedule C conditions have been replaced by the agreed model conditions (copy attached).

The applicant has provided site specific information for the following:

1. Compliance Limits:

<insert>

2. Flow triggers:

<insert>

3. Potential contaminants:

<insert>

The information provided is consistent with DERM's document "*Conditions for Coal Mines in the Fitzroy Basin - Approach to Discharge Licensing*" and the explanatory notes in the model conditions.

Land Management

No changes have been made to the environmental authority.

Regulated Dams

No changes have been made to the environmental authority.

Noise and Vibrations

No changes have been made to the environmental authority.

Waste

No changes have been made to the environmental authority.

Community

No changes have been made to the environmental authority.

3. Assessment Considerations

Initial overall considerations are presented in the checklist EADA (attached). Support and substantiation for the identified relevant considerations are given below under the appropriate headings:

i) Standard criteria (as applicable)

NOTE: when considering the standard criteria, comments related only to those considered relevant are required. For criteria considered not relevant to the matter, no notation is made. Information provided should reflect the complexity of issues for the application. Example text is provided for guidance.

Ecological Sustainable Development

The principals of ESD are applied in this proposal as the activity the water quality of mine discharges have been improved and the dilution of the discharges have been conditioned. It is expected that the improved discharge requirements will reduce impacts to the natural waterways.

Environmental Protection Policies (EPP's)

The EPPs have been considered in the setting of water quality requirements. The Queensland water Quality Guidelines 2006 with the input of Freshwater and Marine Services for the setting of the water quality limits.

Plans, standards and agreements

Not applicable to this amendment.

Environmental Impact Statement (EIS)

The amendment does not require an EIS.

Receiving Environment

The amendments will result in improved releases into waterways compared to the previous environmental authority.

Best Practice Environmental Management

The improved water discharges will result in the applicant applying better water management measures. The conditions will represent the new minimum standard for managing water on coal mine sites in the Fitzroy Basin and will be consistently applied across the basin for coal mines.

Financial implications

The site may incur financial implications from the restriction of mining activities if the site becomes water bound. Further, significant infrastructure may be required as a result of complying with the agreed model water conditions.

Public Interest

There is significant public interest in the implementation of the Recommendations mentioned above. The Fitzroy Water Quality Advisory Group will manage the public interest. Further a website will be released shortly containing information on all issues with water quality of the Fitzroy Basin.

Site management plan

N/A

ii) **Native Title (if applicable)**

N/A

iii) **Notifiable Activity (if applicable)**

N/A

4. Consultations

The model conditions were developed and agreed to by DERM, mining company representatives and QRC through a consultative process. All mining companies were involved in the process.

Consultation with applicant was undertaken at all stages of the amendment process with regard to the amendment, and particularly compliance limits, flow triggers and potential contaminants for table 3.

5. Project Killers

N/A

6. Streamlined Conditions

The following conditions are used:

Full Streamlined Conditions

Some Streamlined Conditions (the agreed model conditions were based initially on the streamline and model mining conditions)

No Streamlined Conditions

7. Recommendations

That the draft amendment of Environmental Authority be decided in accordance with section 257 of the EP Act.

Assessing Officer:

Signed:

Date:

8. Review and Endorsement

Comment:

Supervisor:

Signed:

Date:

9. Decision

Comment:

Delegate:

Signed:

Date:

Checklist

Environmental Authorities for Mining Activities

Assessment Level Decision for Amending a Non Standard EA

Environmental Protection Act 1994

EA NO:	
---------------	--

An assessment level decision must be made within 10 business days from receipt of the application (section 246). The first stage of this decision is to determine whether the amendment would significantly increase the level of environmental harm caused by the mining activity.

In making this determination, you should follow the procedures given in the EPP Water, EPP Air, EPP Waste and EPP Noise, and consider the standard criteria.

Answer the following question:

1. Would the amendment result in a significant increase of environmental harm in respect of:

Consideration	no	n/a	yes > brief description
water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The amendment is consistent with recommendation 1 of the <i>Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin</i> on 11 May 2009. The model conditions have been agreed to by DERM, mining company representatives and the QRC. The amendment would not constitute a significant increase in the level of environmental harm. The model conditions provide a consistent approach to the regulation of discharge of water from mine sites.
air	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A – no change to conditions.
noise	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A – no change to conditions.
waste	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A – no change to conditions.
any other issue	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A – no change to conditions.

Assessing Officer Name:	Date:
--------------------------------	--------------

If you have identified any issues which are likely to significantly increase the level of environmental harm, you should proceed to determine whether an EIS is required for the proposed amendment.

Assessment Level Decision for Amending a Non Standard EA

If there are no concerns of the proposed amendment significantly increasing the level of environmental harm, proceed to decide whether to grant or refuse the application.

PROCESS TO AMEND ENVIRONMENTAL AUTHORITIES FOR RECOMMEDATION 1 OF THE FITZROY PROJECT

Letter sent to mining companies requesting an amendment application in accordance with section 240 of the *Environmental Protection Act 1994* (EP Act) and submitted to DERM by 1 September 2009.

Pre-lodgement meetings can be arranged by contacting the DERM Project Manager and should involve Ian Ramsay, Melissa Wells, or another from the Fitzroy Basin project team.

Fill out the documents:
Fitzroy ALD_Amend_EA.doc
Fitzroy CAC report.doc
Fitzroy EIS_trigger_criteria.doc

The recommendation generally would be: "significant environmental harm increase unlikely"

Where the applicant provides information to the contrary (e.g. works required to meet the conditions), provide a succinct brief to Melissa Wells (Project Manager, Recommendation 1).

The ECSU will issue the AMD within the 10 business days in accordance with section 246 based on the recommendation provided.

Asses the amendment application in accordance with section 256 – 258A of the EP Act:

Complete the documents:
Fitzroy decision notice.doc
Fitzroy Assessment_Report_Amendment.doc
Final Model Water Conditions for Coal Mines in the Fitzroy Basin July 2009.doc

Advice should be sort from Ian Ramsay in relation to:
Compliance limits
Flow triggers
Potential contaminants (table 3)

If the administering authority decides to grant the application the environmental authority (EA) must be amended and a copy of the EA given to the applicant in accordance with s258 EP Act (10BD).

All coal mine EA's must be amended by 31 December 2009. Where mines do not apply or are not consistent with the approach and model conditions, the DERM will amend the legislation to allow for the change with out agreement. Where this is likely provide a brief to Melissa Wells through your current reporting hierarchy.

The amended EA may generate inconsistencies with the current approved Plan of Operations (i.e. action program). In accordance with s236 the EA holder must within 28 days after becoming aware of the inconsistency, cause the plan to be amended in a way that the plan is no longer inconsistent with the EA.

Final Model Water Conditions for Coal Mines in the Fitzroy Basin

Note:

Explanatory notes are in green. DELETE prior to issue of EA.

Insertions required by applicants and or the administering authority are in blue. DELETE prior to issue.

Contaminant Release

- W1** Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.
- W2** The release of contaminants to waters must only occur from the release points specified in Table 1 and depicted in Figure 1 <this would be a plan or plans locating all monitoring (water quality and flow) and release points> attached to this environmental authority.

Table 1 (Contaminant Release Points, Sources and Receiving Waters)

Release Point (RP)	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Contaminant Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	e.g. Stormwater Dam Spillway Overflow	Dam Spillway	Wet Creek
RP 2	XXXX	XXXX	e.g. Dam overflow pipe	Sampling Tap on pipe where the pipe enters Sandy Creek	Sandy Creek

- W3** The release of contaminants to waters must not exceed the release limits stated in Table 2 when measured at the monitoring points specified in Table 1 for each quality characteristic.

Table 2 (Contaminant Release Limits)

EXPLANATORY NOTES – Setting interim release limits for EC:

Option (c) – To negotiate a higher value for end-of-pipe EC limits, it will be necessary to have sufficient background water quality data from historical flow events, ideally above each discharge point. This data should be used to demonstrate that there is sufficient “assimilative capacity” in receiving waters to receive mine discharges of the proposed higher EC levels and maximum flows specified in condition W9. In other words, the limits should be such that the predicted in-stream water quality downstream will always remain below 1000 µS/cm EC (for example, using all historical data and assumptions of complete dilution). Consideration should also be given to the potential impact on any drinking water reservoirs immediately downstream of the discharge and the need to keep in-stream water quality below 750 µS/cm.

Option (d) – To negotiate a stepped approach to achieve Option (b) or (c) it will be necessary to predict the likely downstream receiving water EC as a result of the proposed limits for each step proposed. It will be necessary to have sufficient background water quality data from historical flow events, ideally for each discharge point. The data should be used to demonstrate that there is sufficient assimilative capacity to receive mine discharges of the proposed higher EC levels and maximum flows specified in condition W9. The limits should be such that predicted the in-stream water quality downstream is not likely to result in environmental harm from high salinity impacts. Ideally, in-stream EC s should remain below 1000 µS/cm EC (for example, using all historical data and assumptions of complete dilution). Where in-stream EC is likely to be above 1000 µS/cm then a case should be put forward as to why this is require d and comments about the likelihood and potential extent of impacts. Consideration should also be given to the potential impact on any drinking water reservoirs immediately downstream of the discharge and the need to keep in-stream water quality below 750 µS/cm.

Quality Characteristic	Interim Release Limits for all mines (limits to apply from the date of issue)	Future Release Limits from XX/XX/XXXX (negotiated date) Note: These future limits will apply from a yet to be negotiated date using alternative numbers that will be derived from the information gathered by any combination of the following: (1) the results of near field monitoring, (2) any studies or investigations carried out in accordance with recommendations 2 & 3 of the Cumulative Impact Study on water quality in the Fitzroy River Basin. (3) any review of the QLD Water Quality Guidelines. (4) other relevant information Note: This information should be available by the end of 2011 if not before and when it becomes available limits will be determined for each mine site based on the environmental values to be protected and in accordance with criteria below	Monitoring frequency	Comment
Electrical conductivity (uS/cm)	<p>Hierarchy for determining limits in priority order starting with (a):</p> <p>(a) for mines that do not release contaminants to waters - no conditions are required for release authorisation, then conditions W2, to W15 inclusive, W18, W19 and W43 can be deleted.</p> <p>(b) Current limit for those mine sites not under a TEP or 1500 EC (Maximum)* which ever is lower or</p> <p>(c) a negotiated higher limit value that does not result in the contaminant release exceeding a maximum 1000 EC in the receiving waters and where the mine site demonstrates to DERM that it is unreasonable and impractical to immediately comply with the 1500 EC limit in (b) above and supported by a business case and commitment to ongoing environmental improvement on the mine site and with nominated timeframes.</p> <p><i>Note: If the current limit is lower than a limit determined as above then the current limit would initially apply.</i></p> <p>(d) for those other mines which cannot immediately achieve (b) or (c) above a stepped approach within the interim period ending 2011 to achieve (b) or (c) will be</p>	<p>Aquatic ecosystem protection (no drinking water value):</p> <p>An end-of-pipe limit to achieve in the range 0 to 1000 EC in the receiving waters. (Must have natural flow i.e. the 20th percentile flow trigger and achieve a 1:4 dilution</p> <p>OR</p> <p>for mines in the upper catchments must have natural flow i.e. the 20th percentile flow trigger.</p> <p>OR</p> <p>Drinking water protection:</p> <p>An end-of-pipe limit to achieve 0 to 750 EC in the receiving waters. (Must have natural flow, either 1:4 dilution and only release where a 20th percentile flow trigger occurs; OR for mines in the upper catchment must have a natural flow i.e. 20th percentile trigger.</p>	Daily during release (the first sample must be taken within 2 hours of commencement of release)	

	<p>required.</p> <p><i>Note: some of these mines may already be under an approved TEP and EC limits and compliance timeframes in the TEP need to be taken into account with the stepped approach.</i></p> <p>To support a stepped approach DERM will require a business case and commitment to ongoing environmental improvement on the mine site to ensure that all reasonable and practicable measures are being/will be taken to prevent and/or minimise environmental harm.</p>			
pH (pH Unit)	<p>6.5 (minimum)</p> <p>9.0 (maximum)</p>	<p>6.5 (minimum)</p> <p>9.0 (maximum)</p>	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
Turbidity (NTU)	NA*	NA*	Daily during release* (first sample within 2 hours of commencement of release)	Turbidity is required to assess ecosystems impacts and can provide instantaneous results.
Suspended Solids (mg/L)	Current Limit	Limit to be determined based on receiving water reference data and achievable best practice sedimentation control and treatment	Daily during release* (first sample within 2 hours of commencement of release)	Suspended solids are required to measure the performance of sediment and erosion control measures.
Sulphate (SO ₄ ²⁻) (mg/L)	Current limit or 1000 (maximum) which ever is the lower	<p>250 (Maximum) (Protection of drinking water Environmental Value)</p> <p>OR</p> <p>1000 (Maximum) (Protection of irrigation environmental value)</p>	Daily during release* (first sample within 2 hours of commencement of release)	Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC & ARMCANZ 2000 stock water quality guidelines.

Note: NA – not available, * local trigger values need to be developed

W4 The release of contaminants to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2 and Table 3.

Table 3 (Release Contaminant Trigger Investigation Levels)

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level	Monitoring Frequency
Aluminium	100	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	Commencement of release and thereafter weekly during release
Arsenic	13	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Cadmium	0.2	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Chromium	1	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Copper	2	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Iron	300	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Lead	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Mercury	0.2	<i>For aquatic ecosystem protection, based on LOR for CV FIMS</i>	
Nickel	11	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Zinc	8	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Include additional contaminants as required	Include additional contaminants as required		

EXPLANATORY NOTES – Table 3 Potential Contaminants:

The quality characteristics listed below should be assessed on a site by site basis by each mine prior to finalisation of amendment applications. Based on this assessment, the quality characteristic should be either disregarded if below trigger levels; or included as priority contaminants in Table 3 if above trigger levels. Assessment should involve comparison of representative data from dams that have historically been discharged or likely to be discharged from contaminant release points in Table 1. Data may include historical results or sampling undertaken for this specific purpose. The intent here is that not all dams on site would need to be sampled but those that would make up the majority of water in dams with release points. It could also be demonstrated based on existing water quality information that the water source and relative water quality of some dam are the same, in which case such dams may not need to be sampled individually. For metals and metalloids, trigger levels apply if dissolved results exceed trigger levels. However, total (unfiltered) results for metals and metalloids can be used to disregard a characteristic for inclusion in Table 3. Terms include SMD – slightly moderately disturbed level of protection, guideline - refers ANZECC & ARMCANZ (2000), LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical methods required to achieve LOR.

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level
Boron	370	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Cobalt	90	<i>For aquatic ecosystem protection, based on low reliability guideline</i>
Manganese	1900	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Molybdenum	34	<i>For aquatic ecosystem protection, based on low reliability guideline</i>
Selenium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Silver	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Uranium	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>

Vanadium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>
Ammonia	900	<i>For aquatic ecosystem protection, based on SMD guideline</i>
Nitrate	1100	<i>For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN</i>
Petroleum hydrocarbons (C6-C9)	20	
Petroleum hydrocarbons (C10-C36)	100	
Fluoride (total)	2000	<i>Protection of livestock and short term irrigation guideline</i>

Note:

1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.
2. The list of quality characteristics required to be monitored as per Table 3 will be reviewed once the results of the monitoring data is gathered for the interim period until 31 December 2011 or an earlier date if the data is, or becomes, available and if it is determined that there is no need to monitor for certain individual quality characteristics these can be removed from Table 3.
3. SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARMCANZ (2000).
4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

W5 If quality characteristics of the release exceed any of the trigger levels specified in Table 3 during a release event, the environmental authority holder must compare the down stream results in the receiving waters to the trigger values specified in Table 3 and:

1. where the trigger values are not exceeded then no action is to be taken; or
2. where the down stream results exceed the trigger values specified Table 3 for any quality characteristic, compare the results of the down stream site to the data from background monitoring sites and;
 - (a) if the result is less than the background monitoring site data, then no action is to be taken; or
 - (b) if the result is greater than the background monitoring site data, complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W5 (ii)(b)(ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

W6 If an exceedance in accordance with condition W5 (b)(ii) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Contaminant Release Events

W7 The holder must install, operate and maintain a stream flow gauging station to determine and record stream flows at the locations upstream of each Release Point as specified in Table 4 for any receiving water into which a release occurs.

W8 Notwithstanding any other condition of this environmental authority, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in Table 4 for the contaminant release point(s) specified in Table 1.

Table 4 (Contaminant Release during Flow Events)

EXPLANATORY NOTES – Table 4

Gauging station description:

The intent here is that every release point in Table 1 is associated with a gauging station that measures flow upstream of the discharge point. More than one discharge point may be associated with the same gauging station. The gauging station should be at a minimum distance from the discharge point such that water flow under trigger flow events will not significantly diminish by the time it reaches the discharge point. The location of the gauging station should ideally be such that it is not significantly affected by other upstream point source releases or times of discharge are limited to periods of “natural” flow.

Under certain circumstances it may be appropriate to have a downstream gauging station in addition to or in replace of an upstream gauging station. The location should ideally not be affected by the discharge (e.g. be measured off the main waterway). The need for this must be demonstrated on a case by case basis to show why an upstream gauging station is insufficient. This may be the case when mines are located in the upper parts of catchments or near the downstream confluence or a major waterway. Similarly, the gauging station should be at a distance from the discharge point such that water flow during triggered flow events will not significantly diminish between the discharge point and the measuring point (or the confluence with the creek being measured). For downstream flow triggers, some changes to calculation for flow triggers and maximum release flows would typically be required based on the relative sizes of the waterways involved.

Minimum Flow Trigger:

The intent for the minimum flow trigger is that the times of discharge are limited to times of natural flow events only (for ephemeral receiving waters). Ideally, the flow trigger should be chosen such that it represents, for example, a 20th percentile average daily flow (in m³/s) of a minimum ten year period. This or a similar approach should aim to eliminate discharges during “low flow” periods. The maximum discharge volume can then be calculated by dividing the upstream flow trigger by 4. The intent here is that a minimum dilution 1:4 is always maintained (20% of downstream flow). In some situations, this will not allow the mine to release sufficient quantities of water. Therefore, it is possible to propose more than one flow trigger. For example, a 40th percentile average daily flow trigger may also be used in addition to the initial 20th percentile flow trigger such that above the 40th percentile average daily flow trigger a higher release volume will be allowed during periods of higher in-stream flow (while still maintaining a 1:4 dilution ratio).

The expectation is that where flow gauging data is available, it is used to calculate flow triggers. Where gauging data is not available or is insufficient, flow triggers should be based on runoff/stream flow estimates using appropriate hydrological calculations or models and known catchment area, rainfall estimations etc.

Under certain circumstances, such as where a mine is in the upper part of the catchment, achieving a 1:4 dilution with receiving waters as described above may not allow the mine to discharge sufficient volumes. In such a case, a lower flow trigger must still be proposed but the discharge volume will also need to be linked to some downstream flow measure with sufficient dilution (ideally much greater than 1:4). The need for this must be demonstrated on a case by case basis and be supported by various flow calculations to demonstrate feasibility and show minimal environmental impacts.

Other special cases include discharges to creeks below water reservoirs or dams and these should be dealt with on a case by case basis to address the intent described above.

Receiving water description	Release Point	Gauging station description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Minimum Flow in Receiving Water Required for a Release Event	Flow recording Frequency
Wet Creek		Gauging station 1	XXXX	XXXX	Depending on individual catchment this minimum flow trigger will be either the release comprising less than 20% of the natural flow or any natural flow in the receiving environment. The volume of flow can be determined by height of water or flow. The actual flow must be a quantifiable measure. Example: > or = 5 m ³ /sec	Continuous (minimum daily)

- W9** The volume released through the release point(s) must not exceed **XX** m³/s (minimum flow specified in Table 4 divided by 4).
- W10** The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in Table 1.
- W11** Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

Notification of Release Event

- W12** The authority holder must notify the administering authority as soon as practicable (no later than 6 hours of having commenced releasing mine affected water to the receiving environment). Notification must include the submission of written verification to the administering authority of the following information:
- release commencement date/time;
 - expected release cessation date/time;
 - release point/s;
 - release volume (estimated);
 - receiving water/s including the natural flow rate; and
 - any details (including available data) regarding likely impacts on the receiving water(s).
- Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.*
- W13** The authority holder must notify the administering authority as soon as practicable, (nominally within twenty-four (24) hours after of cessation of a release) of the cessation of a release notified under Condition W12 and within 28 days provide the following information in writing:
- release cessation date/time;
 - natural flow volume in receiving water;
 - volume of water released;
 - details regarding the compliance of the release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
 - all in-situ water quality monitoring results; and
 - any other matters pertinent to the water release event.

Notification of Release Event Exceedance

- W14** If the release limits defined in Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.
- W15** The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:
- the reason for the release;
 - the location of the release;
 - all water quality monitoring results;
 - any general observations;
 - all calculations; and
 - any other matters pertinent to the water release event.

Monitoring of Water Storage Quality

- W16** Water storages stated in Table 5 which are associated with the release points must be monitored for the water quality characteristics specified in Table 6 at the monitoring locations and at the monitoring frequency specified in Table 5.

Table 5 (Water Storage Monitoring)

Water Storage Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Monitoring Location	Frequency of Monitoring
XXXX	XXXX	XXXX	To be negotiated- will depend on the individual storage structure volume. This will deal with stratification – depth profiles and be appropriate to in situ quality characteristics.	Quarterly

W17 In the event that waters storages defined in Table 5 exceed the contaminant limits defined in Table 6, the holder of the environmental authority must implement measures to prevent access to waters by all livestock.

Table 6 (Onsite Water Storage Contaminant Limits)

Quality Characteristic	Test Value	Contaminant Limit
pH (pH unit)	Range	Greater than 4, less than 9 ²
EC (µS/cm)	Maximum	5970 ¹
Sulphate (mg/L)	Maximum	1000 ¹
Fluoride (mg/L)	Maximum	2 ¹
Aluminium (mg/L)	Maximum	5 ¹
Arsenic (mg/L)	Maximum	0.5 ¹
Cadmium (mg/L)	Maximum	0.01 ¹
Cobalt (mg/L)	Maximum	1 ¹
Copper (mg/L)	Maximum	1 ¹
Lead (mg/L)	Maximum	0.1 ¹
Nickel (mg/L)	Maximum	1 ¹
Zinc (mg/L)	Maximum	20 ¹

Note:

¹ Contaminant limit based on ANZECC & ARM CANZ (2000) stock water quality guidelines.

² Page 4.2-15 of ANZECC & ARM CANZ (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".

Note: Total measurements (unfiltered) must be taken and analysed

Receiving Environment Monitoring and Contaminant Trigger Levels

W18 The quality of the receiving waters must be monitored at the locations specified in Table 8 for each quality characteristic and at the monitoring frequency stated in Table 7.

Table 7 (Receiving Waters Contaminant Trigger Levels)

Quality Characteristic	Trigger Level	Monitoring Frequency	Comments
pH	6.5 – 8.0	Daily during the release	See Table 2 comments
Electrical Conductivity ($\mu\text{S}/\text{cm}$)	1000		
Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.		
Sulphate (SO_4^{2-}) (mg/L)	250 (Protection of drinking water Environmental Value) OR 1000 (Protection of irrigation environmental value)		

Table 8 (Receiving Water Upstream Background Sites and Down Stream Monitoring Points)

EXPLANATORY NOTES – Selection of monitoring sites:

The intent here is that that each discharge point has both an upstream and downstream monitoring point associated with it. These monitoring points should be located as close as practicable to the release point and the distances should be defined in the footnotes in Table 8. The location of flow monitoring points should also be considered in selecting upstream monitoring points. Other considerations include accessibility, particularly during wet weather conditions.

Monitoring Points	Receiving Waters Location Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)
Upstream Background Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Downstream Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX

Notes:

- The upstream monitoring point should be within X km the release point.
- the downstream point should not be greater than X m from the release point.
- The data from background monitoring points must not be used where they are affected by releases from other mines.

W19 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table 7 during a release event the environmental authority holder must compare the down stream results to the upstream results in the receiving waters and:

- where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or

2. where the down stream results exceed the upstream results complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W19 (ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

EXPLANATORY NOTES – Designing a REMP:

The intent here is that the REMP will be designed for specific requirements of the mine's releases and the receiving environment. The monitoring within the REMP should not be the primary basis for compliance but will be essential for providing supporting information when incidents may occur or for deriving future license limits. The focus should also be on reporting against water quality objectives for relevant waterways affected by the discharge and be on a longer term basis compared to compliance reporting. The intent is that the REMP is to provide condition assessment of near-field areas, ie. local areas likely to be significantly affected by the mine's releases. To do this, it is necessary that monitoring data is collected during times of natural flow outside of times of release in addition to time of release. The REMP is likely to include monitoring sites and indicators in addition to what is presented in the tables of these conditions. The intent is that far-field areas and cumulative impacts will be monitored as part of regional monitoring described in Condition W43 and assist in providing regional condition assessment and regionally specific reference information.

- W20** A REMP must be implemented to monitor and record the effects of the release of contaminants on the receiving environment periodically and whilst contaminants are being discharged from the site, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water.
- For the purposes of the REMP, the receiving environment is the waters of the **XX** and connected waterways within **XX** (e.g. **X**km) downstream of the release.
- W21** The REMP must address (but not necessarily be limited to) the following:
- a) Description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and
 - b) Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the Environmental Protection (Water) Policy 1997); and
 - c) Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed; and
 - d) Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.
 - e) Monitoring for any potential adverse environmental impacts caused by the release;
 - f) Monitoring of stream flow and hydrology;
 - g) Monitoring of toxicants should consider the indicators specified in Table 3 to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC & ARMCANZ 2000 guidelines for slightly to moderately disturbed ecosystems;
 - h) Monitoring of physical chemical parameters as a minimum those specified in Table 2 (in addition to dissolved oxygen saturation and temperature);
 - i) Monitoring biological indicators (for macroinvertebrates in accordance with the AusRivas methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;
 - j) The locations of monitoring points (including the locations specified in Table 8 which are background and downstream impacted sites for each release point);

- k) The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within 2 years (depending on wet season flows) in accordance with the *Queensland Water Quality Guidelines 2006*. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;
- l) Specify sampling and analysis methods and quality assurance and control;
- m) Any historical datasets to be relied upon;
- n) Description of the statistical basis on which conclusions are drawn, and
- o) Any spatial and temporal controls to exclude potential confounding factors.

W22 The REMP must be prepared and submitted in writing to the administering authority by 1 October 2011.

Water Reuse

W23 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying stock water to properties directly adjoining properties owned by the environmental authority holder or a third party and subject to compliance with the quality release limits specified in Table 9.

Table 9 (Stock Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	5000

W24 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying irrigation water to properties directly adjoining properties owned by the environmental authority holder or a third party and subject to compliance with quality release limits in Table 10.

Table 10 (Irrigation Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	Site specific value to be determined in accordance with ANZECC & ARM CANZ (2000) Irrigation Guidelines

W25 Water contaminated by mining activity may be piped or trucked off the mining lease for the purpose of supplying water to a third party for purpose of construction and/or road maintenance in accordance with the conditions of this environmental authority.

W26 Water contaminated by mining activity may be piped or trucked for the purpose of supplying water to <name adjoining mine> in accordance with the conditions of this environmental authority. The volume, pH and electrical conductivity of water transferred to {name adjoining mine} must be monitored and recorded.

W27 If the responsibility of water contaminated by mining activities (the water) is given or transferred to another person in accordance with conditions **W23, W24, W25 or W26**:

- a) the responsibility of the water must only be given or transferred in accordance with a written agreement (the third party agreement); and
- b) include in the third party agreement a commitment from the person utilising the water to use water in such a way as to prevent environmental harm or public health incidences and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters.

Water General

W28 All determinations of water quality must be:

- a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
- b) made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual;

Note: Condition W27 requires the Water Quality Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.

- c) collected from the monitoring locations identified within this environmental authority, within XX hour of each other where possible; and
- d) carried out on representative samples.

W29 The release of contaminants directly or indirectly to waters:

- a) must not produce any visible discolouration of receiving waters; nor
- b) must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual Water Monitoring Reporting

W30 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:

- a) the date on which the sample was taken;
- b) the time at which the sample was taken;
- c) the monitoring point at which the sample was taken;
- d) the measured or estimated daily quantity of the contaminants released from all release points;
- e) the release flow rate at the time of sampling for each release point;
- f) the results of all monitoring and details of any exceedences with the conditions of this environmental authority; and
- g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with waterways

W31 Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Water *Guideline - Activities in a Watercourse, Lake or Spring associated with Mining Activities*.

Water Management Plan

W32 A Water Management Plan must be developed and implemented by [XX/XX/XXXX \(WITHIN 3 MONTHS OF THE DATE OF ISSUE\)](#) that provides for the proper and effective management of the actual and potential environmental impacts resulting from the mining activity and to ensure compliance with the conditions of this environmental authority.

W33 The Water Management Plan must be developed in accordance with DERM Guideline for Preparing a Water Management Plan 2009 (to be developed by 1 September) or any updates that become available from time to time and must include at least the following components:

- a) Contaminant Source Study;
- b) Site Water Balance and Model;
- c) Water Management System;
- d) Saline Drainage Prevention and Management Measures;
- e) Acid Rock Drainage Prevention and Management Measures (if applicable);
- f) Emergency and Contingency Planning;
- g) Monitoring and Review.

- W34** Each year the holder of the environmental authority must undertake a review of the Water Management Plan prior to the wet season (i.e. by 1 November) and a further review following the wet season (i.e. by 1 May the following year) to ensure that proper and effective measures, practices or procedures are in place so that the mine is operated in accordance with the conditions of this environmental authority and that environmental harm is prevented or minimised.
- W35** A copy of the Water Management Plan and/or a review of the Water Management Plan must be provided to the administering authority on request.

Saline Drainage

- W36** The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

- W37** The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water sediment controls

- W38** An Erosion and Sediment Control Plan must be developed by a suitably qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to waters and contamination of storm water.
- W39** The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any waters.
- W40** Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or waters.

All Dams

EXPLANATORY NOTES – Dam conditions:

Note: Conditions W41 and W42 to be removed if already conditioned in the authority.

- W41** The hazard category of each dam must be determined by a suitably qualified and experienced person at least once in each two year period.
- W42** Dams having a hazard category determined to be significant or high, must be specifically authorised by an environmental authority.

Fitzroy River Basin Study

- W43** The administering authority and the holder of this environmental authority both acknowledge that the conditions for release of contaminants to the **XX** River in this environmental authority have been calculated without the benefit of the findings of projects proposed to be undertaken as per recommendations 2 and 3 of the *Study of cumulative impacts on water quality of mining activities in the Fitzroy River Basin* (April 2009). The administering authority may, based on the information provided in the study report when it becomes available, all relevant information available at the time and the regulatory framework applicable at that time, consult with the holder of this environmental authority about the conditions in the environmental authority concerning the treatment and disposal of waste water.

The aim of the consultation shall be the meaningful review of the contaminant release limits imposed in this authority having regard to:

- a) the study results;
- b) near field monitoring results;
- c) QLD Water Quality Guidelines; and
- d) best practice environmental management.

If this review leads to a change in the requirements on this environmental authority holder, this shall be advanced by way of an authority amendment or a Transitional Environmental Program and as is necessary or desirable.

Definitions:

"20th percentile flow" means the 20th percentile of all daily flow measurements (or estimations) of daily flow over a 10 year period for a particular site. The 20th percentile calculation should only include days where flow has been measured (or estimated), i.e. not dry weather days.

"acid rock drainage" means any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining activity.

"administering authority" means the Department of Environment and Resource Management or its successor.

"dam" means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. However; a dam does *not* mean a fabricated or manufactured tank or container designed to a recognised standard, *nor* does a dam mean a land-based structure where that structure is designed to an Australian Standard. In case there is any doubt, a levee (dyke or bund) is a dam, but (for example) a bund designed for spill containment to AS1940 is *not* a dam.

"environmental authority" means an environmental authority granted in relation to an environmentally relevant activity under the *Environmental Protection Act 1994*.

"environmental authority holder" means the holder of this environmental authority.

"flowable substance" means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

"hazard" in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

"hazard category" means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 2.0, 2009) published by the Environmental Protection Agency on its website.

"natural flow" means the flow of water through waters caused by nature.

"receiving environment" means all groundwater, surface water, land, and sediments that are not disturbed areas authorised by this environmental authority.

"receiving waters" means all groundwater and surface water that are not disturbed areas authorised by this environmental authority.

"representative" means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

"saline drainage" The movement of waters, contaminated with salt(s), as a result of the mining activity.

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, and groundwater and any part thereof.

Draft Model Water Conditions for Coal Mines in the Fitzroy Basin

Contaminant Release

- W1** Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.
- W2** The release of contaminants to waters must only occur from the release points specified in Table 1 and depicted in Figure 1 **<this would be a plan locating all monitoring and release points>** attached to this environmental authority.

Table 1 (Contaminant Release Points, Sources and Receiving Waters)

Release Point (RP)	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Contaminant Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	e.g. Stormwater Dam Spillway Overflow	Dam Spillway	Wet Creek
RP 2	XXXX	XXXX	e.g. Dam overflow pipe	Sampling Tap on pipe where the pipe enters Sandy Creek	Sandy Creek

- W3** The release of contaminants to waters must not exceed the release limits stated in Table 2 when measured at the monitoring points specified in Table 1 for each quality characteristic.

Table 2 (Contaminant Release Limits)

Quality Characteristic	Interim Release Limits for all mines (limits to apply from the date of issue)	Future Release Limits from XX/XX/XXXX (negotiated date) Note: These future limits will apply from a yet to be negotiated date using alternative numbers that will be derived from the information gathered by any combination of the following: (1) the results of near field monitoring, (2) any studies or investigations carried out in accordance with recommendations 2 & 3 of the Cumulative Impact Study on water quality in the Fitzroy River Basin. (3) any review of the QLD Water Quality Guidelines. (4) other relevant information Note: This information should be available by the end of 2011 if not before and when it becomes available limits will be determined for each mine site based on the environmental values to be protected and in accordance with criteria	Monitoring frequency	Comment

		<i>below</i>		
Electrical conductivity (uS/cm)	<p>Heirarchy for determining limits in priority order starting with (a):</p> <p>(a) for mines that do not release contaminants to waters - no conditions are required for release authorisation, then conditions W2, to W15 inclusive, W18, W19 and W43 can be deleted.</p> <p>(b) Current limit for those mine sites not under a TEP or 1500 EC (Maximum)* which ever is lower or</p> <p>(c) a negotiated higher limit value that does not result in the contaminant release exceeding a maximum 1000 EC in the receiving waters and where the mine site demonstrates to DERM that it is unreasonable and impractical to immediately comply with the 1500 EC limit in (b) above and supported by a business case and commitment to ongoing environmental improvement on the mine site and with nominated timeframes.</p> <p><i>Note: If the current limit is lower than a limit determined as above then the current limit would initially apply.</i></p> <p>(d) for those other mines which cannot immediately achieve (b) or (c) above a stepped approach within the interim period ending 2011 to achieve (b) or (c) will be required.</p> <p><i>Note: some of these mines may already be under an approved TEP and EC limits and compliance timeframes in the TEP need to be taken into account with the stepped approach.</i></p> <p>To support a stepped approach DERM will require a business case and commitment to ongoing environmental improvement on the mine site to ensure that all reasonable and practicable measures are being/will be taken to prevent and/or minimise environmental harm.</p>	<p>Aquatic ecosystem protection (no drinking water value):</p> <p>An end-of-pipe limit to achieve in the range 0 to 1000 EC in the receiving waters. (Must have natural flow i.e. the 20th percentile flow trigger and achieve a 1:4 dilution</p> <p>OR</p> <p>for mines in the upper catchments must have natural flow i.e. the 20th percentile flow trigger.</p> <p>OR</p> <p>Drinking water protection:</p> <p>An end-of-pipe limit to achieve 0 to 750 EC in the receiving waters. (Must have natural flow, either 1:4 dilution and only release where a 20th percentile flow trigger occurs; OR for mines in the upper catchment must have a natural flow i.e. 20th percentile trigger.</p>	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
pH (pH Unit)	<p>6.5 (minimum)</p> <p>9.0 (maximum)</p>	<p>6.5 (minimum)</p> <p>9.0 (maximum)</p>	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
Turbidity (NTU)	NA*	NA*	Daily during release* (first sample within 2 hours of commencement of release)	Turbidity is required to assess ecosystems impacts and can provide instantaneous results.
Suspended Solids (mg/L)	Current Limit	Limit to be determined based on receiving water reference data and achievable best practice sedimentation control	Daily during release* (first sample within 2 hours of	Suspended solids are required to measure the performance of

		and treatment	commencement of release)	sediment and erosion control measures.
Sulphate (SO ₄ ²⁻) (mg/L)	Current limit or 1000 (maximum) which ever is the lower	250 (Maximum) (Protection of drinking water Environmental Value) OR 1000 (Maximum) (Protection of irrigation environmental value)	Daily during release* (first sample within 2 hours of commencement of release)	Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC & ARMCANZ 2000 stock water quality guidelines.

NA – not available, * local trigger values need to be developed

W4 The release of contaminants to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2 and Table 3.

Table 3 (Release Contaminant Trigger Investigation Levels)

Note: The list of quality characteristics required to be analysed, and their associated trigger levels, is to be reviewed by DERM in consultation with representatives of the mining industry by 31 July 2009.

Quality Characteristic	Trigger Levels (µg/L)	Monitoring Frequency	Comment
Aluminium #	55	Commencement of release and thereafter weekly during release	Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Ammonia (as N)	900		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Antimony	9		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Arsenic #	13		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Boron #	370		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Beryllium#	0.13		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Cadmium #	0.2		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Chromium #	1		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Cobalt #	1.4		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Copper #	1.4		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Fluoride (# only)	2000		Protection of livestock and short term irrigation trigger (ANZECC & ARMCANZ 2000)
Hardness (HCO ₃)	NA		To provide hardness correction factor to the quality characteristics in accordance with ANZECC & ARMCANZ 2000

Iron #	300		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Lead #	3.4		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Manganese #	1900		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Mercury #	0.1		Detection limit
Molybdenum #	34		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Nickel #	11		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
NO _x (as N)	NA		Nitrite and nitrate are indicators required for stock watering, NO _x is the aquatic ecosystem indicator.
Petroleum hydrocarbons (C6-C9)	20		
Petroleum hydrocarbons (C10-C36)	100		
Selenium #	5		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Uranium #	0.5		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Vanadium	6		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Zinc #	8		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)

Note:

1. All metals and metalloids (except for Fluoride) must be measured as dissolved (filtered). Where specified by a (#) total measurements (unfiltered) must also be taken and analysed. Trigger levels for metal/metalloids apply to dissolved results only.

2. The list of quality characteristics required to be monitored as per Table 3 will be reviewed once the results of the monitoring data is gathered for the interim period until 31 December 2011 or an earlier date if the data is, or becomes, available and if it is determined that there is no need to monitor for certain individual quality characteristics these can be removed from Table 3.

W5 If quality characteristics of the release exceed any of the trigger levels specified in Table 3 during a release event, the environmental authority holder must compare the down stream results in the receiving waters to the trigger values specified in Table 3 and:

- a) where the trigger values are not exceeded then no action is to be taken; or
- b) where the down stream results exceed the trigger values specified Table 3 for any quality characteristic, compare the results of the down stream site to the data from background monitoring sites and;
 - i) if the result is less than the background monitoring site data, then no action is to be taken; or
 - ii) if the result is greater than the background monitoring site data, complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - details of the investigations carried out; and
 - actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W5 (ii)(b)(ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

W6 If an exceedance in accordance with condition W5 (b)(ii) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Contaminant Release Events

W7 The holder must install, operate and maintain a stream flow gauging station to determine and record stream flows at the locations upstream of each Release Point as specified in Table 4 for any receiving water into which a release occurs.

W8 Notwithstanding any other condition of this environmental authority, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in Table 4 for the contaminant release point(s) specified in Table 1.

Table 4 (Contaminant Release during Flow Events)

Receiving water description	Release Point	Gauging station description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Minimum Flow in Receiving Water Required for a Release Event	Flow recording Frequency
Wet Creek		Gauging station 1	XXXX	XXXX	Depending on individual catchment this minimum flow trigger will be either the release comprising less than 20% of the natural flow or any natural flow in the receiving environment. The volume of flow can be determined by height of water or flow. The actual flow must be a quantifiable measure. Example: > or = 5 m ³ /sec	Continuous (minimum daily)

W9 The volume released through the release point(s) must not exceed XX m³/s (minimum flow specified in Table 4 divided by 4).

W10 The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in Table 1.

W11 Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

Notification of Release Event

W12 The authority holder must notify the administering authority as soon as practicable (no later than 6 hours of having commenced releasing mine affected water to the receiving environment). Notification must include the submission of written verification to the administering authority of the following information:

- a) release commencement date/time;
- b) expected release cessation date/time;
- c) release point/s;
- d) release volume (estimated);
- e) receiving water/s including the natural flow rate; and
- f) any details (including available data) regarding likely impacts on the receiving water(s).

Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

- W13** The authority holder must notify the administering authority as soon as practicable, (nominally within twenty-four (24) hours after of cessation of a release) of the cessation of a release notified under Condition W 12 and within 28 days provide the following information in writing:
- release cessation date/time;
 - natural flow volume in receiving water;
 - volume of water released;
 - details regarding the compliance of the release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
 - all in-situ water quality monitoring results; and
 - any other matters pertinent to the water release event.

Notification of Release Event Exceedance

- W14** If the release limits defined in Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.

- W15** The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:
- the reason for the release;
 - the location of the release;
 - all water quality monitoring results;
 - any general observations;
 - all calculations; and
 - any other matters pertinent to the water release event.

Monitoring of Water Storage Quality

- W16** Water storages stated in Table 5 which are associated with the release points must be monitored for the water quality characteristics specified in Table 6 at the monitoring locations and at the monitoring frequency specified in Table 5.

Table 5 (Water Storage Monitoring)

Water Storage Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Monitoring Location	Frequency of Monitoring
XXXX	XXXX	XXXX	To be negotiated- will depend on the individual storage structure volume. This will deal with stratification – depth profiles and be appropriate to in situ quality characteristics.	Quarterly

- W17** In the event that waters storages defined in Table 5, exceed the contaminant limits defined in Table 6, the holder of the environmental authority must implement measures to prevent access to waters by all livestock.

Table 6 (Onsite Water Storage Contaminant Limits)

Quality Characteristic	Test Value	Contaminant Limit
pH (pH unit)	Range	Greater than 4, less than 9 ²
EC (µS/cm)	Maximum	5970 ¹
Sulphate (mg/L)	Maximum	1000 ¹

Fluoride (mg/L)	Maximum	2 ¹
Aluminium (mg/L)	Maximum	5 ¹
Arsenic (mg/L)	Maximum	0.5 ¹
Cadmium (mg/L)	Maximum	0.01 ¹
Cobalt (mg/L)	Maximum	1 ¹
Copper (mg/L)	Maximum	1 ¹
Lead (mg/L)	Maximum	0.1 ¹
Nickel (mg/L)	Maximum	1 ¹
Zinc (mg/L)	Maximum	20 ¹

¹ Contaminant limit based on ANZECC & ARMCANZ (2000) stock water quality guidelines.

² Page 4.2-15 of ANZECC & ARMCANZ (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".
 Note: Total measurements (unfiltered) must be taken and analysed

Receiving Environment Monitoring and Contaminant Trigger Levels

W18 The quality of the receiving waters must be monitored at the locations specified in Table 8 for each quality characteristic and at the monitoring frequency stated in Table 7.

Table 7 (Receiving Waters Contaminant Trigger Levels)

Quality Characteristic	Trigger Level	Monitoring Frequency	Comments
pH	6.5 – 8.0	Daily during the release	See Table 2 comments
Electrical Conductivity (µS/cm)	1000		
Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.		
Sulphate (SO ₄ ²⁻) (mg/L)	250 (Protection of drinking water Environmental Value) OR 1000 (Protection of irrigation environmental value)		

Table 8 (Receiving Water Upstream Background Sites and Down Stream Monitoring Points)

Monitoring Points	Receiving Waters Location Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)
Upstream Background Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX

Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Downstream Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX

Notes:

- a) The upstream monitoring point should be within Xkm the release point.
- b) the downstream point should not be greater than Xm from the release point.
- c) The data from background monitoring points must not be used where they are affected by releases from other mines.

W19 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table 7 during a release event the environmental authority holder must compare the down stream results to the upstream results in the receiving waters and:

- a) where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or
- b) where the down stream results exceed the upstream results complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - i) details of the investigations carried out; and
 - ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W19 (ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

W20 A REMP must be implemented to monitor and record the effects of the release of contaminants on the receiving environment periodically and whilst contaminants are being discharged from the site, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water.

For the purposes of the REMP, the receiving environment is the waters of the XX and connected waterways within XX (e.g. Xkm) downstream of the release.

W21 The REMP must address (but not necessarily be limited to) the following:

- a) Description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and
- b) Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the Environmental Protection (Water) Policy 1997); and
- c) Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed; and
- d) Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.
- e) Monitoring for any potential adverse environmental impacts caused by the release;
- f) Monitoring of stream flow and hydrology;
- g) Monitoring of toxicants should consider the indicators specified in Table 3 to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC & ARMCANZ 2000 guidelines for slightly to moderately disturbed ecosystems;
- h) Monitoring of physical chemical parameters as a minimum those specified in Table 2 (in addition to dissolved oxygen saturation and temperature);

- i) Monitoring biological indicators (for macroinvertebrates in accordance with the AusRivas methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARM CANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;
- j) The locations of monitoring points (including the locations specified in Table 8 which are background and downstream impacted sites for each release point);
- k) The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within 2 years (depending on wet season flows) in accordance with the *Queensland Water Quality Guidelines 2006*. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;
- l) Specify sampling and analysis methods and quality assurance and control;
- m) Any historical datasets to be relied upon;
- n) Description of the statistical basis on which conclusions are drawn, and
- o) Any spatial and temporal controls to exclude potential confounding factors.

W22 The REMP must be prepared and submitted in writing to the administering authority by 1 October 2011.

Water Reuse

W23 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying stock water to properties directly adjoining properties owned by the environmental authority holder or a third party and subject to compliance with the quality release limits specified in Table 9.

Table 9 (Stock Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	5000

W24 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying irrigation water to properties directly adjoining properties owned by the environmental authority holder or a third party and subject to compliance with quality release limits in Table 10.

Table 10 (Irrigation Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	Site specific value to be determined in accordance with ANZECC & ARM CANZ (2000) Irrigation Guidelines

W25 Water contaminated by mining activity may be piped or trucked off the mining lease for the purpose of supplying water to a third party for purpose of construction and/or road maintenance in accordance with the conditions of this environmental authority.

W26 Water contaminated by mining activity may be piped or trucked for the purpose of supplying water to {name adjoining mine} in accordance with the conditions of this environmental authority. The volume, pH and electrical conductivity of water transferred to {name adjoining mine} must be monitored and recorded.

- W27** If the responsibility of water contaminated by mining activities (the water) is given or transferred to another person in accordance with conditions **W23, W24, W25 or W26:**
- the responsibility of the water must only be given or transferred in accordance with a written agreement (the third party agreement); and
 - include in the third party agreement a commitment from the person utilising the water to use water in such a way as to prevent environmental harm or public health incidences and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters.

Water General

- W28** All determinations of water quality must be:
- performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
 - made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual;
Note: Condition W 27 requires the Water Quality Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.
 - collected from the monitoring locations identified within this environmental authority, within XX hour of each other where possible; and
 - carried out on representative samples.
- W29** The release of contaminants directly or indirectly to waters:
- must not produce any visible discolouration of receiving waters; nor
 - must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual Water Monitoring Reporting

- W30** The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:
- the date on which the sample was taken;
 - the time at which the sample was taken;
 - the monitoring point at which the sample was taken;
 - the measured or estimated daily quantity of the contaminants released from all release points;
 - the release flow rate at the time of sampling for each release point;
 - the results of all monitoring and details of any exceedences with the conditions of this environmental authority; and
 - water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with waterways

- W31** Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Water *Guideline - Activities in a Watercourse, Lake or Spring associated with Mining Activities*.

Water Management Plan

- W32** A Water Management Plan must be developed and implemented by XX/XX/XXXX (WITHIN 3 MONTHS OF THE DATE OF ISSUE) that provides for the proper and effective management of the actual and potential environmental impacts resulting from the mining activity and to ensure compliance with the conditions of this environmental authority.

- W33** The Water Management Plan must be developed in accordance with DERM Guideline for Preparing a Water Management Plan 2009 (to be developed by 1 September) or any updates that become available from time to time and must include at least the following components:
- Contaminant Source Study;
 - Site Water Balance and Model;
 - Water Management System;
 - Saline Drainage Prevention and Management Measures;
 - Acid Rock Drainage Prevention and Management Measures (if applicable);
 - Emergency and Contingency Planning;
 - Monitoring and Review.
- W34** Each year the holder of the environmental authority must undertake a review of the Water Management Plan prior to the wet season (i.e. by 1 November) and a further review following the wet season (i.e. by 1 May the following year) to ensure that proper and effective measures, practices or procedures are in place so that the mine is operated in accordance with the conditions of this environmental authority and that environmental harm is prevented or minimised.
- W35** A copy of the Water Management Plan and/or a review of the Water Management Plan must be provided to the administering authority on request.

Saline Drainage

- W36** The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

- W37** The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water sediment controls

- W38** An Erosion and Sediment Control Plan must be developed by a suitably qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to waters and contamination of storm water.
- W39** The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any waters.
- W40** Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or waters.

All Dams

- W41** The hazard category of each dam must be determined by a suitably qualified and experienced person at least once in each two year period.
- W42** Dams having a hazard category determined to be significant or high, must be specifically authorised by an environmental authority.

Note: *Conditions W41 and W42 to be removed if already conditioned in the authority*

Fitzroy River Basin Study

- W43** The administering authority and the holder of this environmental authority both acknowledge that the conditions for release of contaminants to the XX River in this environmental authority have been calculated without the benefit of the findings of projects proposed to be undertaken as per recommendations 2 and 3 of the *Study of cumulative impacts on water quality of mining activities in the Fitzroy River Basin* (April 2009). The administering authority may, based on the information provided in the study report when it becomes available, all relevant information available at the time and the

regulatory framework applicable at that time, consult with the holder of this environmental authority about the conditions in the environmental authority concerning the treatment and disposal of waste water.

The aim of the consultation shall be the meaningful review of the contaminant release limits imposed in this authority having regard to:

- a) the study results;
- b) near field monitoring results;
- c) Qld Water Quality Guidelines; and
- d) best practice environmental management.

If this review leads to a change in the requirements on this environmental authority holder, this shall be advanced by way of an authority amendment or a Transitional Environmental Program and as is necessary or desirable.

Definitions:

"20th percentile flow" means the 20th percentile of all daily flow measurements (or estimations) of daily flow over a 10 year period for a particular site. The 20th percentile calculation should only include days where flow has been measured (or estimated), i.e. not dry weather days.

"acid rock drainage" means any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining activity.

"administering authority" means the Department of Environment and Resource Management or its successor.

"dam" means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. However; a dam does *not* mean a fabricated or manufactured tank or container designed to a recognised standard, *nor* does a dam mean a land-based structure where that structure is designed to an Australian Standard. In case there is any doubt, a levee (dyke or bund) is a dam, but (for example) a bund designed for spill containment to AS1940 is *not* a dam.

"environmental authority" means an environmental authority granted in relation to an environmentally relevant activity under the *Environmental Protection Act 1994*.

"environmental authority holder" means the holder of this environmental authority.

"flowable substance" means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

"hazard" in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

"hazard category" means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 2.0, 2009) published by the Environmental Protection Agency on its website.

"natural flow" means the flow of water through waters caused by nature.

"receiving environment" means all groundwater, surface water, land, and sediments that are not disturbed areas authorised by this environmental authority.

"receiving waters" means all groundwater and surface water that are not disturbed areas authorised by this environmental authority.

"representative" means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

"saline drainage" The movement of waters, contaminated with salt(s), as a result of the mining activity.

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, and groundwater and any part thereof.

Fitzroy River Basin – Mine Licence Water Conditions Workshop
Held on 18 June 2009 at Sebel & Citigate King George Square Hotel, Brisbane

Record of workshop discussions and outcomes

Dean Ellwood, Department of Environment and Resource Management - Acting Assistant Director-General, welcomed the workshop participants and provided a brief introduction.

Professor Bob Miles, facilitator, addressed the workshop regarding proceedings for the day.

Frances Hayter, Queensland Resources Council - Director Environment and Social Policy addressed the group and noted the following key points and issues for resolution on behalf of the coal mining industry:

- understand the political processes that have lead to this project
- the industry is interested in reaching a solution
- 12 days is a very tight timeframe to achieve stated outcomes
- seek agreement not to talk about the contents of the Cumulative Impacts Study at this workshop just recommendation 1 from the Study
- water quality monitoring across all industries not just mining needs to be improved and highlighted that as an issue for discussion during the workshop
- industry believes the Government does not have a good understanding of how mines operate and that needs to change otherwise processes like this could undo all the good work done in water management by mines.
- seek a rational outcome to the development of the conditions so that companies are not put in a position where they have to cut or stop production and recognise that if that is going to happen then it needs to be a conscious decision by Government and the Premier needs to be advised
- question whether DERM can resource the extra work this project will bring
- question what happens regarding wider consultation about these proposed amendments
- seek clarification of TWG role/Taskforce role.

Ian Ramsay, DERM Chief Scientist Freshwater and Marine gave a presentation on the approaches used in developing discharge licence conditions.

A summary of the points raised for clarification follows.

Question/issue	Clarification
How do we get conditions that are reasonable now if we need 2-5 years to collect data to determine ideal conditions for individual sites?	DERM recognises this approach is based on limited understanding of the ambient environmental conditions and that it's not perfect but it can be refined and it is not intended to have limits that can't be met
Process needs to be documented on how these changes may occur as information changes.	

How does a company know if it is in compliance or not when you have trigger values?	Compliance relates to limit numbers in licences. Trigger values are not compliance related but are related to environmental harm and trigger the need for investigation to see whether harm has occurred.
There may be compliance issues with sampling trace elements. Many mines have very remote locations and use sampling processes that are not totally adequate so it's not always possible to guarantee quality assurance of monitoring. Site access can be a problem for monitoring, e.g. getting to a creek in the middle of a floodplain and relying on the goodwill of neighbours to access land.	This is a valid point and it was agreed some approaches to monitoring are not currently appropriate.
The issue of needing to discharge should be addressed as mines should be able to discharge if this will not cause environmental harm. Therefore receiving water should be the limit point not end of pipe. Mine discharge water can be a resource to the receiving environment. Does DERM understand that you can't make end-of-pipe and receiving point monitoring the same limits?	End-of-pipe is needed to determine compliance and as proof of who is responsible for contaminants.
What is the relevance of this process to emergency discharges. How do we manage uncontrolled discharges when all this talk is about controlled discharges. Many of the mines have water storages built on waterways so is this about discharges occurring deliberately or storm events as that needs to be part of the consideration as to how you frame conditions.	The purpose of this workshop is to focus on revised conditions for controlled discharges
Is there an expectation suspended solids would be treated before release?	Yes, through a sediment treatment dam.
The issue of far field monitoring was raised but held for later discussion	

Les Bevis, DERM – Regional Manager Townsville, and Steven Tarte, DERM – Principal Environmental Officer, gave a presentation on the Draft model water conditions for coal mines in the Fitzroy Basin - Parts A and B.

A summary of the points raised for clarification follows.

Question/issue	Clarification
Part A specific	
As amendments are needed by the end of December 2009, why are future amendments being introduced over the next 2 years. An explicit statement on how this process will work is needed as condition W39 does not explain it	

well enough.	
Need mechanism for transition from current conditions to new regime.	DERM acknowledged there are time factors associated with some limits – this will be negotiated.
The 1500 uS/cm limit is a significant change for many mines which will take time to achieve and TEPs should not be the mechanism used to get there. Ministers Jones and Swarten should be told that compliance is not immediately possible and TEPs should not be used.	DERM agreed to look at milestone conditions and acknowledged it may take time to implement changes. DERM also agreed to report on this to Minister Jones.
It was noted that corporate governance is an issue for companies if they sign up to something they can't achieve.	
Is there scope to lower the 18 points of data?	DERM advised there is a limit to how low you can go but this can be worked through with technical officers.
Issue with end-of-pipe discharge limits discussed. Shouldn't the emphasis be on the mine demonstrating no environmental harm. This could possible lead to a higher discharge limit at a lower volume.	DERM agreed that different scenarios for discharge could be considered but releases of higher EC need background data to manage near field toxicity. Also the issue of communication between mines needs to be considered to deal with assimilative issues.
Part B specific	
<ul style="list-style-type: none"> • Why do we need this as a specific part of our licences what is the point when it just repeats what is in the conditions? • Condition should just relate to the need to have a water management plan. • This should be a guideline/code of practice. • Including a stack of how to's in a licence condition goes against all best practice standards. • Suggestion for a condition that states the need for a water management plan that demonstrates your ability to comply with your conditions. 	Agreed: Mines want to see less prescriptive approach to Part B – matter for working group to discuss.
Far field monitoring comments	
<ul style="list-style-type: none"> • Have an issue with far field monitoring as an EA condition. • Some mines do not discharge at all or very infrequently. • Agree with principle but let's talk through how it fits in an EA. What should be in and what shouldn't. Agree that catchment wide 	

Other comments	
List of metals currently need 4 monitoring sites for 1 release.	
Why are dam conditions regulated in Part A when there is still only a draft policy for dams that hasn't been finalised.	This is so that monitoring of water storage occurs so you know what is in your dams
Is this for all dams or just those with a release point.	Intent is just to relate to water storages for which there is a release.
Cannot comply with W18 – should be where practicable and perhaps this should go into dam conditions instead.	

It was agreed that copies of all presentations given at the workshop would be made available to all attendees.

Summary of morning session

Dean Ellwood summed up the morning session with the following key points.

- Will convey concerns to Minister Jones about TEPs being used as a transition process.
- Clarified that TWG/Taskforce intent is current TWG will finish and that a commitment has been made to reconstitute a new group.
- Regarding end-of-pipe, quite wedded to end-of-pipe emissions as most licensing is done at point of release.
(Comment from group – then discussion needs to be about the numbers)
- Regarding far field monitoring – there is an opportunity to move away from conditioning and embrace a Healthy Waterways type of project. With commitment from mines this could be a good news item for all stakeholders.
- Deferred on Part B but noted DERM needs to see water management plans in place.

The following questions were put to Dean Ellwood

Q. We need to see some commitment on how issues should be dealt with and the process needs to be documented.

A: Agree to put a fence around amendments to water conditions in EAs in the Fitzroy Basin while this process continues until the end of 2009.

Q. Are the model conditions going to be opened up to community objection?

A: That is not the intent.

Frances Hayter then asked for a letter from Minister Jones stating that conditions were not open to community objection.

Following the presentations and summing up, the participants broke into groups to discuss 1) strategic issues, 2) condition specific issues, and 3) operational issues with a request to identify issues and possible solutions. A summary of the smaller group discussions follows.

Strategic group

Issue	Solution
Major issue is management of short term stakeholder expectations. For example is we get floods next Christmas	Need a process of engaging with councils and NGO groups. Need to take stakeholders with us.
There is the potential for unintended conflict between legislation (EP Act and Water Act) and different land uses. For example, may need to build a big dam but this could create conflict with use of more land and less environmental flows and likewise using water allocations to shandy etc.	Great coordination between ex-EPA and ex-NRW.
Need to keep the focus on protecting the environment.	Develop a plan of research to understand impacts etc.
Broader catchment monitoring may demonstrate mines are not the bad guys everyone thought so need clear processes for governance of this.	Investigate a Healthy Waterways style of program as this have to be more than just a compliance exercise. It needs a dedicated group and a way of managing data is a critical need.

Condition specific group

- whole group needs to see another version of conditions once changes have been made
- 1500 is not a reachable limit for most mines.
- pH must be 9
- metals in Table 3 should be about 10 in total which could be done in a cost effective and reasonable way
- receiving and near field environment should be one and the same
- Part B – only condition should be requirement for water management plan
- practicalities around monitoring need to be determined
- in release events 20% is not acceptable this figure needs to be lower
- W12 notification of release prior to event is ridiculous
- W13 some information may not be available in that time
- W16 is not necessary
- W17 wording needs changing
- W18 needs to include where practicable, reference sites should be part of regional strategy
- W34 in accordance with EPA Manual is not possible and timing is not possible
- W37(d) is that about discharge volume
- W16 and W36 are redundant because they're about general environmental duty
- add in conditions to provide for stock water, irrigation water, construction water and water transfer to adjoining mines.

Operational group

Issue	Solution
Some sites cannot meet proposed limits in low flow and may not be able to comply with 1500 and list of metals needs to be reduced.	Need a mechanism for a dedicated DERM technical officer to review

Some mines don't have access to upstream and downstream sites for sampling/monitoring.	Mines may need to share data.
24 hour prior notice of discharge is not practical but need a suitable period after discharge.	2 hours notice after discharge for example.
Concerns about period of transition, particularly for older sites.	Milestones in EAs is a solution.
Concerns about far field monitoring.	Participating in a broader regional process.
Need extra conditions to deal with stock water, irrigation water, construction water and transfer of water to adjoining mines.	
DERM needs a dedicated team to process revised EAs.	

Summing up of where to from here?

- Talked about representatives for working group with industry representative being determined as Andrew Grabski, Peter Roe and Tracey Tucker or Dale du Mee.
- Talked about rapidly assembling data from the mines to help in the individual mine assessment process. This would involve DERM advising what information they currently hold and what further information from mines would be helpful. It was determined this process would occur after 30 June 2009.
- Talked about how the assessment process would be managed and how changes from the workshop would be incorporated into the model conditions for further revisions.
- It was agreed DERM would incorporate comments from the workshop into Version 1.1 of the model conditions by COB 24/6/09. This version would be distributed to the working group members for further refining. It was also agreed that version revised by the working group needed to go back to the wider group present at the workshop for further comment.
- DERM agreed to investigate establishing a dedicated team to develop the new EAs for each mine site.
- In relation to meeting the 30 June 2009 deadline for finalising consistent and appropriate licence conditions it was discussed that it may be necessary to report to Minister Jones that agreement has been reached on xx number of conditions but xx number are still to be determined.

Draft Model Water Conditions for Coal Mines in the Fitzroy Basin

Department of Environment and Resource Management

Introduction

The key points for discussion will include: contaminant release limits; releases linked to stream flow; metal trigger values; receiving environment monitoring – both of the discharge and in the catchment; and water management plan requirements including continual improvement. Limits are based on an assumption of limited/no monitoring information on background and discharge water quality. Limits could be amended in the future when this information becomes available.

The following proposed conditions have been broken up into two parts:

- A. Release limits, monitoring and reporting requirements; and
- B. Practices and measures to assist in achieving compliance with conditions. (These part B conditions will be provided prior to the workshop held on 18 June 2009.)

Part A: Release limits, monitoring & reporting requirements

Proposed conditions:

W1 Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.

Contaminant Release Limits

W2 The release of contaminants to waters must only occur from the release points specified in Table 1 and depicted in Figure 1 **<this would be a plan locating all monitoring and release points>** attached to this environmental authority.

Table 1 (Contaminant Release Points, Sources and Receiving Waters)

Release Point (RP)	Latitude (GDA94)	Longitude (GDA94)	Contaminant Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	E.g. Stormwater Dam Spillway Overflow	Dam Spillway	Wet Creek
RP 2	XXXX	XXXX	E.g. Dam overflow pipe	Sampling Tap on pipe where the pipe enters Sandy Creek	Sandy Creek

W3 The release of contaminants to waters must not exceed the release limits stated in Table 2 when measured at the monitoring points specified Table 1 at the monitoring frequency specified in Table 2 for each quality characteristic.

Table 2 (Contaminant Release Limits)

Quality Characteristic	Interim Release Limits for all mines (limits to apply from the date of issue until XX/XX/XXXX the negotiated date)	Release Limits from XX/XX/XXXX (negotiated date) (subject to negotiation with a maximum implementation end date of 1 December 2010 depending on mine site location and receiving environment)		Monitoring frequency	Comment
		For mine sites that can demonstrate that release comprises no more than 20% of the natural flow in the receiving water	For mine sites located in the upper catchments with low natural flows in receiving water		
Electrical conductivity (uS/cm)	1500 (Maximum)*	1400 (maximum)*	720* (maximum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	For Nogoia basin north of Emerald and upper Isaac River. For aquatic ecosystem protection, no drinking water storages downstream.
	1500 (Maximum)*	750 (maximum)*	340 (maximum)*	Daily during release (the first sample must be taken within 2 hours of commencement of release)	For all areas with downstream drinking water reservoir or use, apart from the Dawson (except Dee River Branch)

	1500 (Maximum)*	650 (maximum)*	340 (maximum)*	Daily during release (the first sample must be taken within 2 hours of commencement of release)	For the Dawson except Dee River Branch. For aquatic ecosystem protection with/without drinking water storages downstream
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)	6.5 (minimum) 9.0 (maximum)	6.5 (minimum) 8.0 (maximum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	This applies to the fourth column of this row only: Limits are conservative ambient limit from Ambient QWQ Guidelines for lowland streams. Higher upper limit of 8.5 may be allowed if dilution is sufficient to achieve in stream ambient WQ Guideline based on median (8.0 for lowland and 7.5 for upland streams)
Turbidity (NTU)	NA*	NA*	NA*	Daily during release* (first sample within 2 hours of commencement of release)	Turbidity is required to assess ecosystems impacts and can provide instantaneous results.
Suspended Solids (mg/L)	100 (maximum)	50 (maximum)	50 (maximum)	Daily during release* (first sample within 2 hours of commencement of release)	Suspended solids are required to measure the performance of sediment and erosion control measures.
Sulphate (SO ₄ ²⁻) (mg/L)	Current limit or 1000 (maximum) which ever is the lower	1000 (maximum)	250 (Maximum) (Protection of drinking water Environmental Value) OR 1000 (Maximum) (Protection of irrigation environmental value)	Daily during release* (first sample within 2 hours of commencement of release)	Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC & ARMCANZ 2000 stock water quality guidelines.

NA – not available, * local trigger values need to be developed

W4 The release of contaminants to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency and specified in Table 2.

Table 3 (Toxicant Trigger Investigation Levels)

Quality Characteristic ¹	Toxicant Trigger Levels (µg/L)	Monitoring Frequency	Comment
Aluminium #	55	Commencement of release and thereafter weekly during release	Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Ammonia (as N)	900		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Antimony	9		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Arsenic #	13		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Boron #	370		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Beryllium#	0.13		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Cadmium #	0.2		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Chromium #	1		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Cobalt #	1.4		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Copper #	1.4		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Fluoride (# only)	2000		Protection of livestock and short term irrigation trigger (ANZECC & ARMCANZ 2000)
Hardness (HCO ₃)	NA		To provide hardness correction factor to the quality characteristics in accordance with ANZECC & ARMCANZ 2000
Iron #	300		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Lead #	3.4	Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)	
Manganese #	1900	Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)	

Mercury [#]	0.1		Detection limit
Molybdenum [#]	34		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Nickel [#]	11		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
NO _x (as N)	NA		Nitrite and nitrate are indicators required for stock watering, NO _x is the aquatic ecosystem indicator.
Petroleum hydrocarbons (C6-C9)	20		
Petroleum hydrocarbons (C10-C36)	100		
Selenium [#]	5		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)
Uranium [#]	0.5		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Vanadium	6		Slightly to Moderately Disturbed Aquatic ecosystem – low reliability (ANZECC & ARMCANZ 2000)
Zinc [#]	8		Slightly to Moderately Disturbed Aquatic ecosystem (ANZECC & ARMCANZ 2000)

Note: All metals and metalloids (except for Fluoride) must be measured as dissolved (filtered). Where specified by a (#) total measurements (unfiltered) must also be taken and analysed. Trigger levels for metal/metalloids apply to dissolved results only.
 NA – Not applicable.

W5 If quality characteristics exceed any of the toxicant trigger levels specified in Table 3 during a release event, the environmental authority holder must:

- a) Compare the results of the release to the last 12 consecutive sampling results for the background receiving environment for that monitoring point. If the result is less than the maximum background result, no action is to be taken;
- b) If the result is greater than the maximum background results, complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 1. details of the investigations carried out; and
 2. actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with part b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

W6 If an exceedance in accordance with Condition W5 b), the holder of the authority must notify the administering authority within 14 days of receiving the result.

Contaminant Release Events

W7 The holder must install, operate and maintain a stream flow gauging station to determine and record stream flows at the locations upstream of each Release Point as specified in Table 4 for any receiving water into which a release occurs.

W8 Notwithstanding any other condition of this environmental authority, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in Table 4 for the contaminant release point(s) specified in Table 1.

Table 4 (Contaminant Release during Flow Events)

Receiving water description	Release Point	Gauging station description	Latitude (GDA94)	Longitude (GDA94)	Minimum Flow in Receiving Water Required for a Release Event	Flow recording Frequency
Wet Creek		Gauging station 1	XXXX	XXXX	<p>Depending on individual catchment this minimum flow trigger will be either the release comprising less than 20% of the natural flow or any natural flow in the receiving environment.</p> <p>The volume of flow can be determined by height of water or flow. The actual flow must be a quantifiable measure.</p> <p>Example: > or = 5 m³/sec</p>	Continuous (minimum daily)

W9 The quantity of contaminants released through the release point(s) must not exceed **XX** m³/s (minimum flow specified in Table 4 divided by 4).

W10 The quantity of contaminants released from each release point must be measured and recorded at the monitoring points and at the frequencies specified in Table 2.

W11 Releases of contaminants to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

Notification of Release

W12 The authority holder must notify the administering authority of its intention to commence discharging mine affected water to the receiving environment, a minimum of twenty-four (24) hours prior to a discharge commencing. Notification must include the submission of written verification to the administering authority of the following information:

- release commencement date/time;
- expected release cessation date/time;
- release point/s;
- receiving water/s;
- details regarding the compliance of the proposed discharge with the conditions of Agency Interest: Water (ie contamination limits, natural flow, discharge volume); and
- release volume (estimated).

Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

W13 The authority holder must notify the administering authority, within twenty-four (24) hours after of cessation of a release notified under Condition **W9** and provide the following information in writing:

- release cessation date/time;
- natural flow volume in receiving water;
- volume of water released;
- details regarding the compliance of the proposed release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
- all in-situ water quality monitoring results; and
- any other matters pertinent to the water release event.

W14 If the release limits defined in Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.

- W15** The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:
- the reason for the release;
 - the location of the release;
 - all water quality monitoring results;
 - any general observations;
 - all calculations; and
 - any other matters pertinent to the water release event.
- W16** In addition to the quality characteristic limits specified in Table 2 the release of contaminants must not have any properties nor contain any organisms or other contaminants in concentrations that are capable of causing environmental harm.

Monitoring of Water Storage Quality

- W17** Monitoring of the water storages for the water quality characteristics specified in Table 2 and Table 3 must be undertaken from the monitoring locations and at the monitoring frequency specified in Table 5.

Table 5 (Water Storage Monitoring)

Water Storage Description	Latitude (GDA94)	Longitude (GDA94)	Monitoring Location	Frequency of Monitoring
XXXX	XXXX	XXXX	To be negotiated- will depend on the individual storage structure volume. This will deal with stratification – depth profiles and be appropriate to in situ quality characteristics.	Quarterly

- W18** In the event that waters storages defined in Table 5, exceed the contaminant limits defined in Table 6, the holder of the environmental authority must implement measures to prevent access to waters by all livestock and minimise access by native fauna.

Table 6 (Onsite Water Storage Contaminant Limits)

Quality Characteristic	Test Value	Contaminant Limit
pH (pH unit)	Range	Greater than 4, less than 9 ²
EC (µS/cm)	Maximum	5970 ¹
Sulphate (mg/L)	Maximum	1000 ¹
Fluoride (mg/L)	Maximum	2 ¹
Aluminium (mg/L)	Maximum	5 ¹
Arsenic (mg/L)	Maximum	0.5 ¹
Cadmium (mg/L)	Maximum	0.01 ¹
Cobalt (mg/L)	Maximum	1 ¹
Copper (mg/L)	Maximum	1 ¹

Lead (mg/L)	Maximum	0.1 ¹
Nickel (mg/L)	Maximum	1 ¹
Zinc (mg/L)	Maximum	20 ¹

¹ Contaminant limit based on ANZECC & ARMCANZ (2000) stock water quality guidelines.

² Page 4.2-15 of ANZECC & ARMCANZ (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".

Note: Total measurements (unfiltered) must be taken and analysed

Receiving Environment Contaminant Trigger Levels

W19 The quality of the receiving waters must be monitored at the locations specified in Table 8 for each quality characteristic and at the monitoring frequency stated in Table 7.

W20 If the quality characteristics of the downstream monitoring sites specified in Table 8 exceed the trigger levels specified in Table 7 during release, the environmental authority holder must:

- a) Compare the results of the release to the last 12 consecutive sampling results for the background receiving environment for that down stream monitoring point. If the result is less than the maximum background result, no action is to be taken;
- b) If the result is greater than the maximum background results, complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 1. details of the investigations carried out; and
 2. actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with part b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

W21 If an exceedance of a trigger level occurs notify the administering authority within 14 days of receiving the result.

Table 7 (Receiving Environment Contaminant Trigger Levels)

Quality Characteristic	Trigger Level	Monitoring Frequency	Comments
pH	6.5 - 8	Daily during the release	See Table 2 comments
Electrical Conductivity (µS/cm)	1000		
Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.		
Sulphate (SO ₄ ²⁻) (mg/L)	250 (Protection of drinking water Environmental Value) OR 1000 (Protection of irrigation environmental value)		

Table 8 (Stream receiving water monitoring points)

Monitoring Point	Receiving Waters Location Description	Latitude (GDA94)	Longitude (GDA94)
Upstream Background Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Downstream Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX

Notes:

- The upstream monitoring point should be within **1km** the release point.
- the downstream point should not be greater than **500m** from the release point.

Receiving Environment Monitoring Program (REMP)

W22 A REMP, focussing on near-field and far-field impacts, must be implemented, based on the outcomes of a background environmental investigation, pertaining to the receiving waters (i.e. **XXXX** and connected waters), that addresses at least the following:

- Description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality); and
- Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the Environmental Protection (Water) Policy 1997); and
- Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed; and
- Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP.

Near-field Monitoring Program (NFMP)

W23 A NFMP must be implemented to monitor and record the effects of the release of contaminants on the near-field receiving environment periodically and whilst contaminants are being discharged from the site, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water.

For the purposes of the NFMP, the receiving environment is the waters of the **XX** and connected waterways within **XX** (e.g. 5km) downstream of the release.

W24 The NFMP proposal must address (but not necessarily be limited to) the following:

- Monitoring for any potential adverse environmental impacts caused by the release;
- Monitoring of stream flow and hydrology;
- Monitoring of toxicants and other indicators specified in Table 3 to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC & ARMCANZ 2000 guidelines for slightly to moderately disturbed ecosystems;
- Monitoring of physical chemical parameters as a minimum those specified in Table 2 (in addition to dissolved oxygen saturation and temperature);
- Monitoring biological indicators (for macroinvertebrates in accordance with the **AusRivas** methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;

6. The locations of monitoring points (including the locations specified in **Table 7** which are background and near field impacted sites for each release point);
7. The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within 2 years in accordance with the *Queensland Water Quality Guidelines 2006*. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;
8. Specify sampling and analysis methods and quality assurance and control;
9. Any historical datasets to be relied upon;
10. Description of the statistical basis on which conclusions are drawn, and
11. Any spatial and temporal controls to exclude potential confounding factors.

W25 The NFMP must be prepared and submitted in writing to the administering authority by **1 October 2010**.

Far-field Monitoring Program (FFMP)

W26 A FFMP must be implemented to monitor the effects of the release of contaminants on the receiving environment outside the near field with the aims of identifying and describing the extent of any adverse impacts to local environmental values.

For the purposes of the FFMP, the receiving environment is the waters of the Fitzroy Basin.

W27 The FFMP proposal must address (but not necessarily be limited to) the following:

1. Monitoring of the condition of the Fitzroy Basin waters potentially impacted by the release and potential cumulative impacts;
2. Monitoring of stream flow and hydrology;
3. Monitoring of toxicants and other indicators specified in **Table 3** to assess the extent of the compliance of concentrations with water quality objectives and/or ANZECC & ARM CANZ 2000 guidelines for slightly to moderately disturbed ecosystems;
4. Monitoring of physical chemical parameters, as a minimum specified in **Table 2** (in addition to dissolved oxygen saturation and temperature);
5. Monitoring biological indicators (for macroinvertebrates in accordance with AusRivas methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARM CANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages;
6. The locations of monitoring points (including the locations specified in **Table 7** which are background and near field impacted sites for each release point), cumulative impact sites and reference sites;
7. The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within 2 years in accordance with the *Queensland Water Quality Guidelines 2006*; For ephemeral streams, this should include periods of flow irrespective of mine or other discharges
8. Specify sampling and analysis methods and quality assurance and control;
9. Any historical datasets to be relied upon;
10. Description of the statistical basis on which conclusions are drawn, and
11. Any spatial and temporal controls to exclude potential confounding factors.

W28 The FFMP must be prepared and submitted in writing to the administering authority by the **1 October 2010**.

Involvement in Regional Monitoring Studies (i.e. Far-field Monitoring Program FFMP)

W29 As an alternative to carrying out the FFMP specified in conditions: **W26; W27; and W28** the holder of the environmental authority may become and remain a "participating member" in the following regional water quality and ecosystem health monitoring studies, or any equivalent program:

1. The Ecosystem Health Monitoring Program.

For the purposes of regional (far-field) monitoring studies, the receiving environment is the waters of the Fitzroy Basin.

W30 For the purposes of condition **W29**, the holder of the environmental authority will be deemed by the administering authority to be a "participating member" in regional studies in the following situations.

1. The operator is a "contributing member", to the regional studies of water quality and ecosystem health; and
2. The operator is identified as a "contributing member" in a written statement to the administering authority from the authority carrying out the regional studies; and
3. The registered operator continues to be a "contributing member", of such regional studies.

W31 For the purposes of condition **W29**, the registered operator of the holder of the environmental authority will be deemed by the administering authority to be a "contributing member" until such time as:

1. the authority carrying out the regional studies notifies the administering authority in writing that the holder is no longer a "contributing member"; and
2. the administering authority has undertaken reasonable steps to confirm this with the registered operator and the authority carrying out the regional studies; and
3. the registered operator notifies the administering authority in writing that they are no longer a "contributing member".

W33 The holder of the environmental authority must notify the administering authority and relevant affected stakeholders, as soon as practicable, of water quality results indicating that the release of contaminants from the mining activity has caused or threatened environmental harm in the receiving environment.

Water General

W34 All determinations of water quality must be:

- a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
- b) made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual;
- c) collected from the monitoring locations identified within this environmental authority, within one hour of each other where possible; and
- d) carried out on representative samples.

W35 Records must be kept of the results of all determinations of the quality of contaminants released to waters.

W36 The release of contaminants directly or indirectly to waters:

1. must not produce any visible discolouration of receiving waters; nor
2. must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Water Monitoring Reporting

W37 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority with each annual return:

- a) the date on which the sample was taken;
- b) the time at which the sample was taken;
- c) the monitoring point at which the sample was taken;
- d) the measured or estimated daily flow of water contaminated by mining activities at the time of sampling; and
- e) the results of all monitoring with water quality monitoring data provided to the administering authority in the specified electronic format upon request.

Temporary Interference with waterways

W38 Temporary destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Water *Guideline - Activities in a Watercourse, Lake or Spring associated with Mining Activities*.

Fitzroy River Basin Study

W39 The holder of this environmental authority acknowledges that the conditions for release of contaminants to the **XX** River in this environmental authority have been calculated without the benefit of the findings of a study proposed to be undertaken as per recommendations 2 and 3 of the *Study of cumulative impacts on water quality of mining activities in the Fitzroy River Basin* (April 2009). The administering authority may, based on the information provided in the study report when it becomes available, all relevant information available at the time and the regulatory framework applicable at that time, consult with the holder of this environmental authority about the conditions in the environmental authority concerning the treatment and disposal of waste water.

The aim of the consultation shall be the meaningful review of the contaminant release limits imposed in this authority having regard to:

1. the study results; and
2. best practice environmental management.

If this review leads to more stringent requirements on the environmental authority holder, this shall be advanced by way of an authority amendment and/or a Transitional Environmental Program.

Background information for proposed DERM – QRC meeting to discuss projects arising from the Fitzroy Cumulative Impacts report

On 11 May 2009, the Government adopted the Department of Environment and Resource Management (DERM) report entitled, *Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin* and agreed to the three recommendations in the report that DERM would:

1. develop appropriate conditions in environmental authorities for mine water discharges;
2. develop local water quality guidelines; and
3. develop a model for assessing cumulative impacts across the region.

DERM is delivering these recommendations as separate projects as outlined below.

Project 1 - develop appropriate conditions in environmental authorities for mine water discharges (Project Director – Lindsay Delzoppo)

For this project DERM will work with Fitzroy Basin mining companies to agree to and implement standardised environmental authority conditions for water and wastewater management issues such as:

- on-mine water management,
- wastewater discharges to rivers and streams, and
- water quality monitoring of wastewater discharges and the rivers and streams receiving waste discharges.

This project is progressing well, with amendment of water and wastewater conditions in environmental authorities for all coal mines in the Fitzroy Basin due for completion by 31 December 2009.

Project 2 – establishing environmental values, water quality guidelines and water quality objectives for the Fitzroy Basin (Project Director – Paul Mills)

This project will require collaboration between DERM and several key stakeholders, including local governments, the mining sector, the agricultural sector and the Fitzroy Basin Association and will entail:

1. Establishing Environmental Values and Water Quality Objectives (EV/WQOs) for fresh and estuarine waterways in the Fitzroy Basin suitable for inclusion in Schedule 1 of the *Environmental Protection (Water) Policy 2009*;
2. Establishing water quality guidelines for the Fitzroy based on best available information;
3. Formal amendment of Schedule 1 of the *Environmental Protection (Water) Policy 2009* to include EV/WQOs for fresh and waterways in the Fitzroy Basin

This project is due for completion by 30 June 2010.

Project 3 – develop a cumulative impact assessment model for the Fitzroy Basin (Project Director – Joe Pappalardo)

This project will involve the development of a hydrological model of the Fitzroy Basin which will enable assessment and understanding of the cumulative impacts of existing and potential wastewater inputs to the Fitzroy River system.

The model would be likely to have the following attributes:

- The capability to distinguish mining-related water quality impacts from those attributable to other land use impacts;
- Focus on electrical conductivity (EC) as the key water quality indicator;
- Be capable of being expanded to allow modelling other environmentally relevant contaminants (e.g. heavy metals and sulphates);
- Preferably have linkages with other modelling initiatives such as the development of WaterCast through the eWater Cooperative Research Centre and the monitoring and modelling the framework being developed for Reef Water Quality Protection Plan and Reef Rescue projects.

A hydrological model using the Integrated Quantity and Quality (IQQM) framework will be developed to estimate existing and potential dissolved salt concentrations and loads at various sites within the Fitzroy Basin. EC will be used as the primary indicator for dissolved salts.

The success of this project will rely strongly on collaboration between DERM, mining companies, the Queensland Resources Council and other key stakeholders – particularly in relation to the development of suitable model scenarios.

This project is due for completion by 31 December 2010.

**DEPARTMENT OF ENVIRONMENT AND RESOURCE MANAGEMENT
ASSOCIATE DIRECTOR-GENERAL'S GENERAL BRIEFING NOTE**

TITLE: Fitzroy water quality – implementation update

Date: 05 June 2009

1. RECOMMENDATION

- That the Associate Director-General **note** the progress of projects being implemented following Cabinet's endorsement of the Cumulative impacts study and other recommendations associated with Fitzroy water quality; and **agree** to open the DERM/industry workshop on 18 June.

2. ISSUES

- **Project 1 – consistent and appropriate water discharge conditions** (Attachment 1) is being led by the Environment and Natural Resource Regulation Division. DERM met with mining company and QRC representatives on 28 May and the project team, led by [REDACTED], met this week to prepare new draft discharge conditions for distribution to mining companies, prior to a full-day workshop in Brisbane on 18 June when the conditions will be discussed in detail.
- To ensure a productive workshop, the ground rules need to be set by a senior DERM representative, hence the request for you to open the workshop and explain DERM's mandate.
- A small working group of 3 x DERM representative and 3 x industry representative will be formed at the conclusion of the workshop to refine the conditions based on DERM's mandate and industry comment. A final version of draft conditions will be developed by 30 June 2009 and then discussed with individual mines, site by site for implementation by December 2009.
- **Project 2 -water quality guidelines** is being implemented by Water Accounting and Management Division. Lead division for this project is being scoped through discussion between Environment and Natural Resource Regulation, Water and Corporate Services and Sciences.
- Potential approaches include:
 - a new chapter in the Qld Water Quality Guidelines relating specifically to Fitzroy; or
 - development and scheduling of Environmental Values and Water Quality Objectives in the EPP Water (involving at least 2 Cabinet Decisions and 80 days of public consultation).
- Whichever approach is taken, there will be a need to collect more (preferably a minimum of 1 year) water quality data from across the Fitzroy catchment. DERM would undertake much of this work and the new discharge monitoring requirements for coal mines would also provide data. Potential costs are in the order of \$1.5 million.
- **Project 3 – cumulative impact assessment model** is being led by the Regional Service Delivery Division (Central West Region). This project has been scoped (Attachment 2) and a full project plan will be finalised by 30 June 2009.
- **Project 4 – continuation of the Fitzroy Water Quality Technical Working Group** (TWG) is being implemented by the Regional Service Delivery Division (Central West Region). The current TWG (established to respond the Ensham Mine flooding issues) would wound up and a new group, with broader membership (e.g. AgForce and QRC), new terms of reference, and a new name such as the "*Fitzroy Water Quality Taskforce*". It is proposed that arrangements for the new group would be prepared for consideration by the Minister in the first week of July 2009.
- **Project 5 – development of a web based portal** is being implemented by the Environment and Natural Resource Regulation Division in partnership with Corporate Services' web management staff. This project would start with redevelopment of the current Fitzroy Water Quality page on the DERM web site. This work has started and will be loaded by the end of June 2009. The redeveloped site will include input from other departments and links to other appropriate information. It will eventually form part of the whole-of-Government Queensland wide monitoring system that is being set up as a requirement of the Service Delivery and Productivity Commission.
- **Project 6 – Government's response to the Hart report** (Attachment 3). For discussion

3. BACKGROUND

- On 11 May 2009, Cabinet endorsed the final version of the *Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin*, which contained recommendations for dealing with water quality issues in the region.

4. CONSULTATION

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Date:

Executive Director

Executive Director's comment:

Associate Director-General's comments

DRAFT

PROJECT PROPOSAL & WORK PLAN

PROJECT TITLE:	Fitzroy River Basin – cumulative impact study recommendation1
PROJECT DIRECTOR:	Executive Director, Environmental Services
PROJECT MANAGER:	Regional Manager, Townsville Region for recommendation 1
Proposal Author:	██████████
DERM work unit/office of origin:	Regional Services, Environmental Services

1. Proposal

PROJECT TITLE:	Fitzroy River Basin – cumulative impact study recommendations
LEAD DIVISION:	Responsibility for implementing these recommendations rests with Environmental Services and Environmental Sciences.
BACKGROUND:	<p>The Queensland Government approved the <i>Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin</i> on 11 May 2009. The study made the following recommendations:</p> <ol style="list-style-type: none"> 1. develop appropriate conditions in environmental authorities for mine water discharges. 2. develop local water quality guidelines 3. develop a model for assessing cumulative impacts across the region
OBJECTIVES:	<p>The overall aim of the study's recommendations is to ensure confidence within the Fitzroy Basin community that water management at mine sites will not adversely affect their water quality; consistency in licence conditions is introduced; and efficiency for mining companies is achieved through certainty about water management conditions. Mining companies will be required to take greater responsibility for water management and face the consequences of any mismanagement. This will significantly help to protect the quality of water that flows to towns and areas downstream of the mines and eventually into the Great Barrier Reef Lagoon</p>
EXPECTED DURATION:	Recommendation 1 – May 2009 to December 2009
METHODOLOGY	<p>Recommendation 1 involves a small working group of government and industry technical experts working closely together to determine consistent and appropriate water discharge conditions for coal mines. This approach relies on close consultation with individual mining companies and their willingness to voluntarily adopt recommended conditions.</p>
KEY PARTNERSHIPS:	The implementation of recommendation 1 relies strongly on partnerships with the coal mining companies.
KEY STAKEHOLDERS:	<ul style="list-style-type: none"> • Fitzroy River Water Quality Technical Working Group • Queensland Resources Council • Individual coal mining companies in the Fitzroy Basin (around 38) • Queensland Conservation Council • Capricorn Conservation Council

Action Officer: ██████████
 Position: Project Manager
 Telephone: ██████████

Director: Lindsay Delzoppo

Correspondence No: BNE2009/
 File No.:

	<ul style="list-style-type: none"> • Fitzroy Basin Association • Agforce • Local councils
LINKS TO OTHER PROJECTS:	<p>Fitzroy River Basin – cumulative impact study recommendations link with the following:</p> <ul style="list-style-type: none"> • State <ul style="list-style-type: none"> ○ DERM statewide freshwater biological monitoring programs ○ DERM surface (fresh)water monitoring program (SWAN) ○ DERM GBR event monitoring program ○ DERM QScope modelling program • Regional <ul style="list-style-type: none"> ○ Fitzroy River Water Resource Plan Review ○ eWater modelling development projects ○ Fitzroy Basin Association sub-catchment scale monitoring

2. Resources

PROJECT TEAM:	<p>Team</p> <ul style="list-style-type: none"> • Project team involves 4 x DERM officers. The working group for stage 1 of this project (until end of June 2009) will involve 2 or 3 mining industry representatives.
INDICATIVE COST/BUDGET:	<p>Personnel</p> <ul style="list-style-type: none"> • Funding for salaries is derived from base funding. <p>Operational</p> <ul style="list-style-type: none"> • Funding for recommendation 1 will be derived from base funding

3: Key actions /tasks

Action/Task	Timeframe
<i>Recommendation 1: develop appropriate conditions in environmental authorities (EA) for mine water discharges</i>	
Project Plan	May 09
Develop draft EA conditions	4 June 09
ADG sign off of draft conditions and provide ADG with weekly updates	9 June 09 ongoing
Invite mining companies to full-day workshop to discuss draft conditions	10 June 09
Liaise with mining companies via full-day workshop	18 June 09
Convene working group following workshop	18 June 09
Weekly working group meetings	June 09
Consultation across mining industry on working group proposals by working group	June 09
Finalise discharge conditions (working group)	End June 09

Action Officer: [REDACTED]
Position: Project Manager
Telephone: [REDACTED]

Director: Lindsay Delzoppo

Correspondence No: BNE2009/
File No.:

Amend EAs as voluntarily agreed	End July 09
Consider regulatory means for amending EAs if necessary	August 09
Complete amendment of EAs	December 09

**Terms of Reference for a Project Brief to implement:
Recommendation 3 of
'A study of the cumulative impacts on water quality of mining activities in the Fitzroy
River Basin'**

3. Develop a model for assessing cumulative impacts across the region.

The aim of this recommendation is to understand full extent of cumulative impacts of mine water discharges which will be only known once a model is developed to determine the capacity of the catchment in terms of all inputs. This is likely to take at least two years to develop.

Task:

Develop a draft project brief to implement Recommendation 3 for consideration by the DERM Executive Management Group. The following is an example of a suitable template:

[Project brief template](#)

Scope:

The project should identify the most suitable means of developing and implementing a modelling approach which can be used to determine the impacts of mine water discharge on water quality in the Fitzroy system.

The brief should consider and discuss the linkages between modelling and monitoring for cumulative mine impacts and modelling and monitoring for the Great Barrier Reef.

The model is to be used as a decision-making tool to assess the likely outcomes of decisions on the issuing and amendment of environmental authorities for mine discharges.

The model should be able to distinguish mining-related water quality impacts from those attributable to other sources such as grazing, urban water as well as inputs from the natural environment.

The model should focus on electrical conductivity as the key water quality indicator related to the impacts of mine water discharge however the project should investigate opportunities to develop improved data, knowledge and modelling capabilities for other environmentally relevant contaminants, such as heavy metals and sulfides.

The brief should incorporate a process for achieving community and industry acceptance of the modelling approach.

The brief should take in account the interrelationships between Recommendation 3 and Recommendations 1 and 2 of the study.

The brief should consider the application of existing models and linkages with other modelling initiatives such as the development of WaterCast through the Ewater Cooperative Research Centre and the monitoring and modelling framework being developed for Reef Water Quality Protection Plan.

The brief should incorporate indicative timeframes and resource requirements for the implementation of the recommended modelling approach (including the consideration of external providers of particular components. eg. Independent review, software development)

Brief Development Team

Bob Packett Senior Project Officer.

Action Officer: [REDACTED]
Position: Project Manager
Telephone: [REDACTED]

Director: Lindsay Delzoppo

Correspondence No: BNE2009/
File No.:

Support is to be provided by DERM Regional Managers Mellissa Wells, Andrew Buckley, Ian Gordon and Ed Donohue.

Consultation and advice should include a range of DERM offices including John Platten, John Bennett, Neil Tripodi and officers from NRSc

Sponsors

The brief is sponsored jointly by:

- Joe Pappalardo, Regional Services Director CW Region
- Graeme Milligan, General Manager Water Accounting and Management
- Lindsay Delzoppo, Executive Director Environmental Services

Timing

A draft brief is to be provided to the sponsoring group by 19 June 2009 with a final brief completed by 30 June 2009

-o0o-

Attachment 2

Response to Professor Hart's Report on Fitzroy River Water Quality

Recommendation (Summarised)	Government Response	Status	Responsibility
<p>No 1</p> <p>EPA to undertake a review of procedures for granting a Transitional Environmental Program (TEP)</p>	<p>Supported</p> <p>DERM has reviewed the TEP process and it implementing processes to ensure there is better communication and accountability associated with the issuing of TEPs.</p>		<p>Environmental Services</p>
<p>No 2</p> <p>A process for random audits of laboratories used by mining companies for analysing trace concentrations of heavy metals</p>	<p>Supported</p> <p>The Department of Environment and Resource Management is investigating a condition that laboratories doing this testing be accredited by the National Association of Testing Authority.</p>		<p>Environmental Services</p>
<p>No 3</p> <p>EPA to include Professor Hart's review comments in the Fitzroy water quality monitoring</p>	<p>Supported in Principle</p> <p>Comments from the review have been included in the water quality monitoring project.</p> <p>Requirements for ongoing monitoring will be reviewed in June 2009.</p>		<p>Environmental Services</p>

Action Officer: [REDACTED]
 Position: Project Manager
 Telephone: [REDACTED]

Director: Lindsay Delzoppo

Correspondence No: BNE2009/
 File No.:

project and include a longer timeline for the study			
No 4 Expand the Environmental Flows Assessment Program to measure effects on fish spawning and recruitment	Supported The DERM will implement the recommendation for additional monitoring.		Environmental Services
No 5 Biosecurity Queensland study of health of fish in weirs to be repeated and enhanced	Supported Biosecurity Queensland is currently making arrangements for a further study of fish health.	Need to follow up with DEEDI	Milligan
No. 6 Release water from Fairbairn Dam to dilute water in Bedford Weir and thus improve quality of town water supplies	Supported in principle The implementation of this recommendation is not required now that there has been significant natural inflow throughout the Nogoa–Mackenzie–Fitzroy river system, and water quality levels have returned to normal levels.	No action required	N/A

Action Officer: [REDACTED]
Position: Project Manager
Telephone: [REDACTED]

Director: Lindsay Delzoppo

Correspondence No: BNE2009/
File No.:

<p>No 7</p> <p>Central Highlands Regional Council to establish a taskforce to develop a contingency plan for addressing drinking water issues for Blackwater, Tieri and Bluff</p>	<p>Supported</p> <p>Options have been investigated for alternate supplies to towns in the upper catchment.</p> <p>Under the Water Supply (Safety and Reliability) Act 2008 and the Public Health Act 2005, water service providers such as these councils are responsible for maintaining safe water supplies.</p> <p>The DERM will supply, guidelines on how to prepare drinking water quality management plans to councils, provide advice (if requested) on suitable consultants to prepare such plans, and review draft plans. Contingency Plans are a component of a Drinking Water Quality Management Plan.</p>	<p>Action required by CHRC</p>	<p>Ed Donohue to chase up</p>
<p>No 8</p> <p>Implement the Interim Operational Strategy for Lower Fitzroy and Fitzroy Barrage</p>	<p>Supported</p> <p>This recommendation was implemented by the former Department of Natural Resources and Water to ensure the best available water is in the Fitzroy barrage. Water quality levels are better than the long term averages.</p>	<p>Completed and no further action required</p>	<p>N/A</p>

<p>No 9</p> <p>NRW to develop a contingency plan to deal with the possibilities of mine-affected water from the Isaac / Connors system or general deterioration of water quality in the Fitzroy Barrage due to limited natural inflows</p>	<p>Supported</p> <p>The DERM will work with Fitzroy River Water to develop a contingency plan for dealing with these scenarios.</p> <p>The DERM will supply the Rockhampton Region Council with guidelines on how to prepare drinking water quality management plans (see also response to Recommendation 7).</p> <p>The DERM will install a temporary conductivity probe at the Deverill gauging station on the Isaacs River, and will consider the costs and benefits of having this as a permanent arrangement.</p>	<p>Action required by RRC</p>	<p>Ed Donohue to chase up</p>
<p>No 10</p> <p>Develop an emergency water management plan to improve water quality along the river system between storages that is innovative and not constrained by the current restrictive ROP rules.</p>	<p>Supported in part</p> <p>The implementation of this recommendation in no longer required now that water quality is back to normal flowing substantial summer storm runoff.</p> <p>Note: It is recognised that the Fitzroy WRP and ROP do not specifically provide for establishing and managing a supplemented water allocation for environmental contingencies. However Queensland's water resource planning framework provides for the environment in a number of ways.</p> <p>The framework provides for environmental flows by effectively capping the level of existing and future water allocations within the basin so that the higher parts of the natural flow regime are maintained over the long term.</p>	<p>No action required see Recommendation 11</p>	<p>N/A</p>

	<p>The particular strategies used vary widely across different water resource planning areas and depend on the nature of the natural streamflows, the important environmental flow processes at play, and the scale and style of development provided for in the plan.</p> <p>Providing a supplemented water allocation for environmental flows may be considered appropriate for the more highly regulated river systems, such as the southern parts of the Murray–Darling Basin system where little semblance of the natural sequence of river flows remains. However, the merit of such an approach is questionable in systems where the more natural flow regimes have been maintained, which is the approach used in the Fitzroy and right across Queensland. Maintaining a natural flow regime in terms of the frequency, magnitude, duration and seasonality of river flows is widely recognised as best practice in maintaining river health.</p>		
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<p>No 11</p> <p>For the review of the Fitzroy Water Resource Plan (underway), NRW is to consider a more equitable balance between consumptive use and the environment, and to include the provision of a state owned contingency allocation.</p>	<p>Supported</p> <p>The DERM will consider the balance between consumptive use and the environment, and the provision of a state owned contingency allocation, in the current review of the Fitzroy Basin Water Resource Plan.</p>	<p>Fitzroy Water resource Plan is currently under view with this issue being considered</p>	<p>GM WAP</p>
<p>No 12</p> <p>Government to consider the appointment of a lead agency as a 'river health caretaker', to prepare a catchment management plan and a co-ordinated monitoring and assessment program.</p>	<p>Supported in Principle</p> <p>The DERM has the lead for natural resource management and for supporting catchment based natural resource management groups and is leading the development of a policy paper setting out options for addressing this recommendation for consideration by Government.</p>	<p>DERM finalising a policy paper</p>	<p>GM WAM</p>

No 13 Develop a set of Emergency Response Principles for future situations like the present one	Supported The DERM will lead the development of these principles, in consultation with key stakeholders.		Environmental Services
---	---	--	-----------------------------------

Action Officer: [REDACTED]
Position: Project Manager
Telephone: [REDACTED]

Director: Lindsay Delzoppo

Correspondence No: BNE2009/
File No.:

PROJECT PROPOSAL & WORK PLAN

PROJECT TITLE:	Fitzroy River Basin Coal Mines –Review of EA Water Conditions (Cumulative impact study recommendation 1, phase 2 – Implementation)
PROJECT DIRECTOR:	Senior Director, Environment and Natural Resource Regulation
PROJECT MANAGER:	Regional Manager, Central West Region
<i>Proposal Author:</i>	[REDACTED]
<i>DERM work units</i>	<i>Central West Region & Environment and Natural Resource Regulation Division</i>

1. Proposal

PROJECT TITLE:	Fitzroy River Basin Coal Mines –Review of EA Water Conditions (Cumulative impact study recommendations 1, phase 2 – Implementation)
LEAD DIVISION:	Environment and Resource Regulation
BACKGROUND:	<p>On 11 May 2009, the Queensland Government approved the <i>Study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin</i> which made the following recommendations:</p> <ol style="list-style-type: none"> 1. develop appropriate conditions in environmental authorities for mine water discharges. 2. develop local water quality guidelines 3. develop a model for assessing cumulative impacts across the region <p>Sound communication will be vital to the successfully delivery of these recommendations. With this in mind, the Government has established a Fitzroy Water Fitzroy Water Quality Advisory Group to promote information exchange with stakeholders and the broader community. The Government will also establish a website to provide information about water quality management initiative in the Fitzroy Basin with the broader community.</p>
OBJECTIVES:	<p>The overarching aim of the study recommendations is to provide confidence to Fitzroy Basin residents (i.e. local governments, agricultural, mining and other industry sectors and the public) that water quality in the streams and rivers of the Basin will continue to be of sufficient quality to protect the environmental values and uses made of those waterways.</p> <ul style="list-style-type: none"> • The objective of recommendation 1 is to ensure that wastewater discharges from coal mine sites do not unduly impact on water quality in streams downstream of mine wastewater discharge points. In other words, to ensure that the individual and combined wastewater discharges from coal mines in the Fitzroy Basin do not exceed the “assimilative capacity” of the waterways to accept and deal with those wastes. • This will be achieved by DERM and mining companies working together to develop and implement a set of “standard” environmental operating conditions incorporating best practice for coal mines in relation to:- <ul style="list-style-type: none"> ○ on-mine water management, ○ wastewater discharges to rivers and streams, and ○ water quality monitoring of both wastewater discharges and the rivers and streams receiving those wastes.

EXPECTED DURATION:	1 July 2009 to 31 December 2009
METHODOLOGY	<p>DERM, the mining companies operating in the Fitzroy Basin and the Queensland Resource Council (QRC) to work together to develop and agree to a consistent set of model water management, wastewater release and receiving water monitoring conditions for adaptation and adoption by individual coal mines. <i>This part of the project was completed by 1 July 2009.</i></p> <p>DERM and coal mine operator in the Fitzroy Basin to use the standard conditions as the basis to negotiate new environmental authority conditions for water management, wastewater release and receiving water monitoring, under the <i>Environmental Protection Act 1994</i>.</p> <p>DERM will develop specific administrative support tools and guidelines to help streamline and support the amendment process, including:-</p> <ul style="list-style-type: none"> • standardised information requests to assist mines prepare amendment applications; • transparent and consistent approaches to assessment of applications; • information packages; and • a guideline on the minimum requirements for on-site water management.
KEY PARTNERSHIPS:	The implementation of recommendation 1 relies strongly on a good working relationship and ongoing consultation between government departments, coal mine operators in the Fitzroy Basin and the QRC.
KEY STAKEHOLDERS:	<ul style="list-style-type: none"> • Fitzroy River Water Quality Advisory Group Members • Mining interests in the Fitzroy Basin • Conservation groups • Agricultural interests • State Government and Local Government • Land holders • Traditional Owners • Broader Community
LINKS TO OTHER WORK:	<p>The cumulative impact study projects are linked with the following work:-</p> <ul style="list-style-type: none"> • State <ul style="list-style-type: none"> – DERM Statewide freshwater biological monitoring programs – DERM surface (fresh)water monitoring program (SWAN) – DERM GBR event monitoring program – DERM QScape modelling program • Regional <ul style="list-style-type: none"> – Fitzroy River Water Resource Plan Review – eWater modelling development projects – Fitzroy Basin Association Water Quality Improvement Report implementation – Implementation of report by Professor Barry Hart

2. Resources

PROJECT TEAM:	<p>The Project Team comprises:-</p> <ul style="list-style-type: none"> • Project Director – Lindsay Delzoppo • Project Manager – [REDACTED] • Team Members – [REDACTED] Ian Ramsay, Data analyst, [REDACTED] person from Partnerships and Practice
INDICATIVE COST/BUDGET:	<p>Personnel</p> <ul style="list-style-type: none"> • Funding for salaries is derived from base funding. • This project will required that 1x1fte (Environmental Services – regional or central office) will be required to work specifically on this project – this officer must be determined ASAP in consultation with the project director/manager. • Allocation of 1fte to Environmental Sciences for the 6 month duration of the project has been requested. <p>Operational</p> <ul style="list-style-type: none"> • Funding for recommendation 1 will be derived from base funding

3: Key actions /tasks

Action/Task	Timeframe	Responsible
<i>Recommendation 1, phase 2: develop appropriate conditions in environmental authorities (EA) for mine water discharges</i>		
Finalise model water conditions (working group)	30 June 09 (Completed)	
Identify training and/or other internal requirements	31 July 09	[REDACTED] Lindsay Delzoppo
Review Metal Table 3 in consultation with coal mine representatives	24 July 09	Ian Ramsay, [REDACTED]
Letter to mining companies outlining the implementation process which will include an Information Request proforma (include format for data supplied), process flow chart and timeframes (submission by 31 August 09?), assessment process for alternative conditions, limits and/or trigger values, and application fee waiver to assist both DERM and the mining companies in the site by site review of the licence conditions (note in the letter that DERM will change legislation if required). Also, a standard amendment application partially filled out with reason for amendment included.	31 July 09	[REDACTED]
Identify and develop the necessary support tools including an information package for Discharge Limit Setting and a Guideline for the Preparation of a Water Management Plan.	31 August 09	[REDACTED] an Ramsay/[REDACTED]
Develop a generic assessment package including Standard Operating Procedure, QA, and Standard	31 July 09	[REDACTED]

Cover Letter for use by DERM officers – to be supplied at training for internal staff.		and Practice
Training of DERM assessment staff and a general awareness session with representatives of the mining companies if required	15 August 09	██████████ an Ramsay
<p>Amend EAs by voluntary agreement in priority catchment based on order of potential level of cumulative risk as follows:</p> <ul style="list-style-type: none"> • Anna/Isaac Subcatchment <ul style="list-style-type: none"> ○ Goonyella Riverside (very high) ○ North Goonyella (High) ○ Millennium (high) ○ Burton (medium) ○ Poitrel (medium) • Bee/Walker Subcatchment <ul style="list-style-type: none"> ○ Coppabella (high) ○ Hail Creek (medium) ○ South Walker Creek (medium) • Ripstone/Stephens/Isaac Subcatchment <ul style="list-style-type: none"> ○ Peak Downs (high) ○ Saraji (medium) ○ Norwich Park (medium) • Crinum/Sandy/Nogoa Subcatchment <ul style="list-style-type: none"> ○ Ensham (high) ○ Rolleston (medium) ○ Cook Colliery (medium) ○ Blackwater (medium) • Dawson/Callide subcatchment <ul style="list-style-type: none"> ○ Callide (medium) <p>Note: EA amendment applications for the above listed mines are to be assessed in priority to non-listed mines. Mines with very high/high risk rating take priority over all other applications.</p> <p>Each mine should submit the application by 31 August 09?</p> <p>Once the applications have been received the applications will be forwarded to Freshwater and Marine Sciences for their input.</p>	1 September 09 to 30 November 09	All
Prepare regulatory changes means for amending EAs if necessary.	31 October 09	██████████ Lindsay Delzoppo with ██████████
Complete amendment of EAs	31 December 09	All



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Minister for Climate Change and Sustainability The Honourable Kate Jones

Saturday, June 27, 2009

TIGHTER REGULATIONS ON TRACK FOR WATER QUALITY IN FITZROY BASIN

A draft set of wastewater discharge conditions to be uniformly applied for mines across central Queensland is on track to be completed next week as promised by the Bligh Government.

Climate Change and Sustainability Minister Kate Jones and Member for Rockhampton Robert Schwarten gave the update after the Fitzroy Water Quality Advisory Group meeting.

Ms Jones said the new conditions were being developed through collaboration between the State Government, mining companies and the Queensland Resources Council.

Mr Schwarten said it was a great development towards securing improved water quality in the Fitzroy Basin.

"It means the community can have greater confidence in how discharged water from mines is being regulated, monitored and managed by authorities," Mr Schwarten said.

"We set ourselves a deadline to have discharge conditions drafted by 30 June (next Tuesday) and I'm pleased to say that we're on track to deliver on that commitment."

Ms Jones said a State Government study about the impact of mining on the health of the Fitzroy River found that discharge requirements for coal mine water discharges across the Fitzroy basin were inconsistent and often didn't reflect best environmental practice.

"We commissioned this project to standardise and improve environmental authority wastewater discharge conditions for coal mines in the Fitzroy River basin," she said.

"To date negotiations between the State Government and mining companies over the development of a standard set of wastewater discharge conditions have gone very well.

"A workshop last week developed a set of draft wastewater discharge limits and requirements which will be refined further before being used to negotiate new environmental authority conditions for individual mines.

"A final version of draft conditions will be developed by 30 June 2009."

Mr Swarten said: "This is a new Climate Change and Sustainability Minister who in only 90 days has made significant progress towards improving water quality in this region."

27 June, 2009

MEDIA CONTACT: [REDACTED]

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**A review of the water quality arrangements for
mines discharging water into the Fitzroy river
system.**

Project Plan

October 2008

Version 0.1.5

Owner:	Environmental Protection Agency
Contact Details:	[REDACTED]
Program Name:	A Study of the Cumulative Impacts of Water Discharges from Mines on the Quality of Water in the Fitzroy River system
Division/Unit:	Environmental Services, EPA
Document Status:	Final

Revision History

Revision Date	Version No.	Author	Description of Change/Revision
28-10-08	V1	[REDACTED]	Original draft
29-10-08	V1.1	[REDACTED]	Review
29-10-08	V1.2	[REDACTED]	Review
31-10-08	V1.3	[REDACTED]	Update
31-10-08	V1.4	[REDACTED]	review
08-11-08	V1.5	[REDACTED]	Review

Approvals

Name	Title	Signature	Date
Mr Terry Wall, Director General EPA	Senior User		
Mr Lindsay Delzoppo, Executive Director EPA	Senior Supplier		
Mr [REDACTED] Regional Manager EPA	Project Director		

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1 Project Background

The dewatering of flooded mine pits at Ensham Coal Mine has resulted in water quality impacts, evidenced by a rise in sodium and salinity levels in the Fitzroy River system which in some places exceed the NHMRC Drinking Water Guidelines for aesthetic sodium levels in drinking water.

While it is recognised that the NHMRC Drinking Water Guidelines standard is an aesthetic based value (taste and smell) and there is no definitive health based value, readings exceeding the value have, and will continue to trigger a public health advisory to people who need to be aware of these levels and take action as appropriate. These are people who are monitoring their salt intake for high blood pressure, cardiovascular disease, chronic kidney failure or any dietary reason and parents of infants less than 6 months of age who are bottle fed.

These water quality impacts are being managed to minimise the effects on town water supplies, downstream river water users and the environment.

The dewatering of flooded mine pits at the Ensham Coal Mine is authorised by a Certificate of Approval for a Transitional Environmental Program issued under the *Environmental Protection Act 1994 (Act)* by the EPA. This is one of a number of approved Transitional Environmental Programs to assist in the recovery of mining operations following the flooding that occurred in the Fitzroy River Basin in January/February 2008.

Mining companies across the Fitzroy River system are permitted to discharge water under the conditions specified in environmental authorities issued under the Act by the EPA. Discharges of water from mines is not the only source of impacts on water quality with stormwater, treated effluent from townships, tail-water discharges from irrigation areas, dry land cropping, quarries and overland flows from disturbed areas all contributing to the quality of water in the river and its contaminant load.

The Rockhampton Regional Council and Central Highlands Regional Council in the second half of 2008 requested the State government to give consideration to undertaking a study of the cumulative impacts on water quality of mining activities in the Fitzroy River system.

2 Project Definition

This project will investigate the water quality arrangements for mines discharging water into the Fitzroy River system to provide a greater understanding of the likely cumulative impacts on water quality and to make recommendations consistent with the Terms of Reference.

Outputs will include:

- a brief history of mining development in the Fitzroy River Basin;
- a summary of the regulatory framework for management of the quality of water discharges from mining activities (and its evolution over time);
- a summary of existing approaches to minimising water quality impacts of water discharges from mining activities;
- an analysis of currently authorised discharges from mining activities;
- a forecast of future mining activities and their potential to impact on water quality;
- a review of water quality data, how and where it is collected, by whom and to whom it is reported;
- an analysis of trends in water quality and an assessment of cumulative impacts;
- an analysis of risks associated with changes in water quality;
- a compilation of water quality discharge arrangements from mines;
- recommendations for improving water quality data collection, its coordination and management;

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- recommendations for the future management of water discharges from mining activities; and
- recommendations for any ongoing research, initiatives or project expansion.

2.1 Project Scope

The following are included in the scope of the project:

- The purpose of this study is to investigate current and where appropriate historical data and report on the overall implications of water discharges from mines on water quality in the Fitzroy River system, examine predictions of future expansion and then to make recommendations for the management of water discharges from mining activities with respect to water quality.
- The major focus of the project will be based on risk and is to focus on open cut coal mining because of the number of mines and public concern related to them. Other proposed mining and extraction developments such as coal seam methane extraction will be considered in formulating recommendations but data constraints will prevent in depth examination.
- This study focuses on water discharges from mines, the volumes and quantity of contaminants potentially discharged to local systems and the cumulative risk that those discharges may have on the river environment and the quality of water in the Fitzroy River system.
- Several case studies of known and well researched mines and their discharges will be used to examine likely impacts because of time constraints and data accessibility. These results will be compared with licensed discharge limits from mines to predict cumulative risk of current impact.
- Predictions of future expansion of mines will be used to examine future risk of the expected impact from water discharge.
- The study will attempt to examine how both cumulative and local impacts of discharges could be managed in the future to reduce impacts on water quality.
- The study will also attempt to identify knowledge gaps that impact on the ability of the Queensland Government to manage cumulative water quality impacts from mining activities.

The following are outside the scope of the project:

- It is recognised that a range of other land uses and management practices may have an impact on water quality but their impact is not within the scope of this study. It has also been recognised that longer term measures for addressing these issues include the Great Barrier Reef initiatives such as the Reef Water Quality Protection Plan and the investment with the Australian Government in the Caring for our Country program and Queensland's complementary natural resource management programs.
- Issues such as subsidence related to underground mining and consequent mobilisation of salt could impact on water quality, however it is beyond the scope of this study, does not relate to licensed discharges and therefore will not be included in this study but may form part of the recommendations.
- It is also likely that data and time constraints will preclude detailed examination of all historic or current mine discharges so analysis are likely to be only available for recent history.
- It is acknowledged that on-site management of water in mining establishments is critical to water discharge. However this study will not undertake a detailed examination of those methods that assist in managing water in terms of the quantity and quality of water discharged.
- Water resource management would also be expected to influence river flows and the consequent assimilative capacity of the system. However this cannot be examined within the constraints of the study other than as part of the studies recommendations.

2.2 Product Descriptions

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The Products that will be delivered by this project are:

- A written report in draft form by December 2008.
- A finalised report by January 2009.

Product Descriptions for each of the Products are in Appendix A.

2.3 Assumptions and Constraints

The following assumptions have been made during the planning of this project:

- The study will use a risk based approach in focusing on analysing the key mining activities that impact on water quality.
- That data will be available and provided in a timely manner on the following:
 - licensed discharge limits from mines;
 - quantity and quality of discharges from selected mines;
 - ambient water quality of the river;
 - river flow;
 - a brief history of mining development in the Fitzroy River Basin; and
 - a summary of the regulatory framework and approaches to water quality management.

The following constraints have been placed on this project:

- The timelines for completion by December 2008.
- Availability of data in appropriate formats for analysis.

2.4 Project Schedule

The Project Schedule for this project is shown in Appendix B.

3 Project Roles

Role	Responsibilities
Project Director – [REDACTED] Regional Manager EPA	The Project Director has ultimate responsibility for the project
Senior User - Terry Wall, Director General EPA	The Senior User represents the end users and ensures that the project's products meet end user requirements.
Senior Supplier-Lindsay Delzoppo, A/ Executive Director EPA	The Senior Supplier represents the solution provider/s and is responsible for quality, development of the supplied product.
Project Manager – [REDACTED]	The Project Manager will manage the project on a day-to-day basis on behalf of the Project Board.

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4 Related Initiatives

On 15 October 2008 the Premier, Anna Bligh appointed Emeritus Professor Barry Hart as her independent advisor and supervisor for an independent research project on the status of the Fitzroy River water quality. Subject to advice from Professor Hart, the study to be led by the EPA will monitor:

- Contaminants (e.g. pH, conductivity and salinity) in the water column – Fortnightly.
- Contaminants in Sediments (including a range of metals) – Quarterly.
- Aquatic Invertebrate Species – Quarterly.
- Fish and Turtles – Quarterly.

While the study supervised by Professor Hart is separate to this project, there will commonality in the data used in the two projects. Professor Hart will also be a key point for consultation related to this project.

Currently the development of a coordinated state wide monitoring programme has been recommended by the Service Delivery and Productivity Commission. This review study is separate from the work being undertaken to implement the recommendations of the SDPC.

5 Business Case

The Fitzroy Basin is a massive and crucial water system for Queensland. The ecological and resource value is immense to the environment, users and community. The effects of flood recovery actions of mines in dewatering inundated pits in 2008 has resulted in extremely high levels of concerns from many diverse stakeholders and groups. These concerns are particularly on drinking water supplies and extend to ecological and other water resource users including agricultural and industrial. This project will provide a clear understanding of the existing arrangements for water quality discharges from mines in the Fitzroy River system and make recommendations where improvements to management will further ensure the systems continues to support the environment and resource users now and in the future.

Water quality and its management is a core responsibility of the Environmental Protection Agency. The Agency administers the *Environmental Protection Act (1994)* and the associated *Environmental Protection (Water) Policy (1997)*. The EPA is also responsible for recommending and managing licensed discharge limits from mines. This project is central to these activities and as such is part of core business.

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The anticipated benefits for this project are detailed in the following table.

Benefit	Current Performance	Required Performance	Performance Measurement (How?)	Responsibility (Who?)	Product/s	Timeframe for Benefits Realisation
Assessment of the risk to water quality posed by cumulative impacts of mining discharges	unknown	An understanding of the impacts on the Fitzroy River system and its ecological assets of water discharges from mines.	The recommendations adequately address the terms of reference.	Project team	Report	January 2009
Tool to assess cumulative impacts of mining discharges on water quality	Unavailable at present	Cumulative impact assessment that will inform conditioning of mine discharges	A measure that allows assessment of the cumulative impact of new water discharges in the Fitzroy river system.	Freshwater and marine Sciences EPA	This project should provide recommendations as to how a suitable product would be produced.	Recommendations by January 2009.

6 Project Costs

6.1 Financial Summary

A summary of the project costs is provided below.

Cost Factor	Estimated Cost \$
Salaries	PO5(2) * 4 months G. Schulz \$24929 AO7 (4) * 0.3 * 4 months M. Rodgeron \$7830 SO2(2) * 0.3 * 4 months A. Buckley & M. Wells \$25270 PO5 (2) * 0.3 * 4 months J. Platten \$7479 SO2? * 0.3 * 4 months J. Playford \$12635 PO6(4) * 0.3 * 4 months I. Ramsay \$8557
Contractors/Consultants	
Capital Costs	
Training	
Other	Report production, meeting attendance for consultation, travel: \$20,000
PROJECT TOTAL	\$106,700

6.2 Cost Assumptions

Assumptions include minimal travel, printing and consultation requirements, without vehicle use or flights.

Not all team member levels are certain.

No external agency costs are estimated.

Only replacement value for Project Manager is assumed.

7 Project Controls

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The following project level controls will be implemented to manage the project and provide mechanisms to feed back information to the project team, internal EPA steering committee and other key stakeholders.

7.1 Reports and Assessment Points

The project is to be led by the EPA with a project team made up of staff from the EPA, NR&W and DM&E. Oversight of the project will be coordinated through a project team of senior officers from the EPA and NR&W.

An internal EPA Steering Committee has been formed to provide oversight between this and other associated work being undertaken as part of the study by Professor Barry Hart on the status of the Fitzroy River water quality.

Consultation will occur with the various stakeholder groups utilising the existing Fitzroy River Technical Working Group led by NR&W for the life of the study and on the draft study report.

Meetings relating to the management of the study will be held as far as possible by teleconference. Meetings relating to consultation with stakeholders will be held in Rockhampton in coordination with the Technical Working Group meetings.

- a) Progress reports are to be produced by the Project Manager for circulation to the project team to inform them of project progress. These are to be prepared fortnightly.
- b) Exception Reports are to be raised by the Project Manager if he/she forecasts that Project Tolerance is likely to be exceeded, and the Project Board will then determine the need for Exception Planning or other action to be taken.
- c) An End Project Report is to be produced, by the Project Manager, for circulation to the project team at the end of the project and will include Follow-on Action Recommendations and a Lessons Learned Report.

7.2 Tolerances

The project manager is to report exceptions to the Project Board if at any time:

- a) the forecast timeframes are unlikely to be met, or
- b) the financial expenditure target will be exceeded.

Tolerances	Project Board	Project Manager
Time	Over 10%	+ or – 10%

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Cost	Over 10%	+ or – 10%
Product Quality	Less than 80% acceptance criteria met	Less than 90% but not less than 80% acceptance criteria met
Customer Expectations	Less than 90% acceptance criteria met	Less than 95% but not less than 90% acceptance criteria met

8 Project Quality

8.1 Customer Quality Criteria

Product	Acceptance Criteria (measure of success)	Responsibility
Final report	Implementation of recommendations	EPA Environmental Services

8.2 Applicable Standards

As per EPA publishing.

9 Risks

The following significant risks have been identified to date:

No.	Risk (Cause and Effect)	Mitigation Strategies
1	Acquisition of data	EPA staff have indicated to key stakeholders that they should prepare for data requests
2	Availability of resources	EPA has established a cost code for the project.
3	Stakeholder calls for a broader scope for the project	To ensure the TORs are fulfilled and a timely completion of the project a communication plan will be developed and this is articulated in section 11 of this project plan.
4	Lack of cooperation from	A communication plan will be developed and this is

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No.	Risk (Cause and Effect)	Mitigation Strategies
	stakeholders in the review.	articulated in section 11 of this project plan.

10 Configuration Management

All data acquisition and management issues will be managed by the Whitsunday Coalfields region of the EPA through the Emerald office. Project version control and draft management will be conducted by the project manager.

Data storage protocols and storage of data will be managed by the Freshwater and Marine Sciences unit of EPA.

All electronic files will be kept in the following shared network directory: N:\Mines\Cumulative Impacts Study 2008 - Emerald EPA server.

11 Communications Matrix

Stakeholder	Information Required	Frequency	Method	Responsibility
<ul style="list-style-type: none"> • TWG - The Technical Working Group established to investigate impacts of the dewatering of Ensham mine. Membership includes – 	Project structure and scope	Upon establishment of the project and approval of project (early November)	At TWG meeting	Project manager, Project Director
<ul style="list-style-type: none"> • Environmental Protection Agency (EPA) • Department of Natural Resources and Water (NRW), • Queensland Health • Department of Primary Industries and Fisheries (DPI&F) • Central Highlands Regional Council (CHRC), • Isaac Regional Council (IRC), • Rockhampton Regional Council (RRC) • Fitzroy River Water (FRW) • SunWater, 	Major findings Draft report	In December upon completion of draft report.	At TWG meeting	Project manager, Project Director

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<ul style="list-style-type: none"> • Ensham Resources Pty Ltd • Stanwell Corporation Limited • Fitzroy Basin Association • Central Queensland University; and • Capricorn Conservation Council. 				
Fitzroy Basin Association	Project structure and scope	Upon establishment of the project and approval of project (early November)	TBA	Project manager, Project Director
Queensland Resources Council	Project structure and scope	Upon establishment of the project and approval of project (early November)	TBA	Project manager, Project Director
	Major findings Draft report	In December upon completion of draft report.	TBA	Project manager, Project Director

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Appendix A – Product Descriptions

PBS No	NA	Product Name	A Study of the Cumulative Impacts of Water Discharges from Mines on the Quality of Water in the Fitzroy River system	
Purpose	Assess cumulative impacts of mine discharges on water quality and provide a framework for managing impacts into the future.			
Composition	<p>Written report that provides:</p> <ul style="list-style-type: none"> ○ A compilation of water quality discharge arrangements from mines ○ recommendations for improving water quality data collection, its coordination and management; ○ recommendations for the future management of water discharges from mining activities; and ○ recommendations for any ongoing research, initiatives or project expansion. 			
Derivation				
Format & Presentation	<i>Hard and electronic copy to Senior Supplier, Senior User and Project Director</i>			
Allocated To	Project team from EPA, NRW and DME			
Quality Criteria	Required Performance	Quality Check	Responsibility	
<i>AS per EPA publishing requirements</i>	<i>Meet EPA requirements</i>	<i>Editorial check and peer review by Barry Hart.</i>	Project Manager	

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Appendix B – Project Schedule

Activities	Timeframe	Resources
a brief history of mining development in the Fitzroy River Basin	By Mid Nov	DM&E Neil Hoy
a summary of the regulatory framework for management of the quality of water discharges from mining activities (and its evolution over time)	End of October	EPA [REDACTED]
a summary of existing approaches to minimising water quality impacts of water discharges from mining activities	End Nov	EPA [REDACTED]
an analysis of currently authorised water discharges from mining activities	Mid Nov	EPA [REDACTED]
a forecast of future mining activities and their potential to impact on water quality	Mid Nov	DM&E [REDACTED]
a review of water quality data, how and where it is collected, by whom and to whom it is reported	Mid Nov	NRW & EPA [REDACTED]
an analysis of trends in water quality and an assessment of impacts	End Nov	NR&W & EPA [REDACTED]
an analysis of risks associated with changes in water quality	End Nov	EPA & NR&W [REDACTED]
Draft Report	12 December 2008	[REDACTED]
Final Report	30 January 2009	[REDACTED]

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A study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin

April 2009

Acknowledgements:

The Department of Environment and Resource Management (DERM) would like to thank staff from the former Departments of Natural Resources and Water, and Mines and Energy who supplied data for this report.

DERM would also like to thank the operators of all coal mines within the Fitzroy Basin who kindly provided the information which formed the basis of this report.

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Projections

Geographic Datum GDA94.

ACCURACY STATEMENT

Due to varying sources of data, spatial locations may not coincide when overlaid

DISCLAIMER

Maps are compiled from information supplied to the Department of Environment and Resource Management. While all care is taken in the preparation of these maps, neither the Department nor its officers or staff accept any responsibility for any loss or damage which may result from inaccuracy or omission in the maps from the use of the information contained therein.

Executive Summary

This study examines available data to report on the implications of water discharges from mines on water quality in the Fitzroy River Basin. This study was initiated in response to concerns about water quality following the discharge of very large quantities of water from mines in the Fitzroy River Basin from February to September 2008.

The terms of reference for this study (Appendix A) detailed key elements to be covered with the overall purpose being to make recommendations for the management of water discharges from mining activities with respect to water quality.

The study focuses on discharges from coal mining operations as the Fitzroy River Basin's large-scale mining activities are dominated by coal mining and planned coal mine expansions. These operations potentially release far greater volumes of water than any other mining source currently operating. They have also operated for long periods of time giving the best opportunity to examine changes in regulation and management of water quality over time.

The major water quality parameters of concern associated with coal mining are salinity (based on electrical conductivity), heavy metal ion concentrations and acidity/alkalinity. The study has focussed on salinity impacts as these were of major concern to the communities in the areas affected by the mine discharges in 2008 and the available data relates more to salinity than any other contaminant.

The major findings of this study concluded that in the Fitzroy Basin:

- discharge quality limits and operating requirements for coal mine water discharges are inconsistent;
- the discharge quality limits and operating conditions for some coal mines do not adequately protect the downstream values of the environment;
- background data relating to the quality of the waterways receiving discharge water is extremely limited;
- there is insufficient data to quantify the cumulative impacts of mining water discharges;
- additional and ongoing monitoring and analysis is needed to develop a modelling program for assessing cumulative impacts; and
- based on a risk assessment using salinity, six mines were identified as being the highest contributors to potential cumulative impacts (Coppabella, North Goonyella, Goonyella Riverside, Millennium, Peak Downs and Ensham).

The findings for each of the key elements of the study as listed in the terms of reference are provided in detail in the relevant chapters of this study and summarised below.

Regulatory framework for managing the quality of water discharges

The regulation of water discharges from mines has undergone considerable change in relation to the applicable legislation and responsible Government Agency. Since 2001, the former Environmental Protection Agency (EPA), now the Department of Environment and Resource Management (DERM), has regulated water discharges from mines under conditions listed in each mine's environmental authority. When the EPA took control of mining environmental regulation, it generally converted the commitments from the environmental management overview strategies accepted by the former Department of Mines and Energy (DME) to conditions in new environmental authorities. Generally only new or recently amended environmental authorities contain new conditioning arrangements relating to monitoring parameters and toxicity trigger values. Some environmental authorities have not had conditions changed since they were issued so do not necessarily reflect current knowledge nor best management practice. Under the current provisions in the *Environmental Protection Act 1994* (EP Act), environmental authorities may only be amended without agreement of the holder under limited triggers.

Existing approaches to minimising water quality impacts

Water quality impacts are generally managed under conditions set out in environmental authorities. These authorities place limits on water quality indicators such as pH, electrical conductivity or total dissolved solids and total suspended solids. However, the limits set are based on limited knowledge of ambient water quality conditions, are developed on a case by case basis and are subject to intensive negotiations with the mining companies. As a result, the conditions set in environmental authorities do not always reflect best practice for water quality management nor consider the potential cumulative impacts of several mines in the one catchment.

Analysis of currently authorised water discharges

All of the mines in the Fitzroy River Basin except two are permitted to discharge water under varying conditions set out in environmental authorities under the EP Act. The environmental authorities include anywhere from one to 15 approved discharge locations and may list multiple receiving waters, each with different release conditions. A key reason for this variation is the scale of some sites, the ephemeral nature of streams in the region and the difficulty in determining ambient water quality.

Forecast of future mining activities

At the time of writing this report there were about 45 coal mines, 10 significant mineral mines (excluding small mining operations and gemstone mines) and 20 medium to large quarries operating in the Central Queensland region, although not all are in the Fitzroy River Basin. Many of these mines have ore reserves that will enable production beyond 2020. The current global financial situation may impact on new or expansion projects, however, the environmental issues associated with future activities remain a key issue.

Review of water quality data

All of the currently operating coal mines (38) in the Fitzroy River Basin provided data for this study. This data highlighted the different conditions in place across mines and the limited data available in the region. Mine environment monitoring was generally limited to mine tenure and to times when discharges were occurring. There is a general lack of ambient water data.

Analysis of trends in water quality and an assessment of impacts

Previous studies into water quality suggest that the Fitzroy River Basin is a naturally moderate but variable saline system with substantial differences in electrical conductivity levels across sub-catchments. These studies give a broad picture of baseline information for ambient ranges of electrical conductivity (which is a typically a reliable surrogate for salinity) but not for other contaminants. Water quality monitoring, data collection and reporting in the region is undertaken by a diverse range of State and local government agencies, water providers, natural resource management groups, mines and other industries. There is no single entity that collates, manages and analyses water quality data for the catchment.

Analysis of risks associated with changes in water quality and potential cumulative impacts

In the Fitzroy River Basin, the greatest risk to water quality from coal mines is increased salinity levels resulting from occasions when mine water is discharged. Drinking water and aquatic ecosystems are the most sensitive downstream values to be protected from mine discharge waters. The impacts on these ecosystems are not well known because there is insufficient baseline biological and ecological information and no long-term biological monitoring to identify ecological changes over time. Increased salinity will also affect the taste of drinking water and very high levels may affect crops if water is used for irrigation.

The potential for accumulation of salinity in ephemeral streams is high as stream inputs can only be removed by natural flows from rainfall events flushing accumulated salinity from waterholes and the numerous water impoundments along the river system. This study has examined the catchments most at risk of cumulative impacts associated with electrical conductivity through a risk assessment matrix that looks at the discharge information from

each mine (frequency, duration, volume and the water quality of the discharge and immediate receiving environment) and the relative location of mines in Fitzroy sub-catchments.

All mine discharges are likely to contribute to cumulative impacts to some degree. This study suggests that there are particular areas in the Fitzroy River Basin catchment of concern. Using the risk assessment matrix, six mines were identified as the highest contributors to potential cumulative impacts. Five of these were in the northern Isaac-Connors sub-catchment. In addition, six mines in the northern sub-catchments were identified as medium contributors, which add to the potential for cumulative impacts for this area. In the southern sub-catchments (e.g. Nogoia, Dawson, Mackenzie), the majority of mines were rated as low contributors, except for one mine.

Recommendations

After considering the findings of this study and following consultation on the draft study with key stakeholders, including Queensland Resources Council; the Technical Working Group; the Queensland Conservation Council and Agforce, the following recommendations are made.

1. Develop appropriate conditions in environmental authorities for mine water discharges

The aim of this recommendation is to standardise environmental authority conditions relating to water discharges so that consistent and appropriate conditions exist across the Fitzroy River Basin.

The aim is to work with mining companies to achieve this by convening a small working group comprising DERM and mining company technical specialists that would consider how discharge limits are set, what limits are acceptable and what this should be based on, when discharges may occur and what monitoring should occur. This is to occur by the end of June 2009.

The preferred option for implementing changes is via voluntary agreement with mining companies. If this is not possible, then it may be necessary to implement changes after requiring and reviewing an environmental audit or by changes to the EP Act to allow for the immediate review and amendment of coal mining authority conditions using the issues identified in this study. Changes to environmental authorities are to occur by the end of December 2009.

2. Develop local water quality guidelines

The aim of this recommendation is establish a collaborative project that enables the setting of local water quality guidelines. This would include mining companies and other stakeholder groups to identify current data and monitoring occurring throughout the region as well as developing a suitable monitoring program to complement the current information. The project plan for this project is to be developed by June 2009.

3. Develop a model for assessing cumulative impacts across the region

The aim of this recommendation is to understand full extent of cumulative impacts of mine water discharges which will be only known once a model is developed to determine the capacity of the catchment in terms of all inputs. This is likely to take at least two years to develop.

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1. Introduction

The Fitzroy is the largest east draining river system in Australia. It is usually regarded as including six major rivers: the Dawson, the Comet, the Nogoa, the Isaac-Connors, the MacKenzie and the Fitzroy. In January and February 2008 rainfall events across the Fitzroy River Basin resulted in the flooding of a number of mines in central Queensland.

Mining companies across the Fitzroy River Basin are permitted to discharge water under conditions specified in Environmental Authorities (EA) issued under the *Environmental Protection Act 1994* (EP Act) by DERM. Transitional Environmental Programs (TEP) can be applied for under the EP Act when the holder of an EA cannot comply with its conditions.

In August 2008, while mines were discharging under TEPs, water quality monitoring indicated salinity was increasing in waterways, dams and weirs and that domestic water supply for some townships using these sources for their drinking supplies was being affected. Queensland Health issued a health alert to the community about the potential health effect of increased salinity for those members of the public having to monitor their sodium intake.

The dewatering of mines focussed public attention on the water quality impacts of all water discharges from coal mines across the Fitzroy River Basin.

The Queensland Government responded to this situation by:

- Establishing a Fitzroy River Water Quality Technical Working Group (TWG) that includes a number of government agencies and experts to further investigate issues including options for remediation of the heightened salt levels in the Fitzroy River Basin;
- The Premier, on 15 October 2008, in response to community concern about these potential issues, appointing Emeritus Professor Barry Hart as her independent advisor and supervisor for an independent research project on the status of the Fitzroy River water quality;
- The former Minister for Sustainability, Climate Change and Innovation, on 16 October 2008, announcing that an independent study into the cumulative impact of mining on the health of the Fitzroy River be undertaken and led by the former EPA; and
- The former EPA establishing a monitoring program to assess the status of the Fitzroy River Basin water quality in relation to the potential impact of mine water discharged from the Ensham Resources coal mine on environmental values: human health (drinking water); irrigation and stock watering and aquatic ecosystem health.

Emeritus Professor Barry Hart's report reviews the current situation regarding water quality in the Fitzroy River resulting from the discharge of 138 Gigalitres (138,000 Megalitres) of floodwater from the Ensham Resources Pty Ltd (Ensham) coal mine located near Emerald.

Emeritus Professor Hart's report found that the decision by the former EPA to issue Ensham with a TEP was justifiable. However, the report also found that the discharge has resulted in impacts on water quality in the Fitzroy River Basin, particularly in relation to increased salinity.

The report also found that the TWG has developed a number of management options to improve water quality in the Nogoa-Mackenzie-Fitzroy system. The report including the headline findings and recommendations can be found at <http://www.epa.qld.gov.au/publications/p02740aa.pdf/>.

This study on the cumulative impacts on water quality of mining activities in the Fitzroy River Basin examines available data to report on the implications of water discharges from mines on water quality in the Fitzroy River Basin. It provides recommendations to reduce the potential for cumulative impacts, ensure the conditions in environmental authorities reflect best practice for water quality management; and improve knowledge of water quality.

The scope of this study is the impact of water discharges from coal mines, the quality of the discharges, and the impact that those discharges may have on the river environment and the quality of water in the Fitzroy River Basin.

The discharge of water from mines is only one contributor to water quality impacts. Stormwater, treated effluent from townships, tail-water discharges from irrigation areas and overland flows all contribute to the quality of water in the river system and its contaminant load.

This study recognises that the key longer-term measures for addressing these broader impacts include the Great Barrier Reef initiatives such as the Reef Water Quality Protection Plan and investment with the Australian Government in the Caring for Our Country program and the Queensland complementary natural resource management program. The development and implementation of landscape scale responses that lead to the improvement of water quality in our rivers is the primary approach for dealing with cumulative impacts from a broader natural resource management perspective.

1.1 Approach

Currently the major mining activities in the Fitzroy River Basin are related to energy resources. Some metaliferous mine development is planned but only one gold mine is currently operating. Small-scale sapphire gem mining currently occurs, however even in aggregate these mines are confined to a relatively small area. Other mines include quarries, limestone and zeolite mines and small-scale gem mining for thunder eggs and other valuable substances.

The major mining activity in the Fitzroy River Basin is coal mining and coal seam methane gas production. There are plans to significantly increase production through current mine expansions and by developing new mines. Coal seam methane is currently extracted at three general districts across the catchment. At present this activity is relatively small scale but is developing rapidly, with an estimated 10,000 new wells to be drilled over the next 10 years.

This study uses data relating to discharges from coal mining operations as they dominate the Fitzroy River Basin's large scale mining activities. These operations potentially release far greater volumes of water than any other mining source currently, and operate for long periods of time giving the best opportunity to examine changes in regulation and management of water quality over time.

A map of the study area (Fitzroy River Basin catchment) is shown at Figure 1 on page 10.

Study Location



Cumulative Impacts of Mines

- Towns
- River
- Creek
- Roads



Figure 1 Fitzroy River Basin

2. Mining development and water quality management

2.1 The history and future of mining in the Fitzroy River Basin

The Central Queensland Region produces most of Queensland's high-grade coking coal, and much of the export-traded thermal coal. Extensive coal resources within the region also provide the basis for significant coal seam gas development with potential to supply an emerging liquefied natural gas (LNG) export industry. Proximity to deepwater ports, the presence of a competitive rail system, bulk water and low-cost, reliable electricity supply have helped to establish Central Queensland as a major hub for energy-intensive mineral processing industries, particularly alumina, aluminium, magnesia and cement.

At the time of this report there are about 45 coal mines (12 underground), 10 significant mineral mines (excluding small mining operations and gemstone mines) and 20 medium to large quarries operating in the Central Queensland area, although not all these are in the Fitzroy River Basin. Many of these mines have ore reserves that will enable production beyond 2020. Figure 2 shows the location of current large scale mining activities in the Fitzroy River Basin.

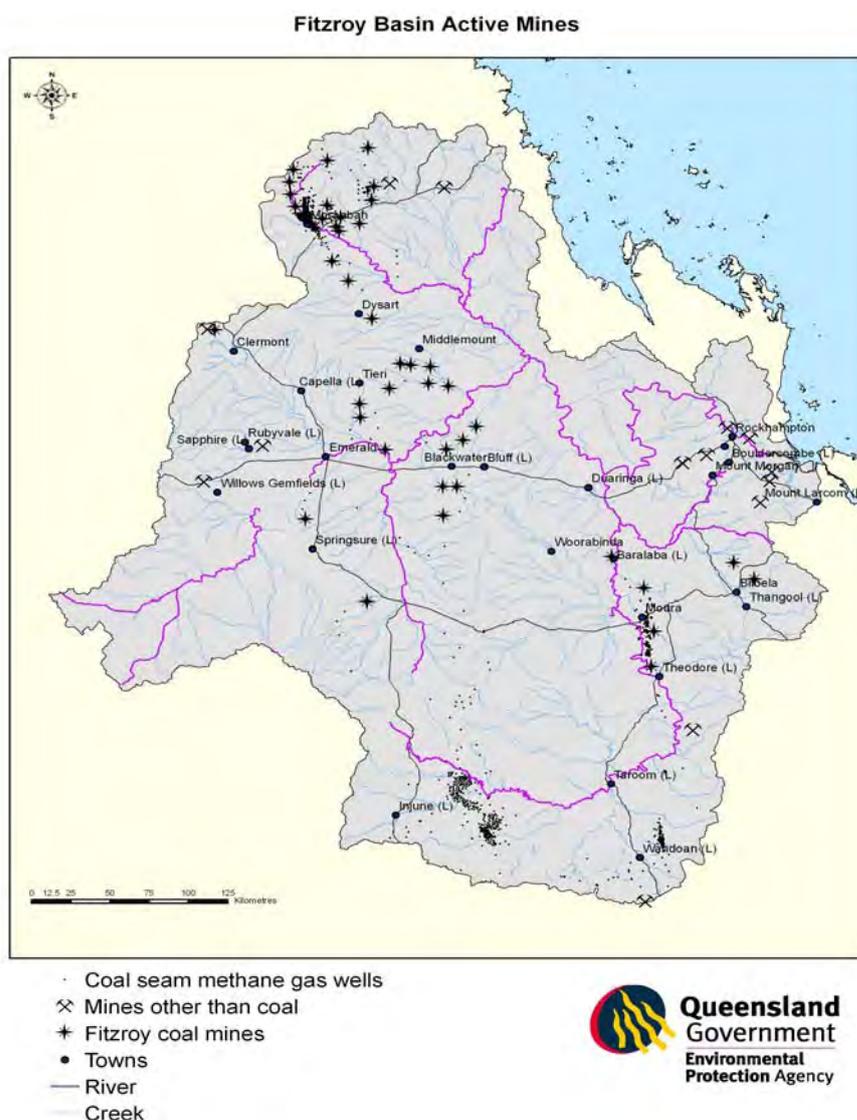


Figure 2 Fitzroy River Basin Active Mines

Coal accounts for more than 95% of the value of all raw minerals produced in Central Queensland and more than 60% of the total value of raw minerals produced in Queensland (DME & ACIL Tasman, 2007). Queensland's total saleable coal production in 2007/08 was around 181Mt, with about 90% (~160Mt) derived from mines located in the Fitzroy River Basin. The value of 2007/08 coal production from Central Queensland was about \$17.8 billion. Coal mines in Central Queensland directly employed about 19,000 people.

Coal Seam Gas (CSG) has been growing as a valuable commodity since the first production from fields near Moura, at Fairview–Spring Gully near Injune, and Peat-Scotia near Wandoan in the 1990s. Moranbah is now also a contributor to commercial CSG production. CSG makes a significant contribution to Queensland's natural gas supply and will continue to do so with the Department of Mines and Energy (DME) estimating that CSG will satisfy 70% of Queensland's gas usage by 2010. It is expected that there will be minimal impact on water quality by coal seam gas in the future – please refer to Text Box 1 for details.

Text Box 1 Coal Seam Methane in the Fitzroy Basin

Coal seam gas is currently extracted at three general locations across the catchment (in the north near Moranbah, near Moura on the Dawson River, and near Wandoan and Injune in the south of the catchment).

Coal seam gas production results in the production of associated water during the mining operations. Each gas well produces both gas and water, these are separated and the water component is aggregated at a number of central handling locations.

This water varies considerably in quality and quantity between locations and over time. In response to issues associated with managing this water the Queensland Government has established a policy that requires:

- wherever possible direct injection of the water into aquifers with water of equal or worse quality;
- if this is not possible, finding a beneficial use of the water; or
- if this is not possible, treatment of the water to a suitable standard before release to the environment (see <http://www.dip.qld.gov.au/growth-strategies/queensland-coal-seam-gas-water-management-policy.html> for more detail).

Therefore water quality issues associated with coal seam methane gas production in the catchment should be negligible. During 2007 approximately 4770 ML of water was produced across the Fitzroy Catchment at the three major sites (see Table 1).

Table 1 Water volumes produced by coal seam methane gas wells in the Fitzroy Basin for 2007/08 (source DME, 2009)

Location	Volume (ML)
Moura	24
Moranbah	513.5
Upper Dawson (Fairview, Spring Gully, Peat, Scotia)	4231.9
Total	4769.4

2.2 Mining's regulatory framework relating to water discharges

Mining has been regulated in Queensland since the late 1800s. Legislative requirements relating to the potential impact of mining activities, including water discharges, only came into force under the *Mineral Resources Act 1989*. The right to produce associated water from petroleum and coal seam gas operations are provided for under the *Petroleum and Gas (Production and Safety) Act 2004* and the *Petroleum Act 1923*.

When the ANZECC/ARMCANZ (2000) National Water Quality Guidelines first appeared in 1992, EAs for mining companies were commonly conditioned only to protect the downstream environmental value of stock water quality. The protection of ecosystem health was not considered. Conditions placed on discharges were predominately set at the stockwater limit of 1500 mg/L total dissolved solids (TDS) or approximately 2205 μ S/cm (the standard approximation for converting TDS to μ S/cm is $TDS (mg/L) = 0.68 \times EC (\mu S/cm)$ or $EC = 1.47 \times TDS$). When the ANZECC/ARMCANZ (1992) guidelines were updated in 2000 the limits were changed and some mines had their discharge limits amended.

On 1 January 2001, the responsibility for the environmental regulation of mining was transferred from the former DME to the former EPA. All previous licences and approvals for mining activities (around 5,500) became transitional authorities which had to be amended or replaced within five years. Since 2006, mining operations have been required to have DERM approved EAs. Many of the transitional authorities and consequent EAs retained the standards from the DME environmental management overview strategies commitments as conditions of the new EA. It is only new or recently amended EAs that cover a broader range of environmental conditions. Under the new regulatory framework DERM sets levels of environmental assessment for new applications, develops environmental conditions, monitors performance, conducts inspections and audits, ensures adequate rehabilitation and is responsible for enforcement of environmental controls. The steps to achieve this are outlined below.

2.3 Existing approaches to minimising water quality impacts

2.3.1 Operational policy

DERM's operational policy for licensing waste water discharge to Queensland waters provides policy advice and technical information for assessing development applications or environmental authority applications under the EP Act, *Environmental Protection (Water) Policy 1997* (EPP Water), *Integrated Planning Act 1997* and *State Development and Public Works Organisation Act 1971* for environmentally relevant activities discharging residual waste water to Queensland waters. The operational policy includes the consideration of mixing zones, assimilative capacity of receiving waters, environmental offsets, and environmental values and water quality objectives in assessing, deciding and conditioning applications. It also informs applicants in preparing applications.

The Queensland Water Quality Guidelines (2006) and *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* (ANZECC/ARMCANZ 2000) are the key technical guides for assessing and regulating the impacts of waste water discharges to water, particularly in terms of potential impacts on ecosystem health.

2.3.2 Environmental authorities

All mining projects require one or more EA under the EP Act. The holder of a mining tenement cannot carry out any mining activities on site unless those activities are authorised by an EA for the relevant tenement.

DERM initially requires applicants for mining projects that are determined to have a medium to high risk of serious environmental harm to submit an Environmental Management Plan (EM

Plan) during the assessment process. The purpose of an EM Plan is to propose measures and activities that will protect environmental values. The potential impact on environmental values may extend beyond the mining lease to surrounding off lease areas (such as a mine water discharge) and include potential impacts of regional extent (such as the catchment area).

The applicant proposes an environmental protection objective, control strategy and EA condition containing measurable standards and indicators in the EM Plan for each environmental value.

In regards to water, a description of environmental values would include background receiving water monitoring data (where available) to enable DERM to establish release limits. Relatively little background receiving water quality data is available for the Fitzroy River Basin.

When preparing water quality contaminant limits for the release of mine affected water to surface waters the EPP Water requires DERM to consider the following:

- whether the size of the initial mixing zone will adversely affect an environmental value, especially biological integrity and suitability for recreational use;
- whether concentration of contaminants in the initial mixing zone are acutely toxic to the biota;
- the existing quality of the surface water;
- the cumulative effect of the release concerned and any other releases of contaminants to the surface water known to DERM;
- future releases to the surface water known to DERM; and
- water quality objectives for waters outside of (i.e. downstream of) the initial mixing zone.

The ANZECC/ARMCANZ (2000) guidelines are also considered when preparing water quality contaminant limits. These guidelines are used to:

- determine environmental values of receiving waters (i.e. pristine, recreational, agricultural etc.);
- set default limits for relevant contaminants in discharges of mine affected water based on the environmental values of receiving waters; and
- set local water quality objectives (i.e. guideline values) for receiving water quality, including the consideration of ambient water quality where available.

There are issues with using the reference-based water quality guideline values that are contained in the abovementioned documents as objectives for indicators such as pH, electrical conductivity and turbidity. These guidelines have generally been developed from permanent flowing streams. The Fitzroy River Basin has many ephemeral streams, which only flow for a limited time each year. Given the nature of ephemeral streams, it is difficult to obtain suitable water quality data from which to derive water quality guidelines/objectives. The ANZECC/ARMCANZ (2000) guidelines recommend a dataset of the most recent 24 monthly observations which is generally unachievable in ephemeral systems due to intermittent and inconsistent natural flows. Furthermore, this issue is compounded by the current conditions on mining EAs which, in the main, only require mines to monitor water quality during discharge events. This restricts the opportunity to gather ambient data when natural flows in waterways are occurring but the mine is not discharging.

Since amendments to the EP Act in 2000 and the transfer of responsibility for mining to DERM, EAs have included the following conditions for water management:

- divert rainfall runoff away from disturbed areas of the site;
- prevent mine affected and process waters from leaving the site and store in holding dams for on-site uses including process water and dust suppression;
- implement effective erosion and sediment control on site;
- designate authorised release point/s for controlled discharges as a last resort;
- designate a background flow volume or rainfall event required to allow discharges;

- monitor ambient and receiving water quality at a specified frequency and for specified parameters during discharges; and
- limits for specified parameters at end-of-pipe and/or the receiving environment.

For EA approvals and related water discharges, water quality-related licence limits are placed on permits for the following water quality indicators:

- pH;
- electrical conductivity (EC) or total dissolved solids (TDS); and
- total suspended solids (TSS) or turbidity.

The conditions in EAs for new operations have undergone continual improvement to help meet current best practice management. The range of parameters being monitored has expanded from pH, salinity and TSS or turbidity to include a range of additional nutrients and metals. Toxicity trigger values are also specified at end of pipe or the receiving environment which, if exceeded, are used to trigger an investigation into the cause of the exceedence, and if necessary, generate a review of discharging arrangements. However, these new conditioning arrangements have generally only been applied to new EAs, or recently amended EAs. EAs do not expire and there is no automatic process in place where best practice standards are applied to all mining EAs across the board.

As a result of water management conditions specified in EAs changing considerably over time, inconsistency exists in the conditions under which mines operating in the Fitzroy River Basin discharge water. For example, a number of historical EAs allow discharges when there is no other flow in the waterway, and include mixing zones of considerable length which, during discharges, may result in the aquatic ecosystems within the mixing zone being exposed to significantly poorer water quality than under ambient water quality conditions.

The lack of ambient water quality data has meant that the default limits have historically been based on ANZECC/ARMCANZ (2000) guidelines. The limits set may not achieve a suitable level of protection of downstream environmental values for the Fitzroy River Basin and are not always reflective of all relevant water quality objectives (e.g. not recognising the use of the water resource in supplying drinking water and supporting ecosystem values). The lack of long-term and/or regular ambient water quality data has meant that the water quality limits applied to EAs are developed on a case by case basis having consideration of the limited ambient or reference site dataset/s that is available, and negotiations with the individual mining companies.

DERM has been working with the Queensland Resources Council for some time in an effort to develop a template for standard EA conditions so that there is a level of consistency in licensing coal mines across the state.

2.3.3 Transitional Environmental Programs

DERM is able to consider the use of a TEP for a business to continue operation during a period when the business is unable to meet a required environmental standard or the conditions of its EA (mining activities). A key requirement of the TEP is to minimise the potential for environmental harm. The proponent can submit a voluntary draft TEP for assessment or DERM can request a draft TEP be prepared if it considers there is potential or actual environmental harm on site.

Section 330 of the EP Act defines a TEP as “a specific program that, when approved, achieves compliance with this Act for the matters dealt with by the program by:

- a) reducing environmental harm; or
- b) detailing the transition to an environmental standard”.

The content requirements of a draft TEP are defined in section 331 of the EP Act and include:

- a) the objectives to be achieved and maintained under the program for an activity;
- b) how the objectives are to be achieved, and a timetable to achieve the objectives, taking into account—
 - i) the best practice environmental management for the activity; and
 - ii) the risks of environmental harm being caused by the activity;
- c) the appropriate performance indicators at intervals of not more than six months;
- d) monitoring and reporting compliance with the program.

In deciding a TEP, DERM must consider standard criteria which, among other things, include:

- the principles of ecologically sustainable development as set out in the 'National Strategy for Ecologically Sustainable Development';
- any applicable environmental protection policy (EPP) including the EPPs for air, noise, water and waste;
- the potential effects of any proposals on the character, values and resilience of the receiving environment;
- submissions made by the applicant for a TEP;
- best practice environmental management for the activities proposed;
- the financial implications of any requirements; and
- the public interest.

The legislation requires DERM to approve a draft TEP, approve it with conditions, or refuse the TEP. Public notification is required if the TEP is proposed to operate for longer than three years.

Emeritus Professor Hart's interim report found that there were deficiencies in the TEP process developed in response to the flooding events early in 2008, largely because of poor communication, but also because of the lack of credible monitoring information. DERM has commenced a review of its TEP process.

2.4 Key findings

- Mining has not developed in the Fitzroy River Basin in a uniform way and has undergone periods of rapid expansion and contraction over time depending on the prevailing economic conditions.
- The regulation of water discharges from mines has changed over time in terms of the applicable legislation and responsible Government Agency.
- Many of the existing EAs that provide conditions for discharging waste water are based on very limited ambient water quality data, require little monitoring from the mining companies, and are developed on a case by case basis leading to a lack of consistency across the state.
- EAs for mines in the Fitzroy River Basin vary in terms of:
 - date granted;
 - geographic area;
 - parameters regulated; and
 - release conditions and compliance requirements.

3. Water quality in the Fitzroy River Basin

3.1 Water quality management framework and guidelines

The National Water Quality Management Strategy sets the context for managing water quality and provides a framework for developing management strategies. This national approach to water quality management is underpinned by the development of guidelines which can provide guidance when issues arise. National guidelines allow flexibility of response to different circumstances at regional and local levels. State and/or local jurisdictions can refine these national water quality guidelines either into their own regional guidelines or into specific water quality objectives to protect waterways.

Water quality objectives are the levels or concentrations of indicators needed to protect all the values of a waterway. In defining water quality objectives, the first step is to define what values the water needs to support (e.g. drinking, irrigation, aquatic ecosystem, and recreational uses). Once defined, a suitable water quality guideline can be used as a reference to compare with current water quality and help develop water quality objectives that are catchment specific. For example, EC concentrations of less than 1000 $\mu\text{S}/\text{cm}$ may be required to support aquatic ecosystem protection in a stretch of waterway. If this is the most stringent guideline for all values in this waterway, it could become the draft water quality objective. Water quality objectives under the EPP Water are also to consider social and economic factors. This process allows management actions and decision making to be designed for the catchment that will help ensure the water quality objectives are achieved in the future.

The National Water Quality Management Framework has been used to establish water quality improvement plans (WQIPs) for a number of catchments discharging to the Great Barrier Reef. In places like the Mackay Whitsunday catchments the natural resource management group has worked with the Queensland and Federal governments to establish clearly defined water quality objectives and management actions to achieve water quality improvements (see Text Box 2 – WQIPs).

Text Box 2 WQIPs

The Mackay Whitsunday Water Quality Improvement Plan (WQIP) aims to provide water quality suitable for human uses and aquatic ecosystem protection. This plan describes local values deserving protection, how current water quality is impacting on local values and management interventions for rehabilitation of priority habitats and reduction of pollutant loads from diffuse and point sources. Implementation of the WQIP involves management interventions, monitoring and modelling, planning and legislation. A monitoring and modelling strategy has also been developed that recommends that many of the monitoring and modelling activities should also be implemented at a cross-regional reef-wide level. Modelling approaches should also be used in conjunction with appropriately targeted water quality monitoring at paddock, sub-catchment and catchment scale, and includes aquatic ecosystem response monitoring and modelling.

In the Fitzroy River Basin the ANZECC/ARMCANZ (2000) guidelines are used to help establish toxicity trigger values (TTVs) for aquatic ecosystems, recreational and aesthetic uses and primary industries, including irrigation and stock water quality. In some cases, the Queensland Water Quality Guidelines (EPA, 2007) define more localised reference-based guidelines for the protection of aquatic ecosystems where sufficient information from local monitoring is available. Reference-based guidelines are derived from monitoring data in the specific region from unimpacted waterways of a similar type. The guidelines are usually derived from 80th percentiles of long-term data (or 75th percentile for electrical conductivity)

and are designed to be compared to the median values of a long-term monitoring data set (typically 12 data points over a year) to provide an assessment of relative condition.

The *Queensland Water Quality Guidelines* provide information on ambient salinity ranges in Fitzroy North and Central Fitzroy. The guideline uses monitoring data from reference sites (permanent flowing streams) to present salinity zone percentiles for the sites in the region. As mentioned, the 75th percentile for electrical conductivity can be used to assess the relative long term condition of a waterway. The higher percentile (such as 90th percentile) could also be used to identify anomalously elevated sites where smaller datasets are available. It should be noted that more local monitoring and investigation may still be required in many cases, particularly where streams are ephemeral as is the case for much of the Fitzroy Catchment. In most of the catchment (Central Fitzroy), 90% of measures for EC were less than 520 μ S/cm, the 75th percentile was 340 μ S/cm and the median value was less than 250 μ S/cm. Values were higher in the Fitzroy north area (median 355 μ S/cm). However, 90% of measures were less than 1300 μ S/cm and the 75th percentile was 720 μ S/cm.

The National Health and Medical Research Council endorses the use of the *Australian Drinking Water Guidelines* (NHMRC, 2004) for setting drinking water quality limits as shown in Table 2 (page 19). This guideline recommends that, based on taste, total dissolved solids in drinking water should not exceed 500 mg/L. The equivalent figure in EC units can be roughly determined by doubling this value. In this report a conversion of 1/0.67 was used to give a limit for drinking water of 746 μ S/cm. The guidelines suggest that below 500mg/L TDS (conservatively 746 μ S/cm) the water should be good and above 1000 mg/L (which is 1500 μ S/cm) is unacceptable.

For other environmental values such as use for irrigation of crops or stock watering, the salinity (or electrical conductivity) threshold is dependent on the crop to be irrigated or stock to be watered, as shown in Table 2 (page 19). The salinity tolerance of crops shown ranges from 1000 μ S/cm to 4200 μ S/cm. The salinity tolerance for watering stock is less stringent, for example 5970 μ S/cm for beef cattle drinking.

Table 2 ANZECC/ARMCANZ (2000) Guideline and ADWG limits for salinity measured as electrical conductivity for protecting livestock drinking water, irrigation water and drinking water for human consumption environmental values

Environmental Value	Plant Salinity threshold tolerance in irrigation water*	Tolerance of livestock to salinity in drinking water**	ADWG [†] limit for salinity in drinking water for human consumption
Cotton	1000 (seedlings) 4000 (adult)	-	-
Wheat	3100	-	-
Maize/corn	1100	-	-
Sorghum	3100	-	-
Lucerne	1600	-	-
Sunflower	2500	-	-
Oats	2300	-	-
Barley	4200	-	-
Peas	1200	-	-
Beans	600	-	-
Oranges	1000	-	-
Grapes	1100	-	-
Sheep	-	7460	-
Beef cattle	-	5970	-
Human Drinking Water	-	-	746 (aesthetic – taste)

(units in $\mu\text{S/cm}$)

* Table 4.2.5 (clay soils) ANZECC/ARMCANZ (2000); clay soils represent the most common soil type for irrigated crops in the Fitzroy River Basin

** Table 4.3.1 ANZECC/ARMCANZ (2000)

† NHMRC (2004), conversion of 1/0.67 for TDS to EC used

3.2 Ambient water quality Fitzroy Basin

The major water quality parameters of concern associated with coal mining are salinity (based on electrical conductivity usually measured in $\mu\text{S/cm}$), heavy metal and metalloid ion concentrations (mg/L) and acidity/alkalinity (pH).

Background ambient water quality of the Fitzroy River Basin has been examined in three main peer reviewed studies:

- a Fitzroy River Basin specific analysis based on data collected from 1993-1996 (Noble et al. 1996);
- a statewide review of water quality in Queensland waters based on data collected from 1992-1996 (Testing the waters – a report on the quality of Queensland Waters, DEH 1999); and
- a review of water quality as part of the Queensland Water Quality Guidelines (EPA, 2007).

These studies provide data that begins to show what could be described as ambient water quality in the Fitzroy River Basin.

A comparison of the results reported and the default ANZECC/ARMCANZ (2000) guidelines suggests that the Fitzroy is a moderate to highly salty system with slightly alkaline water. The results also show that there are substantial differences in EC levels across sub-catchments. The reports do not provide sufficient information to characterise metal and metalloid concentrations.

3.2.1 Electrical conductivity (EC)

EC is related to the number of dissolved ionic solids in water. Typically the most common ions are those found in salt (sodium chloride), so that EC is typically a reliable surrogate for salinity.

All three studies found that by far the majority of sites had EC levels less than 800 μ S/cm. The major location where higher EC levels were recorded were on the Dee River downstream from the Mount Morgan copper mine site which has a long history of water quality issues that are now managed by the Department of Mines and Energy.

DEH (1999) recorded only one site close to current coal mines (Crinum Creek) with a median conductivity above 800 μ S/cm. Noble (1996) recorded two sites (both on the Dee River) with median EC levels above 1500 μ S/cm. More than 80% of their samples were less than 280 μ S/cm, and 17% were between 280-800 μ S/cm. For the sub-basins, median values ranged from 170 μ S/cm (Comet) to 292 μ S/cm (Isaac).

3.2.2 Metal concentrations

Limited information has been recorded in relation to background dissolved heavy metal concentrations. Noble et al. (1996) conducted a very limited study of six sites designed to examine the impacts of discharges from the Mount Morgan mine site. This study found levels of heavy metals typically exceeded ANZECC/ARMCANZ (2000) guidelines downstream of the mine site.

3.2.3 pH

This parameter measures the acidity and alkalinity of water. Values less than seven are considered acidic and those above seven alkaline (Noble et al. 1996). The acidity or alkalinity of water can increase the bioavailability and concentration of contaminants such as metals and therefore the relative toxicity of certain contaminants as well as increasing the accumulative effect and potential impact on environmental values.

Most Fitzroy soils are alkaline and this is reflected in water quality. Noble et al. (1996) records the lowest median pH for water quality in the Connors catchment (7.15) and highest (7.97) for the water quality in the Nogoia catchment. Some sites monitored on the Dee River as part of this study did not meet ANZECC/ARMCANZ (2000) and QWQG (EPA, 2007) guideline trigger values (pH 6.5 – 8).

3.3 *Water quality data collection and reporting*

Water quality monitoring, data collection and reporting in the Fitzroy River Basin is undertaken by a diverse range of State and local government agencies, water providers, natural resource management groups, mines and other industries. Each of these groups does its monitoring, data collection and reporting on water quality differently. There is no single entity that synthesises all available water quality data for the Fitzroy River Basin in a catchment wide context. Text Box 3 illustrates the diverse nature of water quality monitoring that Department of Natural Resources and Water (NRW) and Fitzroy Basin Association (FBA) undertakes.

Text Box 3 Water Quality Monitoring

The Department of Natural Resources and Water (NRW) Water Monitoring

There are a total of 84 government operated water height monitoring stations in the Fitzroy River Basin (FRB). NRW operate a total of 57 gauging stations in the FRB, while SunWater operate another 27 stations.

The majority of NRW stations record stream height data on a continuous basis with 32 of these stations equipped with water quality probes. All stations with water quality equipment have a combined electrical conductivity (EC) and temperature probe. A number of stations also have a pH probe. Either probe is capable of collecting water quality data at 20 minute intervals. A number of stations on major rivers also have telemetry capability. In addition, water samples are collected at 25 of the station sites either 3 or 4 times per year. These samples are analysed for major ions and total and dissolved nutrients (nitrogen and phosphate).

As a part of the NRW Resource Operation Plan (ROP) environmental flow monitoring requirements NRW conduct the Environmental Flow Assessment Program (EFAP). The EFAP monitors spawning and recruitment success of native fish stocks in response to river flows, details can be found at <http://www.nrw.qld.gov.au/factsheets/pdf/water/w130.pdf>.

NRW also conduct seasonal flood water sampling as a part the Great Barrier Reef Water Quality Improvement Plan, and the Sediment Monitoring Program. Further information on NRW water quality monitoring can be found at <http://www.nrw.qld.gov.au/water/index.html>.

Fitzroy Basin Association Water Monitoring

The Fitzroy Basin Association, through a regional planning process, is developing water quality targets for the region, identifying potential hotspot areas and prioritising management actions in order to help achieve this common objective.

This monitoring program focuses on sediment, salinity and nutrient (nitrogen and phosphorus) parameters. Simple load and concentration calculations are derived for these parameters. Monitoring is conducted at the neighbourhood catchment scale (~300km² to 2000km² or groups of smaller catchments).

The monitoring focuses on flood event sampling and captures data over the hydrograph for basic load calculations. This is being conducted to provide baseline data and eventually a baseline trend for the amount of sediment and nutrients being carried downstream during rain events. This information supports Natural Resource Management improvements brought about by stakeholders in each neighbourhood catchment.

For more information please visit the website below:

http://www.fba.org.au/programs/priority_neighbourhood_catchments_water_quality_monitoring_program.html

The Fitzroy River Water Quality TWG has developed a draft table of current water monitoring programs in the Fitzroy River Basin as at September 2008 (see Section 7.2 Appendix B on page 45). This list includes a range of monitoring activity that is occurring from ongoing monitoring to monitoring due to the flooding and subsequent dewatering of mines in the Fitzroy River Basin.

In response to the flooding and subsequent dewatering of mines DERM has started an independent Fitzroy River Water Quality, Sediment and Biological Monitoring Program that will monitor and then assess any potential impact(s) of flooded coal pit water discharged from the Ensham Resources coal mine on waterways and related environmental values in the affected reaches of the Fitzroy Basin.

This program will also provide important information for future monitoring. Further details on this monitoring program and progressive results are available from DERM's website at: http://www.epa.qld.gov.au/publications/p02739aa.pdf/Project_Plan_Fitzroy_Basin_Water_Quality_Monitoring_assessing_the_impact_of_Ensham_Resources_flood_water_release.pdf

DERM is developing a statewide integrated waterways quality monitoring program, comprising the following elements:

- monitoring frameworks based on the processes influencing aquatic ecosystems health in Queensland;
- common techniques, methods and metadata standards for sample collection, handling, analysis, data verification and storage;
- common interpretation and assessment techniques;
- storage and management of collected information in a way to ensure free and rapid access of appropriate information to all stakeholders;
- common indicators and reporting tools; and
- agency roles in water quality monitoring.

This integrated program would benefit from the coordination and inclusion of other monitoring activities such as those carried out by industry and other organisations.

3.4 Key findings

- Drinking water and aquatic ecosystems are the most sensitive downstream environmental values to be protected from discharge waters.
- The Fitzroy River Basin is naturally a moderate but variable saline system with slightly alkaline water overall. Previous studies and the Queensland Water Quality Guidelines show that there are substantial differences in ambient EC levels across sub-catchments.
- There is no overarching comprehensive plan for water quality in the Fitzroy River Basin such as a WQIP that defines environmental values and water quality objectives and considers the cumulative impacts from diffuse and point sources.
- Currently DERM is in the process of developing a statewide integrated waterways quality monitoring program which is expected to be available by June 2009.

4. Data analysis

For the purposes of this study, the EPA contacted the coal mines holding EAs in the Fitzroy River Basin and asked for their monitoring data for the past five years and other relevant information on the approved discharges in their EAs.

The information provided by the coal mines in the catchment has been reviewed. Firstly, the location of the mines and their approved discharges were determined and then grouped into eight sub-catchments. The sub-catchments included:

- Bee/Walker Creeks (Isaac-Connors catchment),
- Anna Creek/Upper Isaac River (Isaac-Connors catchment),
- Ripstone/Stephens Creek/Isaac River (Isaac-Connors catchment),
- Roper/Oakey Creeks, (Nogoa catchment)
- Crinum/Sandy Creeks/Nogoa River, (Nogoa catchment)
- Blackwater Creek/Nogoa River, (Nogoa catchment)
- Ten Mile (Mackenzie catchment), and
- Dawson River /Callide Creek. (Dawson catchment)

Table 6, column three (page 33) identifies the sub-catchment to which the colour shading refers. In Tables 3 (page 25), 4 (page 28) and 5 (page 29) the different colour shading reflects the sub-catchment the mines discharge into.

4.1 Data from authorised discharges

4.1.1 Environmental authorities

Summary of licensed discharge conditions

Current EAs are listed in Table 3 (page 25). These include 40 permits. Of these, mines 34a and 34b are considered together as these authorities are in the process of being amalgamated. All of the EAs permit discharges under certain conditions except for mine 18 and mine 22. Mine 10 was not operational at the time of preparing this report. The EAs include anywhere between one to fifteen approved discharge locations and an EA can have multiple receiving waters, each with different release conditions.

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Table 3 Review of Electrical Conductivity Limits Coal Mine Environmental Authorities in the Fitzroy Catchment

Mine No.	Mine Permit Name	Permit Code	Discharge EC Limit ($\mu\text{S}/\text{cm}$, % background)	Receiving Environment EC Limit ($\mu\text{S}/\text{cm}$)	Conditions Relating to Receiving Environment Stream Flow
1	Hail Creek	M2295		1500	During stream flow
2	South Walker Ck	MIN100552107	2500	2500	During natural flow events
3	Coppabella	MIN100555707	3000	3000	During flow or meets downstream WQ limits
4	Burton	MIN100403206		2500	No release to bed and banks.
5	North Goonyella	MIN100590107	3000	1000	During flow events upstream >2m ³ /s
6	Goonyella Riverside	MIN200491507		1000 (no flow), 2000 (flow)	During flow and no flow
7	Moranbah North	MIN100557107		1500	Discharge during natural flow >5m ³ /s
8	Broadlea North	MIN100726908	1500	1500	Release during natural flows only (measure flow)
9	Isaac Plains	MIN100329505	110%		None specified
10	Lenton	MIN100649407	n/a	n/a	n/a
11	Poitrel	MIN100661507	110% background		During flow not specified
12	Millennium	MIM800130703		3000	None specified. Monitoring during events.
13	Carborough Downs	MIN100329305		3000	None specified
14	Moorvale	MIN100555607	3000	3000	During natural flow >200mm depth.
15	Olive Downs	MIN100381005		3000	None specified
16	Peak Downs	MIN100496107	3000	3000 or 1500	During periods of natural flow (measured)
17	Saraji	MIM800014002		3500	During flow, not specified
18	Lake Vermont	MIN100736808	n/a	n/a	n/a
19	Norwich Park	MIM8002300504		2500	During flow events.
20	German Ck	MIM800019402		1000 & 3000	Not specified (monitoring events)
21	Middlemount	MIN100562607	1500 or 80% reference	1500	None specified
22	Foxleigh	MIN100720308		110%	No release permitted

Mine No.	Mine Permit Name	Permit Code	Discharge EC Limit ($\mu\text{S}/\text{cm}$, % background)	Receiving Environment EC Limit ($\mu\text{S}/\text{cm}$)	Conditions Relating to Receiving Environment Stream Flow
23	Oaky Creek	MIM800022002		2000	During flow - specified.
24	Lake Lindsay	MIM800279904		1000	None specified
25	Blair Athol Coal	M5621	2000 or 100% upstream	2000 or upstream	None specified
26	Clermont Coal	MIN100340805	4500 or 100% upstream	1800	None specified
27	Gregory Crinum	MIN100552507	600, 3500	3500	During flow events (measured)
28	Kestrel	MIM800462306	3000 or 110% upstream	2000	During natural flow
29	Ensham	MIM800086202		1000	During natural flow
30	Minerva Coal	MIN100552307	110% upstream	1493*	During flow event
31	Rolleston	MIM800090802	1000	200 & 715	During flow height >1.6m or >0.5
32	Cook Colliery	MIM900140703	3000	2500	During flow events
33	Blackwater Coal	MIM800007802		3000	During flowing creek (flow not specified)
34a	Curragh	MIN100657807	1493 to 2239 depending on upstream	1493 to 2239 depending on upstream	Creek flow >0.2m ³ /s (Max discharge specified)
34b	Curragh North	MIM800185503	3000	1300	Flow equal to upstream (Max discharge specified)
35	Jellinbah	MIM800087302	2000	1500 or 110% upstream	During flow events
36	Yarrabee Coal	MIM800090202		2836*	During flow (upstream height specified)
37	Dawson North/South/Central	MIN100510607	4000 (500 for passive release <10m ³ /s)		Flow greater than 5 or 10 m ³ /s
38	Baralaba Coal	MIM800330805	2985* or 110% of background		None specified
39	Callide	MIN100507307	2000 to 3000	2000	None specified

Colours in column 2 group the mines into the same sub-catchment (named in column 3, Table 6)

* based on EC to TDS conversion of 0.67

Of the most commonly regulated water quality indicators, EC is the most relevant to this study for the following reasons:

- stream inputs can only be removed by natural flows from rainfall events flushing accumulated salinity from waterholes and the numerous water impoundments along the river system (permanent removal), or through infiltration into the groundwater table (temporary removal), thus the potential for accumulation is high;
- there is little water quality data relating to metal based contaminants; and
- there has been recent concerns with elevated salinity in the Fitzroy River Basin.

Applying EC limits

Three main types of EC limits are applied in the EA conditions for the mines reviewed. These include:

- end-of-pipe limits based on a specified numerical value;
- end-of-pipe limits relative to upstream water quality measures (either 100% or 110%); and
- receiving environment limits based on a specified numerical value.

Combinations and permutations of these three limit types are used for the EAs as shown in Table 3 (page 25).

Specified end-of-pipe limits provide the greatest assurance that environment harm will not occur when set appropriately and complied with. They help provide direct knowledge of the discharge to be controlled and regulated. They also provide the best potential for assessing cumulative impacts. The disadvantage of end-of-pipe limits is that they need to be set based on good information which is not available for many sections of the Fitzroy River Basin.

End-of-pipe limits based on upstream measurements provide less assurance for regulation and environmental protection. Given the ephemeral nature of many of the receiving waters for mines in the Fitzroy River Basin, much of the stream flow will be event related. Monitoring of such streams can be technically and logistically challenging with results not always guaranteed. Furthermore, results will generally have large variability, requiring more frequent sampling to receive representative results. An additional important point to this study is that this type of limit does not lend itself to controlling cumulative impacts as it considers discharges occurring upstream but not downstream. Background water quality could potentially worsen moving down the catchment as relative discharge limits would increase with worsening water quality. This type of limit is therefore not suitable for indicators that relate to contaminants that could potentially accumulate in a waterway.

Receiving environment water limits provide a direct measure of water quality changes in the environment but cannot separate the effects of the discharge from other catchment influences. Also, the potential for the monitoring difficulties and potential variability of results arises as discussed above. Nonetheless, limits applied in the receiving environment may be the only alternative where monitoring of end-of-pipe water quality is not possible.

EC-related discharge limits

There was significant variability in the EC limits specified in the EAs reviewed. For end-of-pipe limits, maximum limits varied from 1500 μ S/cm to 4500 μ S/cm. Most limits were between 2000 μ S/cm to 3000 μ S/cm. Variability in the end-of-pipe limits applied is common and will depend on the circumstance of the release and the type of receiving waters. For example, discharge during high flow events can result in higher dilution, allowing higher EC values in the discharge. Alternatively, discharge during low or no flow would provide no dilution, requiring lower EC values. Understanding and specifying release conditions related to flow of receiving waters is particularly important for these higher EC limits in the EAs.

The majority of discharges approved in the EAs (25) link the release to flows in the receiving waters. However, of these 25 only eight EAs specified the stream flow (or gauging height) at which the release could occur. The remainder did not specify stream flow triggers or how it should be measured. The location where stream flow was required was typically specified.

The remaining thirteen EAs allowed releases in dry weather although monitoring of events was sometimes required.

Maximum EC limits also varied significantly across EAs for receiving environment limits. The limits were generally lower than end-of-pipe limits but ranged from values of 200µS/cm through to values of 4500µS/cm. Limits of 3000µS/cm or greater were common.

4.1.2 Transitional Environmental Programs

Current TEPs for the Fitzroy Catchment are listed in Table 4. These include five approvals, all issued in 2008 following extreme rainfall early in the year. All of the TEPs allow discharge of waste water for extended periods of time, and some TEPs allow discharges during periods of no upstream flow. The TEPs all include a certain discharge period, after which the discharge has to cease to allow inspection of the stream under no discharge conditions.

The EC limits for the TEPs are specified numerical values applied to end-of-pipe measurements and/or receiving waters. Limits vary from 1000µS/cm to 3000µS/cm.

Table 4 Review of Electrical Conductivity Limits for Coal Mine Transitional Environmental Programs (TEPs) in the Fitzroy Catchment

Mine No.	Mine Permit Name	TEP Code	Dates/Duration	Discharge EC Limit (µS/cm, % background)	Receiving Environment EC Limit (µS/cm)	Conditions Relating to Receiving Environment Stream Flow
1	Hail Creek	MAN7274	20 February to 30 June 2008	1500	na	Permitted to occur on a seven day cycle, absence of natural stream flow.
4	Burton	MAN7374	27 March to 30 June 2008		2500	Permitted to occur on a seven day cycle, 14 day inspection
6	Goonyella Riverside	MAN7454	21 May 2008 to 20 May 2009		3000	Permitted to occur on a 28 day cycle, including periods of no detectable flow
29	Ensham	EMD 001-08	29 Feb -, 28 April-, 2 June- 08 to 2 March 09	1200 (2000*)	1000, changed to 1200-2000 (rolling median five weeks)	Permitted to occur on a seven day cycle, 7 day inspection
30	Minerva Coal	EMD 003-08	27 March to 30 June 2008		1493	Permitted to occur on a seven day cycle, 7 day inspection

Colours in column 2 group the mines into the same sub-catchment (named in Column 3, Table 6)

* with approved discharge management plan

The metal-based discharge limits are listed in Table 5 (page 29). The limits are for total metals in receiving waters (i.e. the 'total' metal concentration in the water that includes the sum of metal associated with suspended sediment, and the metal dissolved in the water itself). The limits specified are significantly higher than toxicant trigger values for slightly-to-moderately disturbed systems in the ANZECC/ARMCANZ (2000) guideline. One reason for this is that natural background concentrations of some chemicals may exceed the stated guideline trigger values due to mineralisation from the catchment substrate. In these cases, it is not reasonable to use a guideline value below the background concentration. Monitoring and limit setting for

dissolved metals is likely to provide a more useful regulatory mechanism. Limits for aquatic ecosystem protection should also be considered in the future. Further monitoring for total and dissolved metals in the receiving environment of reference/background sites is probably required to determine what limits are achievable for compliance purposes given the likelihood of high background levels of some metals within such a mineral-rich catchment.

Table 5 Review of Metal Limits for 1 Coal Mine Transitional Environmental Programs (TEPs) in the Fitzroy Catchment. Metals are total metals in mg/L.

Mine No.	Mine Permit Name	TEP Code	Dates/ Duration	Aluminium	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Zinc
1	Hail Creek	MAN7274	20 February to 30 June 2008	20	0.5	5	0.01	1	1	1	0.1	0	0.15	1	0.02	20		
4	Burton	MAN7374	27 March to 30 June 2008	20	0.5	5	0.01	1	1	1	0.1	0	0.15	1	0.02	20		
6	Goonyella Riverside	MAN7454	21 May 2008 to 20 May 2009	5	0.5	0.01	0.01	1	1	20	0.1				1	0.01	0.05	
29	Ensham	EMD 001-08	29 Feb -, 28 April-, 2 June- 08 to 2 March 09	10	0.5	5	0.01	1	1	10	0.1	10	0		1	0.02	5	
30	Minerva Coal	EMD 003-08	27 March to 30 June 2008	5	0.5	5	0.01	1	1	1	5	0.1	0	0.15	1		20	

Colours in column 2 group the mines into the same sub-catchment (named in column 3, Table 6)

4.2 Risks associated with water quality changes and potential for cumulative impacts

The locations of water quality monitoring sites for monitoring by coal mines are generally confined to mining tenure, which provides good information on local impacts but little information on cumulative impacts. In addition, monitoring is nearly always constrained to occurring while there is a discharge from the mine. This means that data collected would be difficult to use for assessing cumulative impacts unless discharges all occurred together. Furthermore, there is insufficient monitoring data available to determine reference or true background benchmark conditions.

To ascertain the full spatial extent of impact of the discharges and the actual cumulative impact, more downstream monitoring and data would be required.

It was evident that discharges from more than one mine were occurring in numerous sub-catchments at the same time. The potential for cumulative impacts spatially across the sub-catchment and catchment would be increased under such circumstances.

One observation resulting from the review of mine data is the close relative proximity of 19 of the mines in the northern three sub-catchments relating to the upper Isaac River and Connors River (Bee/Walker Creeks).

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Table 6 Salinity Risk Assessment for Coal Mines in the Fitzroy Catchment

No	MINE	Creek/River Sub-catchment	Discharge Volume (ML)/ Frequency	Receiving Environment (RE) EC ($\mu\text{S}/\text{cm}$)	Cumulative Risk
1	Hail Creek	Bee/Walker	7530 (07/08) includes 1000 (TEP)	pre TEP < 1300, TEP no flow <1500	medium
2	South Walker Ck	Bee/Walker	2450 (2008)	low to medium (two EC 1620, 1770)	medium
3	Coppabella	Bee/Walker	3990 (2008)	medium to high <3000	high
4	Burton	Anna/Isaac	795+ (08) not all flow monitored	high EC but generally below 2500 in 2008	medium
5	North Goonyella	Anna/Isaac	5490 (2008), 785 (2007)	high RE EC 1400-2800	high
6	Goonyella Riverside	Anna/Isaac	31500 (07/08) includes 3700 (TEP)	pre 2008 low <1000EC RE , June-Oct 08 high 2-3000 up to 4500 in June	v. high
7	Moranbah North	Anna/Isaac	220 (07/08)	low <400, two high values <1520	low
8	Broadlea North	Anna/Isaac	no volumes, two discharges	low < 320	low
9	Isaac Plains	Anna/Isaac	110 (2008)	v. low EC generally 300, <740	low
10	Lenton	Anna/Isaac	0	*na	v. low
11	Poitrel	Anna/Isaac	604+ (2008)	median RE<1100 for extended period, Local levels higher, some no flow	medium
12	Millennium	Anna/Isaac	no volumes, five week discharge	medium EC<2800 DS RE	high
13	Carborough Downs	Anna/Isaac	no volumes, infrequent	EC generally <500	v. low
14	Moorvale	Anna/Isaac	0	*na	v. low
15	Olive Downs	Anna/Isaac	0	*na	v. low
16	Peak Downs	Ripstone/Stephens /Isaac	5500 (2008)	high RE EC<3500, extended period March-May	high
17	Saraji	Ripstone/Stephens /Isaac	660 (2008)	low to high, RE <3200	medium

No	MINE	Creek/River Sub-catchment	Discharge Volume (ML)/ Frequency	Receiving Environment (RE) EC ($\mu\text{S}/\text{cm}$)	Cumulative Risk
18	Lake Vermont	Ripstone/Stephens /Isaac	0	*na	v. low
19	Norwich Park	Ripstone/Stephens /Isaac	1120 (2008)	high RE EC<2400, low EC during flow	medium
20	German Ck	Roper/Oakey	no volumes, multiple releases	downstream sites low EC <600	low
21	Middlemount	Roper/Oakey	no volumes, one release	low <200EC	low
22	Foxleigh	Roper/Oakey	140	low - rain water (discharge EC 1500, RE 150-1200)	v. low
23	Oaky Creek	Roper/Oakey	108 (2008)	RE generally low EC. Some <1200, +one 1500	low
24	Lake Lindsay	Roper/Oakey	no volumes, multiple releases	generally low, max 1200, Jan 08 1700 Sandy Creek	low
25	Blair Athol Coal	Crinum/Sandy/Nogoa	no volumes, 4 releases	low EC<400	low
26	Clermont Coal	Crinum/Sandy/Nogoa	0	*na	v. low
27	Gregory Crinum	Crinum/Sandy/Nogoa	88 (2008)	low EC<608 except for uncontrolled release 06 high EC, low volume	low
28	Kestrel	Crinum/Sandy/Nogoa	0.5 (2008)	v.low<651TDS	v. low
29	Ensham	Crinum/Sandy/Nogoa	208,000 (include 69000 dilution water)	downstream medium EC>1500 on occasion, Corkscrew high >2000 for two weeks	high
30	Minerva Coal	Crinum/Sandy/Nogoa	no volumes, five day discharge only	generally low<1230	low
31	Rolleston	Crinum/Sandy/Nogoa	no volumes, 17 releases	generally low, EC max 1550	medium
32	Cook Colliery	Blackwater/Nogoa	no volumes (7 overflows)	high EC,4700 - washery discharge	medium
33	Blackwater Coal	Blackwater/Nogoa	20	medium to short term, low volume & High EC (in April)	medium
34	Curragh/Curragh North	Blackwater/Nogoa	<20	low - clean water	v. low
35	Jellinbah	Blackwater/Nogoa	0	negligible	v. low
36	Yarrabee Coal	Ten Mile	0	*na	v. low

No	MINE	Creek/River Sub-catchment	Discharge Volume (ML)/ Frequency	Receiving Environment (RE) EC ($\mu\text{S/cm}$)	Cumulative Risk
37	Dawson North/South/Central	Dawson/Callide	0	*na	v. low
38	Baralaba Coal	Dawson/Callide	0	*na	v. low
39	Callide	Dawson/Callide	no volumes, multiple releases	low to medium, Majority EC <2500	medium

Colours in columns 2 and 3 group the mines into the same sub-catchment (named in column 3)

* na – not applicable

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4.2.2 Risk assessment for each EA

The final step of the study was to undertake a risk assessment for each EA based on the information provided. Mines identified as high risk that are grouped together have the greatest potential for producing cumulative impacts. The risk assessment was based on the level of EC sampled immediately downstream from the discharge and the volume or frequency of the discharge. Risk assessment categories for each of these have been developed and are shown in Table 7 and Table 8, respectively.

Table 7 Assessment categories for mine receiving waters EC sampled immediately downstream from discharge for Table 6

Risk category	EC level	Rationale for EC level (percentiles based on Queensland Water Quality Guideline figures)
very low	<720 μ S/cm	Ambient conditions for North Fitzroy (based on 75 ^h percentile), approx 95 th percentile of guideline for Central Fitzroy
low	<1250 μ S/cm	90 th percentile (North Fitzroy) - limited effects on fish/macrobenthos, most crop irrigation possible (except beans & oranges), increased potential effect on drinking water
medium	<2500 μ S/cm	Reduction in some macro-invertebrate species, potential effect on some fish, greater number of crops effected, higher risk on drinking water
high	>2500 μ S/cm	Potential effects on all values - loss of aquatic ecosystem, less suitable for irrigation, highest risk to downstream water supplies

Table 8 Assessment categories for frequency and volume of mine discharges for Table 6

Risk category	Flow frequency and volume
very low	zero flow, release on only a few days, low volume, e.g. <100ML per year
low	In-frequent flow, couple of major releases, volume <1000ML per year
medium	frequent releases, associated with low stream flow, volumes <10,000ML per year
high	extended release for weeks, dry weather associated, volumes >10,000ML per year
very high	extended release for months, dry weather associated, volumes >10,000ML per year

In terms of risk assessment categories for EC, the likely environmental values and water quality objectives for the freshwater reach of the Fitzroy River were considered. Environmental values of particular interest and most sensitivity to salinity are protection of aquatic ecosystem, crop irrigation and potential use for drinking water.

For EC, four risk assessment categories were developed from very low through to high. Information on reference based aquatic ecosystem guidelines for the Fitzroy Catchment is provided in the Queensland Water Quality Guidelines (2006) and was used for defining the limits for the low and very low risk assessment categories. Percentiles for EC for different sub-catchments are presented in the guidelines and the northern catchments such as the upper Isaac River have naturally higher EC values compared to some other parts of the catchment such as the Nogoia River. Nonetheless, given that a significant proportion of the mines are in this northern area, the guidelines for this area were used for defining the levels (Table 7). It is noted that this break up may not be sufficiently conservative for all parts of the catchment. For the higher risk categories, published information on potential chronic effects on fish and macroinvertebrates was considered (Dunlop et al., 2005; Dunlop & McGregor, 2007; Hart 2008).

For irrigation, EC guideline concentrations from ANZECC/ARMCANZ (2000) were considered. The levels of EC suitable for drinking water are more difficult to define. As noted by the recent report by Hart (2008), sodium concentrations are the key element and water treatment in the area is unlikely to remove any salinity or sodium. The very low risk level will generally protect drinking water. Any of the higher levels listed in Table 7 (page 37) could be of concern if the water is used for reticulated drinking water. However, given the monitoring data under review are in close proximity to the mine discharge some dilution would be expected before the discharge water reached drinking water reservoirs.

The risk assessment categories for frequency/volume of discharge water were divided into five categories from very low to very high. The rationale behind the categories was that with greater volumes and more frequent releases, there would be a greater potential for cumulative effects. This is an essential part of the risk assessment given the locations of the monitoring sites were in close proximity to the mines, often in tributaries off the major streams and generally some distance from the environmental value, particularly for drinking water uses. The categorisation of the volumes was somewhat arbitrary and based on expert opinion. The very low risk assessment categories corresponded to discharges for a few days or less and low volumes (<100ML). The very high risk category corresponded to extended releases for months, dry weather associated and with large volumes greater than 10,000ML.

Based on these risk assessment categories, a cumulative risk assessment matrix was developed to help assess the potential for cumulative risk from the mines and is presented in Table 9. Cumulative risk is broken into five categories from very low through to very high. The rationale behind the matrix was that the cumulative impact risk is a combination of the frequency/volume of the discharge and the EC concentration in the environment during the time of discharge. Very low volume discharges with very low receiving water EC would have very low risk of cumulative impact. Alternatively, an extended continuous large volume release combined with high receiving water EC would have a very high risk of cumulative impacts.

Table 9 Cumulative risk assessment matrix used to assess the mine discharges in the Fitzroy Catchment

Frequency/Volume (ML/year)			EC ($\mu\text{S/cm}$)			
			v low	low	medium	high
			<720	<1250	<2500	>2500
v. low	zero/small	<100ML	v. low	low	low	medium
low	few releases, infrequent	<1000	low	low	medium	medium
medium	frequent	<10000	low	medium	medium	high
high	continuous, some dry weather	<100000	medium	medium	high	v. high
v. high	continuous, months	>100000	medium	high	v. high	v. high

The results of the cumulative impact risk assessment for the data obtained from the mines are shown in Table 6 (page 33). Six mines were identified as having a high or very high risk of contributing to cumulative impacts. Five of these were in the two northern Isaac River sub-catchments. In addition, six mines in those catchments were identified as a medium risk of contributing to cumulative impacts, which adds to the potential for cumulative impacts in this area. In comparison in the southern sub-catchments, the majority of mines were rated as low or very low risk of cumulative impact, other than mine 29. It should be noted however that naturally occurring levels of EC are lower in some of the southern catchments and the risk assessment may under predict the cumulative risks for these areas on aquatic ecosystems or drinking water.

Of the six mines rated as high or very high risk, only two were associated with a TEP. The discharges for the remaining four occurred under the existing EA.

To ascertain the full spatial extent of impact of the discharges and the actual cumulative impact, more downstream monitoring and data would be required.

Monitoring data on metal concentrations in receiving waters was received for some mines. In general, the total metal concentrations were quite low and complied with limits specified in the EAs. Some total metal concentration appeared to exceed toxicant triggers for slightly-to-moderately disturbed waters in ANZECC/ARMCANZ (2000) guidelines. In some cases this may be attributable to higher ambient levels due to natural processes of mineralisation. However, further work and data would be required to undertake local and cumulative impact assessment.

4.3 Key findings

- Forty permit holders of coal mines were identified.
- Discharge limits for Environmental Authorities are set for pH, electrical conductivity (or TDS) and total suspended solids (or turbidity). Limits for metals and some additional water quality parameters are not on all EAs but have been imposed on more recent examples.
- Due to data constraints, electrical conductivity (which is a measure of salinity) is the most relevant contaminant to this cumulative impact study for the freshwater reach of Fitzroy River Basin. Knowledge and data on other contaminants will improve the understanding of cumulative impacts.
- Three types of electrical conductivity limits are used in the mine EAs:
 - an end-of-pipe limit based on a specified numerical value;
 - an end-of-pipe limit relative to upstream water quality measures (either 100 or 110%), and
 - receiving environment limit based on a specified numerical value.
- Combinations and permutations of these three limit types are used. End-of-pipe limits are not always used.
- End-of-pipe numerical limits linked to receiving water conditions are recommended as the most effective in regulating and managing the cumulative effect of water discharges.
- There was significant variability in the electrical conductivity limits specified in the EAs for both end-of-pipe and receiving waters. On currently operating mines, limits were as high as 4500 μ S/cm for end-of-pipe and 3500 μ S/cm for the receiving environment.
- Understanding and specifying release conditions related to flow of receiving waters is particularly important for these higher EC limits in the EAs. The higher limit values present a potential risk to both local environmental values and broader cumulative impacts during low flow and no flow conditions.
- Many discharges approved in the EAs link the discharge to flows in the receiving waters. However, the minority specified the stream flow (or gauging height) at which the release could occur. Numerous EAs appeared to allow dry weather releases (providing for a potentially higher associated risk of adverse environmental impacts).
- Mine receiving environment monitoring was limited to within mining tenure and was not ideal for assessing cumulative impacts. Monitoring was also generally limited to only times when releases occurred and thereby greatly limited the data relating to background water quality.
- Limits and monitoring of metals was limited to most recent EAs and TEPs and focussed on total metal concentrations. Dissolved metal concentrations would have provided a better gauge of the potential risk that they might pose to aquatic ecosystems. Discharge limits were set consistent with irrigation and stock watering guidelines that are significantly higher than ANZECC/ARMCANZ (2000) toxicant trigger values for aquatic ecosystems.
- Five TEPs were identified for the catchment, all issued in 2008 and all permitted discharge of waste water for extended periods of time, including periods of no natural stream flow.

- In general, data from 2008 (year of flooding in January and February) showed a significantly larger number of mine discharges compared to any other year. Discharges from more than one mine were occurring in numerous sub-catchments at the same time which increases the likelihood for cumulative impacts.
- More downstream data is required to quantify the cumulative impacts from water discharges from mines.
- In the cumulative impact risk assessment of salinity, six mines were identified as having a high or very high risk of cumulative impacts. Five of these were in the two northern Isaac River sub-catchments. In addition, six mines in the northern sub-catchments were identified as a medium risk of cumulative impacts, which adds to the potential for cumulative impacts for this area.
- In comparison in the southern sub-catchments, the majority of mines were rated as low or very low risk of cumulative impact, other than mine 29.
- Of the six mines rated as high or very high risk, only two were associated with a TEP. The discharges for the remaining four occurred under the existing EAs.

5. Recommendations

Recommendations

After considering the findings of this study and following consultation on the draft study with key stakeholders, including Queensland Resources Council; the Technical Working Group; the Queensland Conservation Council and Agforce, the following recommendations are made.

1. **Develop appropriate conditions in environmental authorities for mine water discharges**

The aim of this recommendation is to standardise environmental authority conditions relating to water discharges so that consistent and appropriate conditions exist across the Fitzroy River Basin.

The aim is to work with mining companies to achieve this by convening a small working group comprising DERM and mining company technical specialists that would consider how discharge limits are set, what limits are acceptable and what this should be based on, when discharges may occur and what monitoring should occur. This is to occur by the end of June 2009.

The preferred option for implementing changes is via voluntary agreement with mining companies. If this is not possible, then it may be necessary to implement changes after requiring and reviewing an environmental audit or by changes to the EP Act to allow for the immediate review and amendment of coal mining authority conditions using the issues identified in this study. Changes to environmental authorities are to occur by the end of December 2009.

2. **Develop local water quality guidelines**

The aim of this recommendation is establish a collaborative project that enables the setting of local water quality guidelines. This would include mining companies and other stakeholder groups to identify current data and monitoring occurring throughout the region as well as developing a suitable monitoring program to complement the current information. The project plan for this project is to be developed by June 2009.

3. **Develop a model for assessing cumulative impacts across the region**

The aim of this recommendation is to understand full extent of cumulative impacts of mine water discharges which will be only known once a model is developed to determine the capacity of the catchment in terms of all inputs. This is likely to take at least two years to develop.

6. References

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7. Appendices

7.1 Appendix A

TERMS OF REFERENCE

Background

The dewatering of flooded mine pits at Ensham Coal Mine has resulted in water quality impacts, evidenced by a rise in sodium and salinity levels in the Fitzroy River system which in some places exceed the NHMRC Drinking Water Guidelines for sodium in drinking water.

While it is recognised that the NHMRC Drinking Water Guidelines standard is an aesthetic based value and there is no definitive health based value, readings above this have, and will continue to trigger a public health advisory to people who need to be aware of these levels and take action as appropriate. These are people who are monitoring their salt intake for high blood pressure, cardiovascular disease, chronic kidney failure or any dietary reason and parents of infants less than 6 months of age who are bottle fed.

These water quality impacts are being managed to minimise the effects on town water supplies, downstream river water users and the environment.

The dewatering of flooded mine pits at the Ensham Coal Mine is authorised by a Transitional Environmental Program issued under the *Environmental Protection Act 1994* by the EPA. This is one of a number of Transitional Environmental Programs approved to assist in the recovery of mining operations following the flooding that occurred in the Fitzroy River Basin in January/February 2008.

Mining companies across the Fitzroy River system are permitted to discharge water under the conditions specified in environmental authorities issued under the *Environmental Protection Act 1994* by the EPA. Discharges of water from mines is not the only source of impacts on water quality with stormwater, treated effluent from townships, tail-water discharges from irrigation areas and overland flows all contributing to the quality of water in the river and its contaminant load.

The Rockhampton Regional Council and Central Highlands Regional Council in the second half of 2008 requested the State government to give consideration to undertaking a study of the cumulative impacts on water quality of mining activities in the Fitzroy River system.

Purpose / Scope

The purpose of this study is to investigate current and historical data and report on the overall implications of water discharges from mines on water quality in the Fitzroy River system, and to make recommendations for the management of water discharges from mining activities with respect to water quality. This study focuses only on the impact of water discharges from mines, their quality, and the impact that those discharges may have on the river environment and the quality of water in the Fitzroy River system.

It is recognised that a range of other land uses and management practices may have an impact on water quality. The impact of these is not within the scope of this study.

Key Elements of the Study

The study is to include:

- a brief history of mining development in the Fitzroy River Basin
- a summary of the regulatory framework for management of the quality of water discharges from mining activities (and its evolution over time)

- a summary of existing approaches to minimising water quality impacts of water discharges from mining activities
- an analysis of currently authorised water discharges from mining activities
- a forecast of future mining activities and their potential to impact on water quality
- a review of water quality data, how and where it is collected, by whom and to whom it is reported
- an analysis of trends in water quality and an assessment of impacts
- an analysis of risks associated with changes in water quality
- recommendations for improving water quality data collection, its coordination and management (note this is related to the implementation of Service Delivery and Productivity Commission recommendations)
- recommendations for the future management of water discharges from mining activities

Stakeholders

EPA	NRW	Queensland Health
DPI&F	SunWater	DME
DTRD&I	Regional Councils	Queensland Resources Council
Mining companies	Agforce	Landholders
QFF	Fitzroy Basin Association	

Study Management

The study is to be led by the EPA with a project team made up of staff from the EPA and NRW. The EPA will designate a person from its staff to be the study leader. The study team will be based in Rockhampton. Oversight of the project will be coordinated through a Steering Committee of senior officers from the EPA and NRW.

Consultation will occur with the various stakeholder groups during the life of the study and on the draft study report.

Meetings relating to the management of the study will be held as far as possible by teleconference. Meetings relating to consultation with stakeholders will be held at locations in the Fitzroy River Basin.

It is intended that the study will be based on currently available data and information sets. It is not intended that the study collect new water quality data.

Each party to the study will contribute its own costs with the EPA contributing the cost of publishing the draft and final study report.

7.2 Appendix B

Fitzroy River Water Quality Technical Working Group (TWG)

Table 10 Existing Monitoring Program of Agencies for September 2008 onwards (Draft 4/12/08) for TWG consideration

Agency	Monitoring Site	Parameters Monitored	Frequency	Notes
NRW Stream flow monitoring and Surface Water Ambient Network	130113A Mackenzie River at Rileys Crossing	Flow, Rain, temporary EC logger	Continuous	WQ when serviced (3 x per year) Major Ions, Nutrients, EC, pH
	130105A Mackenzie River at Coolmaringa	Flow, Rain, Temp, EC	Continuous	WQ when serviced (3 x per year)
	130003B Fitzroy River at Riverslea	Flow, Rain	Continuous	WQ when serviced (3 x per year)
	130005A Fitzroy River at Eden Bann Weir	Flow, Rain, Temp, EC	Continuous	WQ when serviced (3 x per year)
NRW Great Barrier Reef flood monitoring	The Barrage	Manual Sample	Wet season	Equipment – None Required Service Agreement – Bob Packett to coordinate
	130005A The Gap	Manual and Turbidity probe		Equipment – Turbidity probes installed
	130322A Dawson River	Manual and Turbidity probe		Equipment – Turbidity probes installed Service Agreement – Bob Packett to Sample
	130105A Mackenzie River Lower	Manual and Turbidity probe		Equipment – Turbidity probes installed
	130401A Issacs River	Manual and Turbidity probe		Equipment – Turbidity probes installed
	130404A Connors River	Manual and Turbidity probe		Equipment – Turbidity probes installed
	130504B Comet River	Manual		Service Agreement – Emerald NRW to sample
	130201B Nogoia River @ Emerald	Manual		Service Agreement – Emerald NRW to sample

Agency	Monitoring Site	Parameters Monitored	Frequency	Notes
DPI&F	Tartrus Weir Bedford Weir (between wall and upstream sites) Emerald Town Weir (for comparison / control)	Fork-tailed Catfish (Arius graeffei) Pathology, Bacteriological, Toxological	22, 23 & 24 September	Once off – preliminary at this stage – depending on results could continue. Results due: Path/Bact – Oct, Tox – Nov
NRW EFAP	Nogoa @ Glenlees Nogoa @ Emerald Nogoa @ Bridge Flat Rd Mackenzie @ Rileys Crossing Mackenzie River @Jellinbah Mackenzie @ Honeycomb Mackenzie River @ Duaringa/Apis Rd Comet @ Comet Weir	Fish larvae and egg sampling	Event Monitoring	Dependent on flow conditions for environmental flow monitoring
Ensham Mine (subject to amended TEP)	Upstream and immediately downstream of mine lease	As per condition 12 of June (amended) TEP	Weekly	Dependent on amended TEP conditions
	Bedford, Bingegang, Tartrus and Eden Ban Weirs, Fitzroy Barrage and other water bodies depending on outcome of new TEP (Sept 2008)	As per condition 12 of June (amended) TEP Boat – mid stream, phys at 2m depth intervals, chem at surface and 2m from bottom, for EC, pH, Ions, Metals, Nutrients, others	Weekly	Dependent on amended TEP conditions
	Storage Pit A	As per TEP conditions	Monthly	Dependent on amended TEP conditions
Stanwell	Riverslea Crossing	EC, Turbidity, most ions	Weekly	Has been at weekly interval for last few months, about to stop due to planned EPA monitoring at this site
	Intake water	EC, Turbidity, most ions (?)	Weekly	

Agency	Monitoring Site	Parameters Monitored	Frequency	Notes
EPA	Enhanced EPA monitoring program (10 sites) Comet, Bedford(3), Bingegang(3), Tartrus(3), Moura and Eden Bann(3) Weir's, also - Duck Ponds, Riley's crossing, May Downs crossing (Isaac River) the Fitzroy River Barrage(3)	Water column physiochemical parameters and dissolved metals at multiple sites in weirs, Barrage Total organic carbon and metals in sediments Invertebrates, fish, turtles	Water Quality – every 2 weeks Sediments and biological quarterly	First monitoring trip completed from 28th to 31st Oct 2008 next planned field trip 17th November
	Fitzroy Estuary (6 sites - mouth to Barrage)	Water column physiochemical parameters as per historical ambient program plus 3 metals sampling sites	Fortnightly	Sampled on 30th Oct 2008 next planned field trip 17th November
SunWater	Rileys Crossing	Date & time, depth, temperature, dissolved oxygen (mg/L), pH, electrical conductivity, turbidity, total nitrogen, total phosphorous, sulphides (tailwater only)	Quarterly	Monitoring has been at an increased frequency during recent months due to current water quality issues in the Mackenzie and Fitzroy Rivers
	Bedford Weir	Date & time, depth, temperature, dissolved oxygen (mg/L), pH, electrical conductivity, turbidity, total nitrogen, total phosphorous, sulphides (tailwater only) Cyanobacteria (Blue-green algae) species identification and counts (in storage only)	Quarterly	Headwater (in-storage site), Tailwater site
	Bingegang Weir	As per Bedford	Quarterly	Headwater (in-storage site), Tailwater site

Agency	Monitoring Site	Parameters Monitored	Frequency	Notes
	Tartrus Weir	As per Bedford	Monthly (Oct-May plus July)	Inflow site, Headwater (in-storage site), Tailwater site
	Eden Bann Weir	As per Bedford	Monthly (Oct-May plus July)	Inflow site, Headwater (in-storage site), Tailwater site
Fitzroy River Water	Treated water	EC	Continuous	Ongoing
	Treated water	Potable water monitoring – standard required phys / chem. Parameters	3 Monthly	From September onwards potable water monitored monthly
	Wattlebank Weir	Surface (20-30cm) sample for TN, TP, DO, pH, Temp, EC, Turbidity	Monthly	As part of ROP obligations
	Glenmore WTP intake	Profile (at 1m intervals or smaller) from Surface to bottom, Sample for TN, TP, DO, pH, Temp, EC, Turbidity	Monthly	As part of ROP obligations
	Barrage Outflow	Surface (20-30cm) sample for TN, TP, DO, pH, Temp, EC, Sulphide, Turbidity	Monthly	As part of ROP obligations
Central Highlands Regional Council	Multiple sites – Emerald, Tieri, Blackwater, Duaringa (others?). Town water plus (appears) ad hoc additional monitoring for current water quality issues	Potable water monitoring – standard required phys / chem. Parameters. Plus – ad hoc monitoring for EC, pH, Ions, Metals, Pesticides, PAH's	3 Monthly (?)	Recent additional monitoring weekly (?), future (?)
Fitzroy Basin Association	Bridge Flats Nogoa Comet River @ Capricorn Highway Bedford Weir Bingegang Weir Tartrus Weir Isaac River at Railway (winchester downs) Bee Creek/ Harry Brandt Junction Isaac River on	Major anions + cations, total metals, TSS, TDS, total alkalinity, EC, pH	Late September to Follow up a number of these sites late November	These sites have all been looked at as part of our dewatering investigation

Agency	Monitoring Site	Parameters Monitored	Frequency	Notes
	Wylinga Connors River at twin bridges - Lotus Creek Isaac River at May Downs Crossing Mackenzie Crosssing & Apis Creek Road Dawson River before junction Mac Riverslea Crossing Glenroy Crossing Mornish Bee Creek in Dipperu NP Bee Creek overflow Lagoon in Dipperu NP Bee Creek at Mt Flora			
FBA PNC water quality monitoring	Around 20 sites across the Fitzroy Basin See FBA website for details on sites	Event monitoring looking at TSS, EC, pH, TN, TP	Samples collected by landholders during flood events	

Enquiries
Telephone
Your reference
Our reference


Water Quality Data
Cumulative Impact Study

6 November 2008

<Site Senior Executive>
<Name of Coal Mine>
<PO Box>
<City, State, Post Code>

Dear <Title>

Water Quality Monitoring Results for Mine Water Discharges during past 5 years

On 16 October 2008, Minister for Sustainability, Climate Change and Innovation the Hon. Andrew McNamara, announced that the Environmental Protection Agency (EPA) will lead an independent study into the cumulative impact of mining on the health of the Fitzroy River.

To properly complete this study an analysis of currently authorised mine water discharges is required. To facilitate the analysis of relevant water quality data the EPA requests that you submit electronic documentation (Excel spreadsheets for water quality results. No PDF documents) outlining all mine water discharges over the past 5 years. The submitted documentation should include:

- All raw water quality and flow data (e.g. ML/day or m³/s) in an Excel spreadsheet collected on discharges to the environment including dates, times, monitoring point site ID codes. This should include at least all discharge monitoring points and indicators specified in your environmental authority;
- All raw water quality and flow data (e.g. ML/day or m³/s) in an Excel spreadsheet collected for the receiving environment including dates, times, monitoring point site ID codes. This should include at least all upstream and downstream locations specified in environmental authorities or approved monitoring programs;
- A map showing the mine location, discharge location/s, monitoring locations and name of receiving environment (creek or river);
- Coordinates of discharge and monitoring locations (Lats and Longs in GDA 94);
- The circumstances under which any discharge occurred (e.g. flow or no flow conditions); and
- Any other relevant information to describe the conditions and circumstances of the discharge or the receiving environment that has not been specifically requested above (e.g. a comparison of water quality and Licence limits).

I request that this information be submitted via email to [REDACTED] of the EPA at [REDACTED] [@epa.qld.gov.au](mailto:[REDACTED]@epa.qld.gov.au) by no later than **Wednesday 19 November 2008**.

Should you require any further clarification about the nature of the water quality information required please contact Dr [REDACTED] of the EPA on telephone [REDACTED]
[REDACTED]

Yours sincerely

Terry Wall
Director-General

Cc: [REDACTED] **Regional Manager, Rockhampton**
[REDACTED] **Regional Manager, Whitsunday/Coalfields**

m/08/03528



Office of the Premier

RECEIVED
20 OCT 2008
MINISTERIAL OFFICE

For reply please quote: ERP/JC - TF/08/12196 - DOC/08/32222

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PO Box 15185 City East
Queensland 4002 Australia
Telephone +61 7 3224 4500
Facsimile +61 7 3221 3631
Email ThePremier@premier.qld.gov.au
Website www.thepremier.qld.gov.au

Mr [REDACTED]
President
Queensland Resources Council
Level 13, 133 Mary Street
BRISBANE QLD 4000

Dear Mr [REDACTED]

Thank you for your letter of 26 September 2008 regarding the need for a balanced approach to dealing with the impacts of a range of activities on the quality of water in the Nogoia, Mackenzie and Fitzroy Rivers.

Ensham Resources Pty Ltd is to be commended on the approach taken by the Ensham Coal Mine to support the Central Highland community through the difficult task of recovering from the flooding that occurred in the first two months of this year.

Additionally, Ensham Resources Pty Ltd's decision to cease dewatering of the mine and manage the substantial remaining volume of water on the mine site was an appropriate response to growing community concern about the potential for this activity to have wider impacts in the community.

I acknowledge that there is a range of activities that result in cumulative impacts on water quality in catchments. Key longer term measures for addressing these impacts include the Great Barrier Reef initiatives such as the Reef Water Quality Protection Plan and investment with the Australian Government in the Caring for Our Country program and Queensland's complementary natural resource management programs.

B/C The Honourable the Minister for Natural Resources and Water and Minister Assisting the Premier in North Queensland.

**By direction. For your information.
Copy of inwards correspondence is attached.**

[REDACTED]
Senior Policy Advisor

CTS 10837/08

Min Office comments
<input type="checkbox"/> ACK
<input type="checkbox"/> To Dept for
<input type="checkbox"/> MIN REPLY
<input type="checkbox"/> SPA
<input type="checkbox"/> SPA/WATER
<input type="checkbox"/> BRIEF
<input type="checkbox"/> INFORMATION
<input type="checkbox"/> ACTION

New investment opportunities are imminent, and the Fitzroy Basin Association is well placed to be involved in leading the process of developing our understanding and management of these cumulative impacts on the health of our river systems. I see the development and implementation of landscape scale responses that lead to the improvement of water quality in our rivers as the primary approach for dealing with cumulative impacts from a broader natural resource management perspective.

However, the collective issue of mine water quality discharge arrangements demands immediate attention, given the increasing community concern and the real impacts currently being experienced by some towns. In particular, the interaction of current Transitional Environmental Programs and Environmental Authorities issued to mines needs to be considered in the aggregate. This is why I have requested that relevant Ministers direct their departments to undertake a specific study 'Review of Water Quality Arrangements for Mines Discharging Water into the Fitzroy River System'. I have attached the terms of reference for this study.

The Environmental Protection Agency, as the regulator of water discharges from mining activities, will lead the study with support from the Department of Natural Resources and Water (DNRW). The draft report for review is to be prepared by the end of this year. The Queensland Resources Council is recognised as a key stakeholder and will be included in consultation on the draft report.

I am advised that the DNRW is responding directly to you on specific matters relating to implementation of the Fitzroy Resource Operations Plan.

Thank you for bringing these matters to my attention and I wish you well in your upcoming retirement. Should you have any questions regarding the study of water discharges from mining activities, please do not hesitate to contact Mr Terry Wall, Director-General, Environmental Protection Agency, on telephone

[REDACTED]

Yours sincerely

ANNA BLIGH MP
PREMIER OF QUEENSLAND

*Encl.

Attachment: A Review of Water Quality Arrangements for Mines Discharging Water into the Fitzroy River System

Terms of Reference

Background

The dewatering of flooded mine pits at Ensham Coal Mine has resulted in water quality impacts, evidenced by a rise in sodium and salinity levels in the Fitzroy River system which in some places exceed the NHMRC Drinking Water Guidelines for sodium in drinking water.

While it is recognised that the NHMRC Drinking Water Guidelines standard is an aesthetic based value and there is no definitive health based value, readings above this have, and will continue to trigger a public health advisory to people who need to be aware of these levels and take action as appropriate. These are people who are monitoring their salt intake for high blood pressure, cardiovascular disease, chronic kidney failure or any dietary reason and parents of infants less than 6 months of age who are bottle fed.

These water quality impacts are being managed to minimise the effects on town water supplies, downstream river water users and the environment.

The dewatering of flooded mine pits at the Ensham Coal Mine is authorised by a Transitional Environmental Program issued under the Environmental Protection Act 1994 by the EPA. This is one of a number of Transitional Environmental Programs approved to assist in the recovery of mining operations following the flooding that occurred in the Fitzroy River Basin in January/February 2008.

Mining companies across the Fitzroy River system are permitted to discharge water under the conditions specified in environmental authorities issued under the Environmental Protection Act 1994 by the EPA. Discharges of water from mines is not the only source of impacts on water quality with stormwater, treated effluent from townships, tail-water discharges from irrigation areas and overland flows all contributing to the quality of water in the river and its contaminant load.

The Rockhampton Regional Council and Central Highlands Regional Council in the second half of 2008 requested the State government to give consideration to undertaking a study of the cumulative impacts on water quality of mining activities in the Fitzroy River system.

Purpose / Scope

The purpose of this study is to investigate current and historical data and report on the overall implications of water discharges from mines on water quality in the Fitzroy River system, and to make recommendations for the management of water discharges from mining activities with respect to water quality. This study focuses only on the impact of water discharges from mines, their quality, and the impact that those discharges may have on the river environment and the quality of water in the Fitzroy River system.

It is recognised that a range of other land uses and management practices may have an impact on water quality. The impact of these is not within the scope of this study.

Key Elements of the Study

The study is to include:

- a brief history of mining development in the Fitzroy River Basin
- a summary of the regulatory framework for management of the quality of water discharges from mining activities (and its evolution over time)
- a summary of existing approaches to minimising water quality impacts of water discharges from mining activities
- an analysis of currently authorised water discharges from mining activities
- a forecast of future mining activities and their potential to impact on water quality
- a review of water quality data, how and where it is collected, by whom and to whom it is reported
- an analysis of trends in water quality and an assessment of impacts
- an analysis of risks associated with changes in water quality
- recommendations for improving water quality data collection, its coordination and management (Note this is related to the implementation of Service Delivery and Productivity Commission recommendations)
- recommendations for the future management of water discharges from mining activities

Stakeholders

EPA	NRW	Queensland Health
DPI&F	SunWater	DME
DTRD&I	Regional Councils	Queensland Resources Council
Mining companies	Agforce	Landholders
QFF	Fitzroy Basin Association	

Study Management

The study is to be led by the EPA with a project team made up of staff from the EPA and NRW. The EPA will designate a person from its staff to be the study leader. The study team will be based in Rockhampton. Oversight of the project will be coordinated through a Steering Committee of senior officers from the EPA and NRW.

Consultation will occur with the various stakeholder groups during the life of the study and on the draft study report.

Meetings relating to the management of the study will be held as far as possible by teleconference. Meetings relating to consultation with stakeholders will be held at locations in the Fitzroy River Basin.

It is intended that the study will be based on currently available data and information sets. It is not intended that the study collect new water quality data.

Each party to the study will contribute its own costs with the EPA contributing the cost of publishing the draft and final study report.

E-MAILED
28 September 2008

26 September 2008

The Hon Anna Bligh MP
Premier of Queensland
Executive Building
George Street
Brisbane Qld 4000

Dear Premier

Nogoa~Mackenzie~Fitzroy River Systems – The Need for a Balanced Approach

While the Central Highlands region continues its efforts at recovery following the unprecedented and devastating floods in January 2008, the Mayor of Rockhampton Regional Council Cr Brad Carter has drawn my attention to a letter he has written to you on 15 September 2008 expressing his Council's concerns over EPA monitoring of non-routine post-flood discharges into the Fitzroy River, and concerns about cumulative impacts of upstream discharges into the Nogoa~Mackenzie~Fitzroy River system that his letter rather presumptuously attributes to '*mining operations*'.

The letter from Mayor Carter appears to have caused a number of State agencies to focus their studies and reviews in relation to this vitally important river system exclusively on '*cumulative impacts of mining*' in a manner which is proscriptive of the uses and impacts imposed by other activities. The letter, *inter alia*, asks State agencies to exclude for example the impacts of the activities involved in irrigated and non-irrigated agricultural cropping, the raising of beef cattle and other livestock, the processing of related agricultural products, the effects of other industrial activity, as well as the presence of residential communities and their infrastructure.

The scale of this huge river system is best absorbed visually from the attached maps which depict the system and its major tributaries including the Theresa, Retreat, Nogoa and downstream from Ensham, the Sandhurst, Comet, Cooroora, Blackwater, Roper, Connors-Isaacs, Charlevue and Dawson sub-systems as well as the plethora of lesser streams and tributaries. The wide variety of human activity can be seen and imagined by reference to the maps. By way of scale, it is more than 500 kms by river from Ensham Mine to Rockhampton.

The proscription of other activities and the restrictive focus on '*cumulative mining impacts*' in isolation is inappropriate and unhelpful. Such incompleteness carries great dangers of producing misleading results. This concern has been communicated to the State agencies.

The Queensland Resources Council recommends that the reviews under discussion between State agencies and Regional Councils should not be proscriptive and that scoping of such work requires a more objective and comprehensive approach to enable a good understanding of post-flood impacts. QRC officers are available to collaborate with agencies on the scoping task.

A similar view favouring a more comprehensive approach also has been publicly expressed by the Fitzroy Basin Association.

Direct conversations between QRC President (and Ensham CEO) John Pegler and Mayor Peter Maguire (Central Highlands Regional Council) and Mayor Brad Carter (Rockhampton Regional Council) reveal that a proscriptive approach which focussed only on 'cumulative mining impacts' was not the intention of their requests. Both Mayors acknowledged the presence of a wide variety of activities of many sectors and their potential for impacts on this very large, vital river system.

As you know, there has been a very extensive dialogue between QRC Member, Ensham Resources Pty Ltd ("Ensham"), and Queensland Government agencies related to the Ensham Flood Recovery Project in which Ensham has been engaged continuously throughout 2008. The aim of the Ensham Project is to recover the Ensham Mine, safely and sustainably, following the devastation which accompanied the unprecedented flooding which occurred in January 2008. QRC notes that Ensham has been very appreciative of the professional and careful approach taken by the State agencies and Regional Councils in dealing with the many regulatory issues.

The flood event and its impacts on Ensham and others in the region were publicly documented in a presentation given by Ensham at a public forum organised by the Fitzroy Basin Association (FBA) in Rockhampton on 5 ~ 7 August 2008. This Forum was well attended by officers from all relevant State Government agencies as well as from Rockhampton Regional Council and Central Highlands Regional Council together with various groups representing agricultural and environmental interests, along with members of the public.

For convenience, the Ensham presentation is attached.

Other presentations and papers are available from FBA. For example, a number papers at the FBA Forum dealt with other non-mining impacts, such as the cumulative impacts of herbicides including Atrazine, Simazine, Diuron and Tebuthiuron as used in the agricultural sector. The toxic effect of such materials on plant, fish and animal life in and around the river system following the completely uncontrolled releases from agricultural holdings after flooding obviously is deserving of continuing attention. Such study is especially warranted given the recent publicly expressed concerns about the health of fish and mangroves and other aquatic life in the river system. If improperly used or unwittingly released, some of these herbicidal materials are also thought to have carcinogenic effects on human health and animal health. They are deserving of great care and control.

Meanwhile QRC advises that Ensham confirmed that it voluntarily suspended its pumping program on Tuesday 8 September 2008 and also subsequently confirmed that it had volunteered not to re-commence the program. It will absorb the imposts and complications of holding 12,000 to 14,000 megalitres of the remaining flood water at the Ensham Mine. Prior to this cessation, Ensham also purchased and used ~64,000 megalitres of water from local Nogoa-Mackenzie allocation holders at a cost of ~\$10 million, inclusive of SunWater charges of ~\$2 million. The purchases were made to ensure that Ensham met the EPA specifications concerning discharge water quality. The direct financial contribution to the region arising from these payments as well as the indirect impost paid to the State Government via SunWater by Ensham as a flood victim, is obvious.

QRC also reports that Ensham has also continued its voluntary proactive approach by providing assistance with engineering and actual works to assist the Central Highlands Regional Council with improvements to water supplies to regional towns. These initiatives were reported to Hon Paul Lucas MP, Acting Premier, during his visit to Emerald on Wednesday 24 September 2008. At the same time, QRC understands that Central Highlands Regional Council, supported by Ensham, has asked the State Government through the Department of Natural Resources and Water, to review how allocations or loss off-sets from Fairbairn Dam can be used to provide new water into the weirs supplying towns in the CHRC region.

Yours sincerely


President
Queensland Resources Council

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ABN 59 050 486 952

Queensland 4000

e info@qrc.org.au

www.qrc.org.au

Copies to:

The Honourable Paul Lucas MP
Acting Premier
Deputy Premier and Minister for Infrastructure and Planning

The Honourable Geoff Wilson MP
Minister for Mines and Energy

The Honourable Craig Wallace MP
Minister for Natural Resources and Water
and Minister assisting the Premier in North Queensland

The Honourable Andrew McNamara MP
Minister for Sustainability, Climate Change and Innovation

The Honourable Tim Mulherin MP
Minister for Primary Industries and Fisheries

The Honourable Stephen Robertson MP
Minister for Health

The Honourable Desley Boyle MP
Minister for Tourism, Regional Development and Industry

The Honourable Andrew Fraser MP
Treasurer

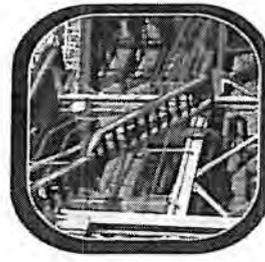
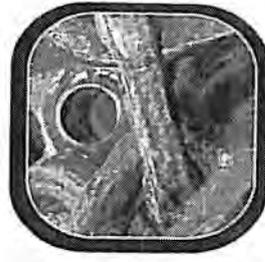
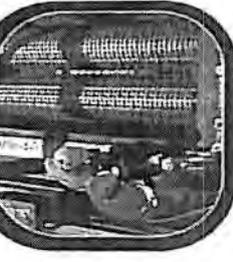


Ensham

R E S O U R C E S



A
COALZED
FUND COMPANY



A COLLABORATIVE APPROACH TO RECOVERY FROM AN UNPRECEDENTED NATURAL EVENT

Presentation to

Fitzroy Flood Forum

of the

Fitzroy Basin Association

Rockhampton - Queensland

6 August 2008

出光

POWER





Ensham supports Council improvements at Blackwater

23 September 2008 – Ensham Resources is supporting Council improvements to the Blackwater treatment plant which aim to quickly alleviate water quality concerns at Blackwater, Tieri and Bluff.

Discussions also continued last Friday with State Government with the aim of utilising water from Fairbairn Dam as the “top up” water for Bedford Weir to underwrite the improvements.

Over the weekend, crews organised by Ensham at the behest of Central Highlands Regional Council, installed a ‘bypass’ pump and pipeline around the large council holding dam at Blackwater to speed up the flow of better quality water through the system.

According to Council this should result in a rapid improvement in water quality for local residents. The arrangement will also provide the opportunity to clean out years of accumulated silt and backwashing from the large holding dam at Blackwater so that the dam does not continue to degrade the taste of the improved water supplied from Bedford Weir.

Ensham General Manager, Technical, Colin Moffatt said Ensham had completed installation of the temporary bypass pump and 500 metres of 300mm diameter pipeline, ready for commissioning by Council last Monday.

Council and Ensham's engineers have confirmed that there are opportunities and budgets to instal improved monitoring equipment to better control water quality in the aged Blackwater treatment plant.

Following the successful ‘bypass operation’ around the Council owned and operated Holding Dam supplying the Blackwater water treatment plant, Ensham will continue to aid Council in identifying ways and means to improve the system.

“The State Government is reviewing how allocations from Fairbairn Dam can be used to provide new water into the Bedford Weir. Ensham has already purchased 64,000 megalitres of water allocations as part of its program”, Mr Moffatt said.

ENDS



FBA calls for long-term monitoring of Fitzroy

LEADING Central Queensland natural resource management group, the Fitzroy Basin Association Inc (FBA), says long-term monitoring is required to measure and improve the health of the Fitzroy River.

FBA chief executive officer Suzie Christensen said while the organisation was concerned about the health of the river, recent claims by a University of Queensland professor seemed to be based on a cursory examination, rather than actual local data.

Q: Is the Fitzroy River dying?

A: Information presented recently in the media on mangrove die-back and fish health in the river was vague and there could be many potential causes.

"The mangrove die-back could have been caused by flood inundation, sediment, the impact of freshwater, and a reduced ability to photosynthesise. It is unlikely you would see such a severe result from chemicals unless there was a massive injection of undiluted pollutant

and there is no evidence of that," she said.

"In addition:

- Fisherman reported very large catches directly after the flooding in January and February '08

- There is no real indication of whether fish numbers have suddenly dropped

- Extended low water temperatures this winter may have affected fish

- Fish naturally move through estuaries and out to sea as a result of flooding

- Flooding aids fish breeding and numbers are expected to boom in coming years.

"The Fitzroy is a large and complex river system, and experiences periodic big flows rather than regular smaller floods. We haven't seen a flow of this size for 17 years, and the causes of the short-term ecological impacts require a sound scientific basis for action."

Q: What work is underway to improve the Fitzroy?

A: Lots of good research and on-ground work is being done to improve catchment health, our knowledge

and our ability to manage our precious river resource.

"FBA recognises the need to improve the health of the Fitzroy and had been working with the community for more than 10 years to enhance the management of creeks and rivers," she said.

"We work directly with local landholders to improve land management to reduce erosion and run-off into waterways, and also to collect water-quality data. Evidence exists that we have had a positive impact.

"We support the development of a long-term monitoring plan and local water quality guidelines to get a clearer picture of river health. Specific investigations into the impacts of recent events are required and already under way.

"FBA also organised a large community forum in August this year to discuss the impact of recent flooding on our region, where issues including water quality, the impact of mining, mangrove health and fish stocks were discussed."

Q: What else can be

done?

A: More information and support is needed

"Central Queensland said a collaborative approach was needed to fully understand and protect our region's important natural resources.

"Our region has undergone strong agricultural development and more recently the mining and heavy industry boom, which has seen lots of development over a short time period," she said.

"We need to be mindful of the collective impact these activities can have over time and not jump to unjustified conclusions."

She said it was also important that there was recognition of the region's role as the engine room of the Queensland economy and support for efforts to manage resources sustainably.

"CQ is the economic powerhouse of the state and FBA calls on the Queensland government to return some of that revenue to the area to ensure we can effectively manage the impacts of development."

Fitzroy Model Water Conditions Review

TERMS OF REFERENCE

1.0 Abbreviations Used

Department of Environment and Resource Management	DERM
Electrical Conductivity	EC
Environmental Authority	EA
Environment and Natural Resource Regulation	ENRR
Environment and Resource Sciences	ERS
Fitzroy Water Quality Advisory Group	FWQAG
Queensland Resources Council	QRC
Receiving Environment Monitoring Program	REMP
Regional Service Delivery	RSD
Transitional Environmental Program	TEP
Water Management Plan	WMP

2.0 Background

DERM proactively works with mining companies to improve the management of water on mine sites and reduce the risk of contaminated discharges. The improvements have focussed on areas such as:

- improvements to on-site storages to better handle large rainfall events
- diversion of clean water around sites so as to prevent mixing with contaminants
- management of water so that any release is of the best quality water and occurs during periods of high flow in the receiving waters
- contingency and response plans to account for various scenarios and provide clear, staged actions for the mining company in the event of above average rainfall
- emergency response plans which detail how the site will respond in the event of a contamination incident.

It is recognised that due to the nature of mining and the unpredictability of the wet seasons it is impossible to eliminate the risks of discharges from mine sites. To effectively manage environmental impacts of mine water releases it is necessary to control and limit discharges in a manner that considers both local and cumulative effects of mine releases on relevant environmental values of downstream receiving waters (ref Environmental Protection (Water) Policy 2009).

In 2009 DERM worked closely with coal mines and QRC to introduce the new water discharge management and monitoring requirements in the Fitzroy Basin. The new Fitzroy Water Model Conditions set limits for the quality of water discharged, including salinity levels, and restrict the volume of water discharged to a percentage of the flow in the receiving waters.

DERM has also prepared a draft report on environmental values and water quality objectives for Fitzroy sub-catchments, including locally specific water quality guidelines

based on DERM reference monitoring. The draft report was publicly released for consultation in December 2010.

Recent wet season events have highlighted the importance of the model conditions in managing mine discharges. Monitoring data collected during the last two years provides an opportunity to review the model conditions and ensure that the conditions are suitable in relation to the key objective of maximising the ability of mines to discharge water while ensuring the protection of the environment and downstream water users.

DERM is therefore undertaking a review of the methodologies and specifications relating to the objectives of the model conditions in conjunction with the mining sector.

3.0 Objective

The objective of the review is to:

- evaluate the methodologies and conditions relating to the objectives of the conditions
- evaluate the conditions in light of recent wet seasons and collected data
- ensure the conditions are outcome based
- avoid repeated and ongoing use of TEPs as a method of authorising discharges.

4.0 Key Considerations

In particular the review will focus on:

- In the context of the ability to achieve water quality objectives and avoid detrimental impacts on environmental values of receiving waters, a comparative study of:
 - old EAs and new (2009) EA lower end of pipe limits and their justification; and
 - EAs vs recent TEPs
- High and low flow discharge conditions/emergency releases to avoid future TEPs
- Defining 'mine affected water'
- Passive (ie. spillway) and active discharges and the requirement to notify
- Linkages with WMPs
- Populating the right parameters and limits for releases based on the latest data and information (including release point and environment monitoring undertaken by mines, reference monitoring undertaken by DERM and relevant environmental values, water quality objectives and guidelines.)
- Monitoring and reporting requirements
- Use of gullies/depressions/diversion drains as a conduit on site for mine affected water
- Notification requirements
- Evaluating receiving water flow rate specifically in relation to dilution ratios and location of flow gauges.

The review will involve examination of the monitoring data for the last two years from mines in the Fitzroy Basin. The data is required to evaluate the performance of the existing model conditions in achieving key environmental objectives and will consequently form the basis of any proposed or considered changes to the key water quality parameters in the Fitzroy Model Water Conditions. The data includes:

- Site and monitoring location information

- All discharge water quality and quantity/flow data from these sites for the last two years (EA and TEPs)
- All environmental water quality data for the last two years (EA, TEP and REMP)
- All creek flow data from gauging stations for the last two years (EA, TEP and REMP)
- Site representative contact details
- Spatial coordinates.

The collated data will be used in the scientific process of reviewing the model conditions. With sufficient high quality data readily available in excel format, the review of the model conditions may include an assessment of the “triggers” table, that is, to ascertain whether certain indicators may not be needed in future routine monitoring. A review of EC will also be undertaken.

A formal request for the data was sent to QRC by DERM on 30 March 2011. QRC is collating this information for provision to DERM by 5 May 2011. QRC’s assistance in gathering this information is appreciated and will be critical to the success of the review.

A report will not be produced at the completion of the review. Any outcomes from the review will be reflected in an update to the model conditions, as necessary.

5.0 Methodology

The review methodology will comprise DERM internal and DERM/QRC workshops and consultation with relevant Mayors and the FWQAG. Details for timing of these activities are as follows:

- The first DERM internal workshop is to be held on 9/10 May in Brisbane (confirmed date) and will concentrate on licensing conditions. Workshop participants are to include nominees from RSD, ENRR and ERS.
- A working draft document of the model conditions from the first DERM internal workshop is to be developed and circulated to QRC for review one week (23 May) prior to the first DERM/QRC workshop (31 May).
- The first DERM/QRC workshop is to be held on 31 May in Brisbane (date to be confirmed with QRC) and will discuss the working draft of the model conditions.
- The second DERM internal workshop is to be held on 8/9 June in Brisbane (confirmed date) and will concentrate on parameters, limits, flow triggers and dilution rates based on a review of available monitoring data and guidelines. Dr Ian Ramsay, Chief Scientist and his team will develop and present potential licensing approaches for review by workshop participants. Technical officers only are required to attend this workshop - other nominees are optional.
- The working draft of the model conditions from the second internal DERM meeting to be circulated to QRC for review one week (20 June) prior to the second QRC workshop (week commencing 27 June).
- The second DERM/QRC workshop is to be held in the week commencing 27 June (tentative date) and will focus on the science data in the working draft of the model conditions. Relevant expertise and company technical staff will be invited to attend.
- The working draft of the model conditions from these workshops is to be circulated to the FWQAG for comment (30 June) one week prior to the FWQAG meeting set for

7 July. Andrew Brier to attend the FWQAG in July to finalise the working draft of the model conditions with FWQAG.

- Relevant Mayors are to be briefed at the same time as the FWQAG (via email).
- Final comments/amendments on the working draft of the model conditions to be finalised with appropriate Industry representatives (via email) by 22 July.
- Final model conditions to be circulated by 31 July.
- The first DERM internal and DERM/QRC workshops will be set dates and will not change. The workshops are not the only opportunity for interaction/consultation and additional meetings and correspondence will be organised as required. Any further clarification or amendments required to be undertaken to the draft working documents will be done out of session via email.
- The second DERM internal and DERM/QRC workshops are tentative and may be subject to change dependant on nominee availability and development of adequate working drafts of the model conditions.

6.0 Management Arrangements

The review will be managed by the General Manager, Coal and CSG Operations, RSD. The General Manager will be supported in conducting the review by staff from:

- RSD, Environmental Services, Central West Region, DERM
- ENRR, DERM
- ERS, DERM

The panel will draw on expert advice as required.

7.0 Approach

The review will consult internally, across government and with non-government agencies, relevant industry representatives and key stakeholders.

The review will incorporate the following key stakeholders:

- Appropriate Industry representatives
- QRC
- FWQAG, whose membership includes:
 - AgForce
 - Banana Regional Council
 - Capricorn Conservation Council
 - Central Highlands Regional Council
 - Central Queensland University
 - Department of Employment, Economic Development and Innovation
 - Fitzroy Basin Association
 - Fitzroy Basin Elders Committee
 - Fitzroy Food and Fibre
 - Fitzroy River Fish Stocking Association
 - Isaac Regional Council
 - Queensland Conservation Council
 - Queensland Health
 - Rockhampton Regional Council/Fitzroy River Water
 - Stanwell Corporate Limited

- SunWater

8.0 Timing

The review is to commence in May 2011 and be completed by 31 July 2011 in order to enable time for processing of EA amendments prior to the 2011/12 wet season.

Prepared by: General Manager, Coal & CSG Operations, Regional Service Delivery, DERM
Date: 11 May 2011
Version: 1.2

Attachment 3.

FMWCR - DERM Responses to Industry Comments received

Industry Comment	DERM Response
22 July 2011	
<p>While we are pleased that DERM has included an explanatory note that ‘alternative approaches’ can be proposed, but on the face of it this appears just to relate to site-specific conditions to deal with normal weather. At our meeting on 29 June, item 3 was specifically about ‘model conditions and extraordinary events’. When DERM agreed to insert an explanatory note about the ability to consider site-specific cases, obviously in the context of the agenda item no-one understood this as just being generally about the ability to negotiate different conditions from the model conditions, but rather, we were talking specifically about planning upfront for extraordinary events. Dr Ian Ramsay agreed that there had been learnings from the last wet season which could be applied to site-specific negotiations for conditions to deal with extraordinary events, so as to avoid the need for TEPs. Industry said that there could be an explanatory note that, if specified weather or flooding thresholds were reached, this would trigger a schedule of overriding conditions (obviously based on what was previously negotiated site-by-site for TEPs). This would not cater to all types of possible future events (which would be impossible, as none of us has a crystal ball), but it would at least prevent a repetition of the TEPs process if the next wet season is fairly similar to the last one. Conditions would have the advantage of kicking in straight away, enabling prompt and suitably staged releases, rather than diverting government and industry resources unnecessarily, during the</p>	<p>DERM agrees with the value in forward preparation, emergency and contingency planning, however is not convinced that the model conditions can cater for unknown emergency circumstances. This is not due to inability to predict events of certain magnitudes, but more to do with the ability to predict how a large number of variables may interact following an unknown extraordinary event, e.g. how many mines are impacted, what about influences from other affected land uses, natural effects such as saline groundwater discharge etc.</p> <p>In the event that a mining company supplied information including detailed contingency planning exercises to support an emergency discharge scenario, including evaluating the effect on local / regional environmental values then DERM would consider any alternative condition proposed on a case by case basis.</p> <p>One of the difficulties in pre-solving water management problems associated with extraordinary events, is the need to consider cumulative impacts associated with an authorised discharge. If reasoning starts from the basis of protecting environmental values (including human use values such as drinking water supplies), then a broad approach to extraordinary events is likely to result in a conservative approach that assumes each mine has similar emergency needs when considering cumulative impacts.</p>

<p>height of an emergency, to negotiating paperwork.</p>	<p>Contingency planning information may be of great benefit to a mining company in making preparations for future extraordinary events. Being prepared ahead of time with an emergency response proposal supported by quality information about associated risks to environmental values, and even seeking advanced comment from DERM on likely needs for consideration during a similar wet season event, will prepare both industry and DERM for future extraordinary events.</p>
<p>The authorisation of releases under condition W41 is a little more narrow than we had in mind for the water management plan and ESMP, because it is restricted to ‘stormwater’. The types of clean water which are released from a mining lease, but which do not pass through unrehabilitated disturbed areas are obviously not just restricted to stormwater, unless we take an extremely broad definition of ‘stormwater’, including groundwater emerging into springs etc. An example we gave at the November workshop was a watercourse contaminated by agricultural chemicals from an upstream farm, passing through the perimeter of a mining lease. This was why our original suggestion was that the simplest solution to this broader problem would be to amend condition W1 to refer to ‘Contaminants <u>from the mining activities</u>’, but if condition W1 remains completely unreconstructed, then we need to have specific authorisations for every conceivable category of water passing through the mining lease.</p>	<p>On clarifying this point, there are a couple of associated points. One is the lack of exclusion of water in ‘true’ sediment dams in the ‘mine affected water’ definition, as was an original intent, and secondly is the perception that existing conditions may cause an EA holder to become liable for contaminants released to waters by a third party upstream that subsequently flow through a mining lease area.</p> <p>The first point is accepted and a modification to the definition of ‘mine affected water’ has been made.</p> <p>The second point is not agreed, but to provide less cause for dispute and maintain the intent of the condition, condition W1 has been amended to explicitly prohibit the release of contaminants to waters as a result of the mining activities (unless otherwise permitted under the EA).</p>
<p>Another problem is that, because condition W2 is not required to authorise releases of mine affected water from one internal storage to another, there is currently no authorisation anywhere in the conditions for these types of internal transfers but condition W1 still prohibits them (given that W1 uses a different definition of ‘waters’). Again, there would be various drafting options for these problems.</p>	<p>It is agreed that previous drafting changes did not resolve this issue. A changed approach is necessary and is now based on providing specific authorisations for particular needs e.g. W3 provides a specific permission to release to internal water management infrastructure, reuse conditions include permission to deliver to a third party</p>

<p>Assuming that we stay with the restriction in condition W41 for 'stormwater', QRC's recommended solution would be along the following lines:</p> <ul style="list-style-type: none"> ○ W1 – Add '<i>from the mining activities</i>', after 'contaminants'. We acknowledge that this suggestion has been previously rejected, but it still has the advantage of simplicity, in dealing with waters other than stormwaters which are just 'passing through'. ○ W2 Add a second part to this condition: '<i>The release of mine affected water to internal water management infrastructure that is installed and operated in accordance with a water management plan that complies with conditions W32 to W37 inclusive is permitted.</i>' 	<p>artificial water storage e.g. farm dam.</p>
<p>We are still missing an authorisation for re-use water to be delivered to the third party in the third party's artificial storage structure. Presumably, the intention is that it is not ok to deliver the mine affected water to the third party's natural watercourse, lake, lagoon, groundwater, swamp or wetland, but the conditions do not mention this anywhere (other than generally under W1), and they do not draw a specific distinction between this and the fact that it is ok to deliver to a farm dam, tank, artificial channel etc (which is also generally prohibited by condition W1). This is not just a minor technical point. There are in fact third parties out there who have asked for mine affected water to be delivered to natural watercourses on their properties, and the mines cannot point to anything in their conditions which makes a specific distinction in this regard, which places the mines in a difficult position in dealing with their communities.</p>	<p>Agreed and as above.</p>
<p>We would still like to see a reference to delivery by artificial open channel. If DERM is not keen to include this in the model condition,</p>	<p>OK on explanatory notes, for artificial channel, what is risk to groundwater seepage, is the channel contained or does it flow past the</p>

<p>then we would at least like to see an explanatory note to the effect that site-specific modes of delivery other than piping or trucking may be specifically authorised. The explanatory notes could also mention that conditions may authorise delivery to types of businesses other than those referenced in the model conditions. (Many existing conditions have already replaced the ‘adjoining mines’ reference in W26 with more general references to ‘other businesses’ or government agencies, which is useful for mines located within a reasonable distance of industrial areas.)</p>	<p>particular customer.</p> <p>These types of questions can only really be contemplated by site specific consideration but can possibly be captured in an explanatory note.</p>
<p>Some companies do not feel that the inclusion of Sulphate is required in Table 4 / Mine-affected water release events. Targeting an EC limit of 1000 mg/L ensures that Sulphate remains below 250 mg/L</p>	<p>DERM data review reveals sulphate as a parameter of interest in release waters. If the assurance of controlling EC means that sulphate will also comply as suggested here, and sulphate is to be monitored anyway, then there is no reason to object to the limit being imposed.</p>
<p>Sodium constitutes a significant new burden on already extensive monitoring requirements. Given that the aim of Table 3 is to only include the contaminants that do pose a risk and to remove those which have never exceeded trigger values, it would be good to also have the ability to remove sodium from Table 3 once data become available (for instance in one year).</p>	<p>Sodium is intended to be dealt with in the same way as other ‘potential contaminants’ in Table 3. It is true that sufficient data could be collected inside of a year to consider a review of the requirement, depending on rainfall and the frequency of release events. It is also possible that it could take longer than 2 years if release events were infrequent. Footnote 2 beneath Table 3 has been amended to provide some added flexibility to considering the adequacy of such a data set.</p>
<p>Monday, 25 July 2011</p>	
<p><i>Table 3. Potential Contaminants</i> Removing the need to test for substances that have never been detected in release water is an improvement on previous conditions. This should be extended to excluding those substances that occur in mine water in similar or lesser concentrations than they do in the receiving environment.</p> <p><u>The explanatory note to Table 3 testing parameters should be expanded to facilitate exclusion of contaminants in release waters that occur in similar concentrations in the release waters as they do in</u></p>	<p>The key issue here is having sufficient data as well as having methodology for excluding potential contaminants. If the contaminants are low in all dams and less than receiving waters (where receiving waters sampling numbers and QA is sufficient), there would be a case for removing contaminants. The challenge is that some dams will have high levels of contaminants and others will have low levels (perhaps those with the RPs). This provides a case to keep this as a contaminant end of pipe (may be a case for dropping</p>

<p><u>the receiving waters.</u></p>	<p>RE monitoring) unless the mine can demonstrate cross contamination will not occur.</p> <p>It is difficult to make a broad statement such as that proposed here. If the receiving water was already ‘overloaded’ with a particular contaminant then removing measurement of further inputs is not desirable. If it is not ‘overloaded’ then the case can be successfully made and footnote 2 beneath Table 3 provides the guidance to allow an informed review and consideration of these monitoring requirements. It is true that sufficient data may be collected inside of 2 years in order to revise monitoring requirements depending on rainfall and release events. In some circumstances it may also take longer to collect sufficient data. Footnote 2 is amended to provide greater clarity and flexibility in this regard.</p>
<p><i>W7. Flow Measurement</i> This condition does not allow for the holder to rely on existing flow gauging infrastructure that was installed and is operated and maintained by others under agreement or otherwise.</p> <p><u>This condition should be amended to allow flexibility in relation to the arrangements under which flow data is acquired. For example a company may contract a 3rd party to supply data at the nominated sites, with the 3rd party owning, installing and maintaining the necessary equipment.</u></p>	<p>Fair comment. Condition W7 amended to require EA holder to ensure it happens rather than require it to be done by the holder.</p>
<p><i>W8. Natural Flow During Release.</i> W8 is read to mean that regardless of any other condition in the EA, releases in accordance with W2 must only occur during periods of natural flow. It is not clear how this applies to managing water where sediment is the only contaminant or any mine affected water by definition, that is clean water or has been treated or to a level suitable for</p>	<p>Amendment made to definition of ‘mine affected water’ to deal with ‘true’ sediment dam water differently to mine affected water.</p> <p>The new model conditions do provide scope to release good quality water during low or no flows on the tail end of flow events. The basic</p>

<p>release.</p> <p>W2 relates to release of all mine affected water, and appears to include runoff from areas in which sediment is the only contaminant. Is W8 then intended to require that releases from sediment dams only occur when flow triggers are met?</p> <p>W8 also appears to preclude releasing surplus fresh water during times of no flow. For example fresh water may accumulate in mine water dams during periods of no flow as a result of localised storm activity. This water is best removed to reinstate storage capacity and prevent deterioration, or in the case of sediment dams, removed to reinstate the storage capacity and allow inspection and maintenance of the dam. Sediment dams may also surcharge during localised rainfall events that do not induce a flow in the receiving water.</p> <p>Clarification is sought as to the exclusion of fresh water and treated water releases from W8, or alternatively, explicitly provide for the release of fresh water and treated water at times when flow triggers are not met through W2 and Table 4.</p>	<p>premise here is that the better the quality of the water, the greater the volume that will be permitted for release.</p>
<p><i>Table 4. Explanatory Notes</i> (For example) The water quality in the Mackenzie River and Blackwater Creek varies considerably. During low flows of the receding hydrograph, salinity can increase significantly. The principles as set out in the Table 4 notes could lead to circumstances where the site holds surplus water of a quality consistent with or better than that of the receiving water, yet release is precluded on the basis that the receiving water quality is exceeding the long term background reference.</p> <p><u>There should be an allowance for releases to occur under such circumstances. It should be noted in the principles that releases be allowed when the release water quality is consistent with or better than the upstream receiving water WQ. This would apply to the low flow and medium flow conditions.</u></p>	<p>It doesn't work like this – there is a need to consider both near-field and far-field impacts. Long term data is necessary to rely on as we don't want to result in accumulation in the far-field. Higher salinity tends to happen towards the tail of events. We don't want to make this more exaggerated in terms of salt loads. We have already put in that we will consider local reference data over WQOs to provide more flexibility.</p>

<p><i>Table 4. Maximum Release Rates</i></p> <p>Table 4 states that the maximum release rates are to be calculated on case by case basis. It is not clear whether this is intended to be a site by site basis or rather on the basis of release by release. WCPL is seeking the ability to manage the rate of release in order to maximise release of surplus water while meeting water quality objectives in the receiving water.</p> <p>Receiving water flow rates and stored water quality are largely outside the control of WCPL, yet both are significant variables in determining a suitable release configuration. Table 4 seeks to manage release flows on the basis of fixed intervals for these variables. WCPL considers that the most effective way of determining a suitable release configuration is to calculate the target release rate on the basis of upstream flow rate and water quality, release water quality, downstream target water quality and a factor of safety which is reflective of measurement accuracy and flow control.</p> <p>Is it envisaged that a formula is inserted in the maximum release rate column, or alternatively, the maximum release capacity of the infrastructure? Should Table 4 require the nomination of fixed scenarios then WCPL will seek to populate this table with a comprehensive selection of scenarios so as not to limit the ability to discharge when suitable conditions exist.</p>	<p>DERM is using overall WQOs rather than event WQOs (which are significantly lower for EC) to manage these discharges. If DERM allows mines to “pollute” up to the WQO for all of the hydrograph, there is a strong likelihood that the EC in regional waterways will noticeably increase and may exceed EC targets for reservoirs. Currently, the model conditions allow for two points on the hydrograph at which the majority (or a proportion for Zone 3) of the assimilative capacity at that flow point can be utilised. Because this point is likely to occur at different times and different locations for mines, the likelihood of far-field issues are significantly reduced.</p>
<p>Wednesday 27 July 2011</p>	
<p>QRC is quite happy with the proposed definition of ‘mine affected water’. Legal advice is that the proposed W41 about stormwater is also quite workable, as far as it goes (ie, to the extent that it just covers stormwater from undisturbed areas). W41 still doesn’t cover a few other types of releases which we had intended to cover. DERM could either choose to add those issues to W41 or these could instead be added to W2 (or just</p>	

after W2). The additional types of releases that we would like DERM to think about are:

- (a) Internal transfers - There is no authorisation anywhere for releases of mine affected water from one internal storage to another, but W1 still prohibits these internal transfers because it relies on the wider definition of 'waters'. The second part of W2 currently provides that these types of releases do not need to be authorised under W2, but it does not go on to provide that they are positively authorised by some other provision. (In passing, could we also mention that the example given in item (b) '<e.g. internal dam to dam transfer for managing internal dam free board' could be interpreted too literally as only being intended 'to manage internal dam freeboard'. There are various reasons for internal dam to dam transfer. Could you please delete the words 'for managing internal dam free board'?)
- (b) Clean water other than 'stormwater' which is released from the mining lease, whether this has been actively diverted around the disturbed areas or not, eg, diverted watercourses are not exactly 'stormwater'.
- (c) Water contaminated by upstream users which is just passing through the mining lease, not necessarily as 'stormwater';
- (d) How would DERM like to deal with relatively minor releases of 'mine affected waters' such as run-off from haul roads? We assume that you do not want these individually listed under W2 and comprehensively monitored on the same scale as tailings dams. On the other hand, this is not 'stormwater other than mine affected water', so is not covered by W41 as currently drafted.
- (e) Releases from 'true' sediment dams. QRC is comfortable with describing this water as 'mine affected', because in fact it is,

- (a) provided by amendment to W2.
- (b) I don't view a diverted watercourse as a 'release to waters', it is a potential receiving 'waters'. But for the sake of clarity can't see any issue with linking this prohibited release to the mining activity - it is the only activity afterall that is authorised by the EA and that the conditions are applicable to.
- (c) as for (b).
- (d) Haul roads can present different levels of risk depending on how well they are managed. There is a possibility for other types of contamination in these areas, e.g. hydrocarbons. Haul roads should not be excluded specifically from mine affected water definition, but where companies can demonstrate areas that are maintained clean and sediment is the only parameter of concern to manage, and appropriate infrastructure is installed to manage risks through ESCPs then they will achieve compliance with conditions as drafted.
- (e) amendment to mine affected water definition. 'True' sediment dams are intended to capture rainfall runoff to settle out sediment.

<p>strictly speaking, 'mine affected' if it includes water from areas stripped in advance of mining or from rehabilitation works that are underway (as opposed to completed). Once the dam picks up the sediment and the sediment is allowed to settle, the dam has done its job. We just need a condition which authorises the clean releases from this type of 'true' sediment dam, which we would like to see under the standards and requirements of the ESCP. However, these releases are not strictly "stormwater, other than mine affected water".</p>	
<p>Thursday 28 July 2011</p>	
<p>In condition W1, the words 'as a result of the authorised mining activities' should be positioned so as to qualify the word 'contaminants', rather than the words 'any waters', eg: 'Contaminants that are a result of the authorised mining activities, and that also will, or have the potential to, cause environmental harm, must not be released directly or indirectly to any waters, except...'</p>	<p>Contaminants that are a result of the mining industry would imply that the contaminants were produced by the mining activity. A more likely scenario is that contaminants already existed but are relatively immobile, but have the potential to be mobilised by the mining activities. The current placement of the wording is intended to clarify that contaminants must not be released to waters specifically as a result of the mining activity (i.e. they must not be mobilised by the activity and released to waters at levels capable of causing environmental harm), to address any concern that previous wording could cause the EA holder to be penalised for contaminants in waters passing through the lease that were put there by an upstream third party. I recommend DERM retain proposed drafting.</p>
<p>In W2, it would be easier to read if you could break this up into sub-clauses.</p>	<p>Agreed. Redrafted as a separate condition and entire EA conditions renumbered.</p>
<p>Also, we are still not sure where you are planning to address runoff from private haul roads, which do form part of the 'mining activities', so this is 'mine affected water'. (Public haul roads are not part of the 'mining activities'.)</p>	<p>Haul roads can present different levels of risk depending on how well they are managed. There is a possibility for other types of contamination in these areas, e.g. hydrocarbons. Haul roads should not be excluded specifically from mine affected water definition, but where companies can demonstrate areas that are maintained clean and</p>

	<p>sediment is the only parameter of concern to manage, and appropriate infrastructure is installed to manage risks through ESCPs then they will achieve compliance with conditions as drafted.</p>
<p>On thinking about it, I would also like to raise now that we still have concerns about the re-drafted explanatory note relating to ‘extraordinary events’. While we understand your concerns about the difficulties of foreseeing all possible types of ‘extraordinary events’ and also the issues with cumulative impacts, we are hoping that you can express this explanatory note a little more positively in terms of addressing similar types of events to those that have already occurred and some guidance on a methodology for drafting those tailored conditions. This is the kind of wording we have in mind:</p> <p>Model conditions do not preclude applicants from proposing alternative or additional conditions, nor restrict the administering authority from using alternative conditions where the case warrants. However, applications proposing alternative approaches will need to be supported by sufficient environmental risk assessment and contingency planning information to allow the administering authority to adequately consider the proposal.</p> <p>In particular, there may be instances where case-by-case proposals can be considered for conditions to address management of particularly heavy rainfall and flooding that is similar to previous events, where there is sufficient information available based on: previous transitional environmental programs, monitoring and analysis, the environmental values of the receiving environment in those circumstances together with the experience of impacts on those environmental values, rigorous contingency and disaster response planning, and with particular regard to actual and potential cumulative</p>	<p>This proposed wording is generally quite good, but I have shortened up the second paragraph. I think our understanding of the potential to predict extraordinary events is a little different. I think it is reasonable to predict that wet seasons that are out of the ordinary will occur in future, the difficulty in drafting model conditions is the ability to consider all possible variables thrown up by the situation due to the influences from other mines or different activities, or other environmental effects throughout the catchment, such as saline groundwater recharge. Due to the need to consider cumulative effects, any attempt to standardise an approach through model conditions is likely to be overly conservative to the point that the objective of reducing the need for future TEPs in such circumstances will only be achieved to the point we have made it to with the model conditions. Acknowledging that there may be sites that can demonstrate a robust approach based on their own surroundings that goes further than the model conditions is acceptable.</p>

impacts. For example, there would be potential to tailor a schedule of conditions to be triggered upon reaching nominated thresholds of rainfall, flow, flooding (or a combination) similar to a an event that has occurred in the past, generally adopting a similar framework to the content requirements for a previous TEP, but adapted so as to take account of any relevant information obtained through a previous TEP process. However, it is not possible to predict all possible 'extraordinary events' which may occur in the future, so these model conditions have not attempted to provide a 'catch-all' condition for 'extraordinary events' in general. Each application to address flood events needs to be assessed on its individual merits.

Department of Environment and Resource Management
MINISTERIAL BRIEFING NOTE

TO: Minister for Environment

SUBJECT: 2011 Review of Fitzroy Model Water Conditions

Advisor	OK
Dated / /	
	Approved Not Approved Noted
	Further information required
Minister.....	
Dated / /	

TIMEFRAME/REQUESTED BY

- This brief was initiated by the Department
- There is no specific timeframe associated with this briefing note

RECOMMENDATION

- It is recommended that the Minister:
- **note** that the department has completed a scheduled review of the Fitzroy Model Water Conditions for coal mines across the Fitzroy Basin.

BACKGROUND

- Following severe flooding in 2008 the former Environmental Protection Agency authorised a release of water (150 gigalitres) trapped at the Ensham Coal Mine near Emerald into the Nogoa River.
- High salinity in the discharge impacted waterways and affected drinking water supplies at Rockhampton and surrounds resulting in intense scrutiny of departmental actions.
- A number of actions occurred, including: the Premier commissioning Professor Barry Hart to provide a report on the incident; a study of cumulative impacts by the department; formation of the Fitzroy Water Quality Advisory Group consisting of industry, government and conservation group representatives; and an improved approach to providing water quality information to the community via web published information.
- The department resolved to amend its Environmental Authority (EA) conditions for coal mine water discharges, develop local water quality guidelines for the Fitzroy Basin, and develop a model for assessing cumulative impacts across the region.
- Model conditions for coal mine water management (the Fitzroy Model Water Conditions) were developed in 2009 and were scheduled for review in October 2011 to coincide with the anticipated scheduling of local water quality objectives.

CURRENT ISSUES

- Repeat heavy wet seasons across the Fitzroy Basin led to a decision to bring forward the scheduled review of the Fitzroy Model Water Conditions (model conditions).
- As a result of the 2010-11 wet season the department assessed in excess of 100 applications for Transitional Environmental Programs (TEPs) or amendments to TEPs relating to coal mine companies seeking to discharge water captured on site during the wet season events.
- Information obtained through monitoring programs following the 2008 flooding and TEP assessments for case-specific discharge requests informed the review of the model conditions.
- Most notably the advanced state of development of Water Quality Objectives (WQOs) for waterways throughout the Fitzroy Basin has provided the department with a sound basis for considering a broader range of discharge options that can be designed on achieving the WQOs and consequently protecting identified environmental values throughout the basin.
- The key change to the model conditions is the provision for greater flexibility in the options for discharge conditions. The limiting factor for most coal mines in the Fitzroy is salinity, which is measured as electrical conductivity (EC).
- In general terms, the concentration of EC is simply a measure of the amount of salt in a given volume of water, i.e. a higher amount of salt within a fixed volume of water will result in a higher EC.

Author Name: Andrew Connor Position: Director, Coal Operations Tel No: 3330 6335 Date: 11 August 2011	Cleared by Name: Andrew Brier Position: General Manager Tel No: 4529 1220	Cleared by Name: Andrew Buckley Position: A/Assistant Director-General General <i>Approved</i> Tel No: 0403 340 808	Recommended Name: <i>Debbie Best</i> A/Director-General, DERM Tel No: 3330 6298 Date: <i>18.8.11</i>
	Name: Position: Tel No:	Name: <i>Terry Wall</i> Position: <i>Assoc. DG, CER</i> Tel No: <i>3330 6240</i>	Date: <i>16.8.11</i>

- When considering authorising a discharge of mine-affected water for a coal mine (either via an EA or TEP), key considerations include ensuring the amount of EC does not cause acute toxicity effects directly at the point of discharge and that, following mixing of the released water with the stream flow passing the mine, the load of EC will not cause chronic or cumulative effects on identified environmental values including ecosystem and human use values, such as drinking water or irrigation uses.
- The model conditions now provide a basis for considering higher end-of-pipe concentration limits for mine-affected water releases, with an associated reduction in the volume permitted to be released.
- This approach remains limited by the management of localised acute toxicity effects at the point of discharge by capping allowable EC discharge concentrations and volumes based on site-specific consideration of local flow conditions and water quality objectives.
- A further change is variable discharge options based of receiving water flows, which essentially provides changing discharge opportunities on low, medium or high receiving water flows to ensure opportunities for discharges are improved when conditions are favourable, whereas previous conditions remained static once the minimum flow trigger was reached.
- The model conditions now provide a methodology for conditioning releases based on a mine's location within the catchment. This improvement is based on an improved understanding of the cumulative effects of releases from mines in upper catchment (less than 10km from the top of catchment), mid catchment and lower catchment (regional waterways with developed water quality objectives 50km or more downstream of the top of catchment) areas.
- The model conditions also include limits for other important water quality parameters, such as pH, turbidity and sulphate and they require rigorous monitoring of a range of potential contaminants including heavy metals, petroleum hydrocarbons and sodium.
- While the new approach provides greater flexibility to mine operators to tailor conditions to the characteristics of the water held on site and the location of their mine within the catchment, the methodology is still based on the overall protection of the environmental values associated with the waterways throughout the Fitzroy Basin.
- The approach is not a relaxation in environmental protection, but is a refinement of how environmental protection is best achieved.
- The flexibility introduced into the new model conditions formalises a simple principle whereby the better the quality of mine-affected water held on site, the greater the volume that can be released when a release opportunity occurs. This provides incentives to either improve the quality of water held on site through water treatment, or reduce the potential for producing great volumes of mine-affected water by, for example, accelerating rehabilitation and improving on-site water management systems.
- While offering increased flexibility when compared to the existing EA conditions, the adoption of the new model conditions will not result in mines being able to discharge more water than was authorised by TEPs during the recent wet season. The new conditions will mean that more than half of the TEPs that have been issued will no longer be required as these mines will be able to discharge under similar situations due to the new model conditions.
- The model conditions will increase the number of options available for mining companies that are managing legacy water accumulation issues by providing a basis for considering releases of poorer quality water at reduced volumes during periods of higher flow without the need to apply for a TEP. Such a strategy will necessarily need to be combined with a suite of effective water management strategies to ensure any given company improves its water inventory outlook.
- On 11 August 2011 the Australian Financial Review ran an article (Attachment 2) giving broad details about the new arrangements. It quoted the Queensland Resources Council as saying the industry was happy with the more flexible arrangements but frustrated that the changes had not been implemented before the past summer.

RESOURCE/IMPLEMENTATION IMPLICATIONS

- The department expects to process a significant number of Environmental Authority applications as mining companies seek to incorporate the new model conditions into their operations. This will create a service demand that will be met through existing resource levels.

Author: Name: [REDACTED] Position: Director, Coal Operations Tel No: [REDACTED] Date: 11 August 2011	Cleared by Name: Andrew Brier Position: General Manager Tel No: [REDACTED]	Cleared by Name: [REDACTED] Position: A/Assistant Director-General Tel No: [REDACTED]	Recommended: Name: Terry Wall A/Director-General, DERM Tel No: [REDACTED] Date:
	Name: Position: Tel No:	Name: Position: Tel No:	

- The increase in amendment demand for Environmental Authority assessment will be offset somewhat by a reduced potential for TEP applications in future.

PROPOSED ACTION

- The department will progress amendment applications and focus its compliance efforts on inspecting mine sites ahead of the next wet season to evaluate their on-site water management performance and preparation for the wet season ahead and
- Prepare a matter to note for Monday 22 August 2011 to formally advice Cabinet members of the changed conditions.

OTHER INFORMATION

Consultation:

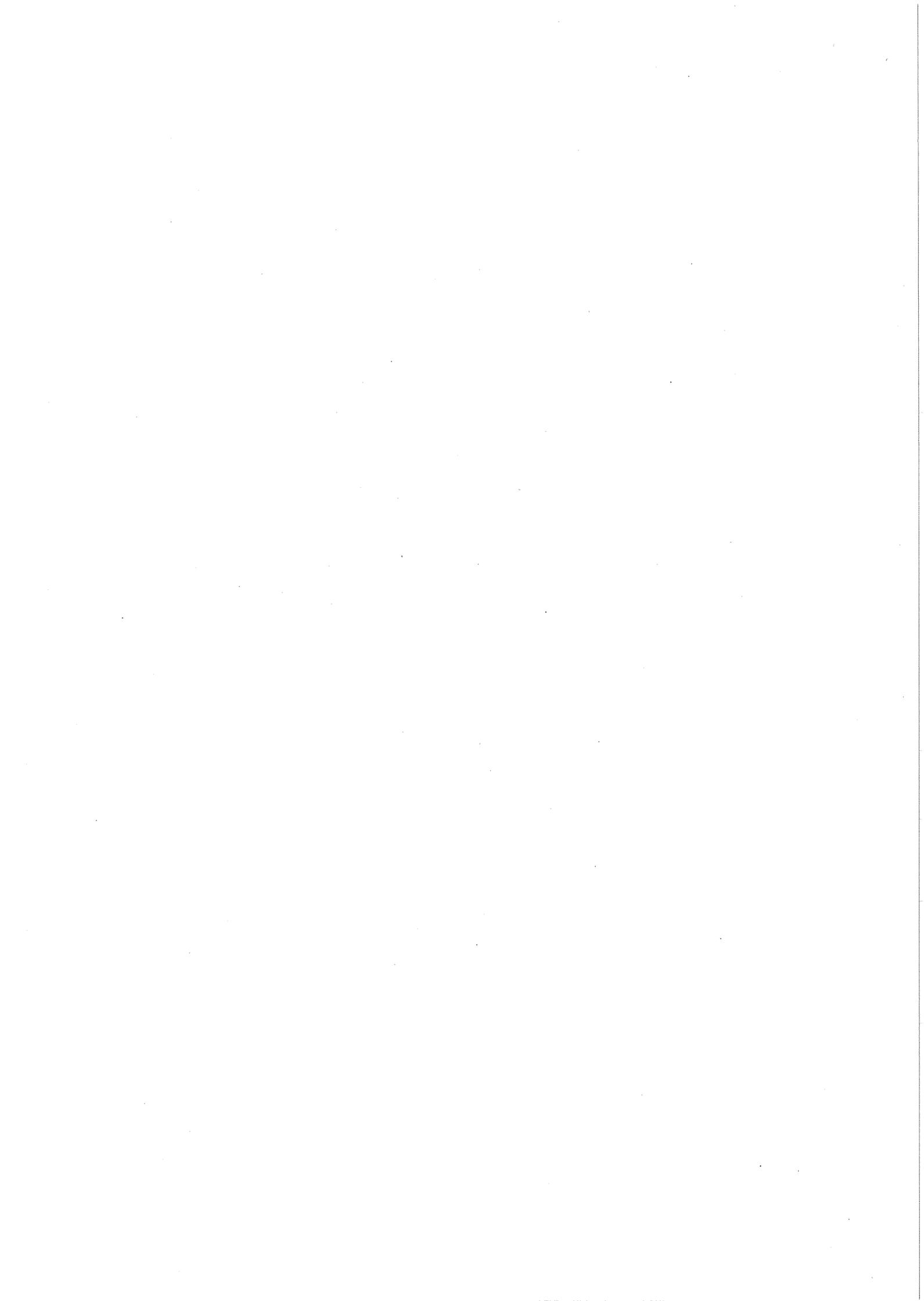
- There has been extensive consultation with the Queensland Resources Council, which is supportive of the enhanced flexibility in the new model conditions.
- The Fitzroy Water Quality Advisory Group was also given a working draft, provided with a presentation about the key changes and given an opportunity to comment on the conditions. Only a small number of comments were received, but they did result in the inclusion of sodium as a monitoring parameter relevant to drinking water quality. Group members include AgForce, Banana Regional Council, Capricorn Conservation Council, Central Highlands Regional Council, Central Queensland University, Department of Employment, Economic Development and Innovation, Fitzroy Basin Association, Fitzroy Basin Elders Committee, Fitzroy Food and Fibre, Fitzroy River Fish Stocking Association, Isaac Regional Council, Queensland Conservation Council, Queensland Health, Queensland Resources Council, Rockhampton Regional Council / Fitzroy River Water, SunWater and Stanwell Corporation Limited.
- *Key Communication Messages:* A review of model water conditions applied to coal mines in the Fitzroy Basin has resulted in an improved methodology for managing mine-affected water releases from mine sites. The improved methodology provides greater flexibility to mining companies to develop water management systems that best suit their site-specific circumstances, while reinforcing environmental protection requirements through the incorporation of design water quality objectives to protect the environmental values of the Fitzroy Basin waterways.

MINISTER'S COMMENTS

ATTACHMENTS

- Attachment 1. New Fitzroy Model Water Conditions
- Attachment 2. AFR article

<p>Author Name: [REDACTED] Position: Director, Coal Operations Tel No: [REDACTED] Date: 11 August 2011</p>	<p>Cleared by Name: Andrew Brier Position: General Manager Tel No: [REDACTED]</p>	<p>Cleared by Name: [REDACTED] Position: A/Assistant Director-General Tel No: [REDACTED]</p>	<p>Recommended: Name: Terry Wall A/Director-General, DERM Tel No: [REDACTED] Date:</p>
	<p>Name: Position: Tel No:</p>	<p>Name: Position: Tel No:</p>	



Final Model Water Conditions for Coal Mines in the Fitzroy Basin

Note:

Explanatory notes are in green. DELETE prior to issue of EA.

Insertions required by applicants and or the administering authority are in blue. DELETE prior to issue.

Contaminant Release

- W1** Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activities, except as permitted under the conditions of this environmental authority.
- W2** Unless otherwise permitted under the conditions of this environmental authority, the release of mine affected water to waters must only occur from the release points specified in Table 1 and depicted in Figure 1 <this would be a plan or plans locating all monitoring (water quality and flow) and release points> attached to this environmental authority.
- W3** The release of mine affected water to internal water management infrastructure that is installed and operated in accordance with a water management plan that complies with conditions W33 to W38 inclusive is permitted.

Table 1 (Mine Affected Water Release Points, Sources and Receiving Waters)

EXPLANATORY NOTES – Determining Mine Affected Water Release Points:

Mine affected water release points should be specified in Table 1 where they represent a potential source of water contaminated by the mining activity. Release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage run-off containing sediment only that is not likely to contain contaminants or have properties that would cause environmental harm, do not need to be separately identified in Table 1.

Release Point (RP)	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Mine Affected Water Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	e.g. Stormwater Dam Spillway Overflow	Dam Spillway	Wet Creek
RP 2	XXXX	XXXX	e.g. Dam overflow pipe	Sampling Tap on pipe where the pipe enters Sandy Creek	Sandy Creek

- W4** The release of mine affected water to waters in accordance with condition W2 must not exceed the release limits stated in Table 2 when measured at the monitoring points specified in Table 1 for each quality characteristic.

Table 2 (Mine Affected Water Release Limits)

Quality Characteristic	Release Limits	Monitoring frequency	Comment
Electrical conductivity (uS/cm)	Release limits specified in Table 4 for variable flow criteria.	Daily during release (the first sample must be taken within 2 hours of commencement of	

		release)	
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
Turbidity (NTU)	Current limit or limit derived from suspended solids limit and demonstrated correlation between turbidity to suspended solids historical monitoring data for dam water*	Daily during release* (first sample within 2 hours of commencement of release)	Turbidity is required to assess ecosystems impacts and can provide instantaneous results.
Suspended Solids (mg/L)	Limit to be determined based on receiving water reference data and achievable best practice sedimentation control and treatment*	Daily during release* (first sample within 2 hours of commencement of release)	Suspended solids are required to measure the performance of sediment and erosion control measures.
Sulphate (SO ₄ ²⁻) (mg/L)	Release limits specified in Table 4 for variable flow criteria.	Daily during release* (first sample within 2 hours of commencement of release)	Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC.

Note: *Limit for suspended solids can be omitted if turbidity limit is included. Limit for turbidity not required if suspended solids limit included. Both indicators should be measured in all cases.

W5 The release of mine affected water to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2 and Table 3.

Note: the administering authority will take into consideration any extenuating circumstances prior to determining an appropriate enforcement response in the event condition W5 is contravened due to a temporary lack of safe or practical access. The administering authority expects the environmental authority holder to take all reasonable and practicable measures to maintain safe and practical access to designated monitoring locations.

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

EXPLANATORY NOTES – Table 3 Potential Contaminants:

The quality characteristics listed below should be assessed on a site by site basis by each mine prior to finalisation of amendment applications. Based on this assessment, the quality characteristic should be either disregarded if below trigger levels; or included as priority contaminants in Table 3 if above trigger levels. Assessment should involve comparison of representative data from dams that have historically been discharged or likely to be discharged from contaminant release points in Table 1. Data may include historical results or sampling undertaken for this specific purpose. The intent here is that not all dams on site would need to be sampled but those that would make up the majority of water in dams with release points. It could also be demonstrated based on existing water quality information that the water source and relative water quality of some dam are the same, in which case such dams may not need to be sampled individually. For metals and metalloids, trigger levels apply if dissolved results exceed trigger levels. However, total (unfiltered) results for metals and metalloids can be used to disregard a characteristic for inclusion in Table 3. Terms include SMD – slightly moderately disturbed level of protection, guideline - refers ANZECC & ARMCANZ (2000), LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical methods required to achieve LOR.

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level	Monitoring Frequency
Aluminium	55	For aquatic ecosystem protection, based on SMD guideline	Commencement of release and thereafter

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Arsenic	13	<i>For aquatic ecosystem protection, based on SMD guideline</i>	weekly during release
Cadmium	0.2	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Chromium	1	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Copper	2	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Iron	300	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Lead	4	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Mercury	0.2	<i>For aquatic ecosystem protection, based on LOR for CV FIMS</i>	
Nickel	11	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Zinc	8	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Boron	370	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Cobalt	90	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Manganese	1900	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Molybdenum	34	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Selenium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Silver	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Uranium	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Vanadium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Ammonia	900	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Nitrate	1100	<i>For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN</i>	
Petroleum hydrocarbons (C6-C9)	20		
Petroleum hydrocarbons (C10-C36)	100		
Fluoride (total)	2000	<i>Protection of livestock and short term irrigation guideline</i>	
Sodium	TBA		
Include additional contaminants as required	Include additional contaminants as required		

Note:

1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.
2. The quality characteristics required to be monitored as per Table 3 can be reviewed once the results of two years monitoring data is available, or if sufficient data is available to adequately demonstrate negligible environmental risk, and it may be determined that a reduced monitoring frequency is appropriate or that certain quality characteristics can be removed from Table 3 by amendment.
3. SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARM CANZ (2000).
4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

W6 If quality characteristics of the release exceed any of the trigger levels specified in Table 3 during a release event, the environmental authority holder must compare the down stream results in the receiving waters to the trigger values specified in Table 3 and:

1. where the trigger values are not exceeded then no action is to be taken; or
2. where the down stream results exceed the trigger values specified Table 3 for any quality characteristic, compare the results of the down stream site to the data from background monitoring sites and;
 - (a) if the result is less than the background monitoring site data, then no action is to be taken; or
 - (b) if the result is greater than the background monitoring site data, complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

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Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W6 2(b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

- W7** If an exceedance in accordance with condition W6 2(b) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Mine Affected Water Release Events

- W8** The holder must ensure a stream flow gauging station/s is installed, operated and maintained to determine and record stream flows at the locations and flow recording frequency specified in Table 4.
- W9** Notwithstanding any other condition of this environmental authority, the release of mine affected water to waters in accordance with condition W2 must only take place during periods of natural flow events in accordance with the receiving water flow criteria for discharge specified in Table 4 for the release point(s) specified in Table 1.
- W10** The release of mine affected water to waters in accordance with condition W2 must not exceed the Electrical Conductivity and Sulphate release limits or the Maximum Release Rate (for all combined release point flows) for each receiving water flow criteria for discharge specified in Table 4 when measured at the monitoring points specified in Table 1.

Table 4 (Mine Affected Water Release during Flow Events)

EXPLANATORY NOTES – Table 4

Gauging station description:

The intent here is that every release point in Table 1 is associated with a gauging station that measures flow upstream of the discharge point. More than one discharge point may be associated with the same gauging station. The gauging station should be at a minimum distance from the discharge point such that water flow under trigger flow events will not significantly diminish by the time it reaches the discharge point. The location of the gauging station should ideally be such that it is not significantly affected by other upstream point source releases or times of discharge are limited to periods of "natural" flow.

Under certain circumstances it may be appropriate to have a downstream gauging station in addition to or in replace of an upstream gauging station. The location should ideally not be affected by the discharge (e.g. be measured off the main waterway). The need for this must be demonstrated on a case by case basis to show why an upstream gauging station is insufficient. This may be the case when mines are located in the upper parts of catchments or near the downstream confluence or a major waterway. Similarly, the gauging station should be at a distance from the discharge point such that water flow during triggered flow events will not significantly diminish between the discharge point and the measuring point (or the confluence with the creek being measured). For downstream flow triggers, some changes to calculation for flow triggers and maximum release flows would typically be required based on the relative sizes of the waterways involved.

Flow Triggers and EC Quality Criteria:

The intent for flow triggers is that the times of discharge are limited to times around natural flow events only. Different flow regime methodologies are used to define mine affected water release opportunities, provide flexibility for site operators and to protect identified environmental values within receiving waters. The expectation

is that where flow gauging data is available, it is used to calculate flow triggers. Where gauging data is not available or is insufficient, flow triggers should be based on runoff/stream flow estimates using appropriate hydrological calculations or models and known catchment area, rainfall estimations etc.

Separate methodologies for discharges which occur to local waterways rather than regional waterways will be applied as part of this revised approach. Due to the increased flexibility of the revised approach and consideration of a wider range of local factors the application of these model conditions to individual sites will require case-by-case assessment and require sufficient background information to be provided. For example, it should be noted that discharges upstream of dams or lakes may require special considerations and generally stricter controls. Also, where multiple mines discharge to the same or closely connected waterways consideration of cumulative impacts will be necessary as part of the assessment process.

Model conditions do not preclude applicants from proposing alternative or additional conditions, nor restrict the administering authority from using alternative conditions where the case warrants. However, applications proposing alternative approaches will need to be supported by sufficient environmental risk assessment and contingency planning information to allow the administering authority to adequately consider the proposal.

There may be instances where case-by-case proposals can be considered for conditions to address management of particularly heavy rainfall and flooding that is similar to previous events, where there is sufficient information available based on: previous transitional environmental programs, monitoring and analysis, the environmental values of the receiving environment together with the experience of impacts on those environmental values, rigorous contingency and disaster response planning, and with particular regard to actual and potential cumulative impacts. For example, there may be potential to tailor a schedule of conditions to be triggered upon reaching nominated thresholds of rainfall, flow, flooding (or a combination) based on learning from an event that has occurred in the past; possibly adopting a similar framework to previous discharge permissions granted in similar circumstances, provided the framework was demonstrated to adequately address environmental risk to the satisfaction of the delegate.

No/low flow stream conditions (best quality / low EC mine affected water):

Discharge water quality will need to meet or be better than water quality objectives (or long term background reference 75th / 80th percentile) for EC and will only be permitted for temporary periods after periods of significant flow. The focus of this is to allow "good" quality water to be released when collected rather than having it stored over long durations resulting in deteriorating water quality. Any discharges made under no/low flow stream conditions must not contribute to or cause erosion and due consideration should be given to road/rail access, stock crossings etc (particularly in relation to multiple mines discharging under no/low flow stream conditions on connected waterways). General principles include:

- Release at times when flow is on tail end of flow event only i.e. following a flow above specified event flow trigger and when the flow reduces below the flow trigger again. This trigger will commence a discharge window of 4-6 weeks for good quality water only.
- End of pipe WQ \leq WQO (or long term background reference 75th/80th percentile). May require assessment of downstream environmental values where WQO is more stringent (e.g. drinking water supply).
- Duration of release is limited (dry ephemeral stream, 4 weeks after flow event ceases, use time after flow trigger for below – add additional time).
- Volume/rate will be considered on a case by case basis.

Medium flow stream conditions (medium quality mine affected water):

A flow trigger for the stream is required and will be set to avoid discharge of medium quality water during periods of no or low flow. General principles include:

- Requires the use of a stream flow trigger above which release can occur. The stream flow trigger must be representative of event flow and be above base/low flow (typically determined from hydrographs, historical flow/water quality data and/or modeling).

- End-of pipe EC <3500uS/cm. Options for either <1500us/cm and <3500uS/cm as maximum limits can be considered which will result in different maximum discharge rates for different quality water. The better the quality of water to be released, the greater the volume that can be permitted.
- The design dilution/maximum discharge rate should be based on a site specific risk assessment. These should be designed to achieve an in-stream EC based on the location – upper (Zone 1), mid (Zone 2) or lower (Zone 3) catchment. The EC_{WQO high flow} should be adopted as background EC for design calculations.
 - o Zone 1, upper catchment mines, approximately <10km from top of waterway catchment.
EC_{in stream} = 1000uS/cm (toxicity guideline).
 - o Zone 2, mid catchment mines, zones not within Zone 1 or Zone 3
EC_{in stream} = 700uS/cm
 - o Zone 3, lower catchment mines (All regional waterways are considered Zone 3 from distance >50km from top of waterway catchment, refer to Zone 3 map) –
EC_{in stream} = EC_{high flow WQO} + multiplier x (EC_{WQO low flow} – EC_{WQO high flow})

e.g. multiplier = 0.2 for Isaac, Nogoia, Dawson
- EC_{in stream} for calculations may vary according to other locally relevant environmental values that may need to be considered.

High flow stream conditions (poorer quality water):

This option might be used in some cases for mines that need to discharge higher EC wastewater than is allowable under medium flow stream conditions. Any discharge is required to have a higher level of dilution than with medium flow cases but still achieve a maximum incremental increase in the waterway. This option is most feasible for mines situated on regional waterways as the window for discharge is likely to be limited for local waterways. Some additional considerations on management of mixing zones and acute/chronic toxicity may be required in this case. General principles include:

- Requires the use of a stream flow trigger above which release can occur. The stream flow trigger must be representative of high event flow and be above medium flow (typically determined from hydrographs, historical flow/water quality data and/or modeling).
 - End-of pipe EC must be > 3500uS/cm (but <10,000uS/cm). The better the quality of water to be released, the greater the volume that can be permitted.
 - The design dilution/maximum discharge rate should be based on a site specific risk assessment. These should be designed to achieve an in-stream EC based on the location – upper (Zone 1), mid (Zone 2) or lower (Zone 3) catchment as described above.
 - May need some additional indicators/requirements and requires case by case assessment.
 - This option is likely to be less feasible for Zone 1 and 2 mines.
-

Receiving waters/ stream	Release Point (RP)	Gauging station	Gauging Station Latitude (decimal degree, GDA94)	Gauging Station Longitude (decimal degree, GDA94)	Receiving Water Flow Recording Frequency	Receiving Water Flow Criteria for discharge (m ³ /s)	Maximum release rate (for all combined RP flows)	Electrical Conductivity and Sulphate Release Limits
e.g. Wet Creek	Insert all release points that will release based on this gauging station flow. e.g. RP1, RP2 & RP3	e.g. Gauging station 1	XXXX	XXXX	Continuous (minimum daily)	Low Flow <XX m3/s for a period of <insert number of days> after natural flow events that exceed XX m3/s (where XX is a specified event flow trigger)	Insert < xx ML/day or < xx m3/s Volume/rate to be determined on case by case basis	Electrical conductivity (uS/cm): <insert water quality objective or 75 th percentile of long term background reference data> Sulphate (SO ₄ ²⁻): 250 mg/L
						Medium Flow > XX m3/s (where XX is specified event flow trigger)	< XX m3/s (where XX is the maximum release rate determined on case by case basis)	Electrical conductivity (uS/cm) <insert value determined on case specific basis but typically <1500 Sulphate (SO ₄ ²⁻) (mg/L) <insert limit to be determined based on achieving downstream target of 250 (Maximum) >
							< YY m3/s (where YY is the maximum release rate determined on case by case basis)	Electrical conductivity (uS/cm) <insert value determined on case specific basis but typically <3500 Sulphate (SO ₄ ²⁻) (mg/L) <insert limit to be determined based on achieving downstream target of 250 (Maximum)>
						High Flow > ZZ m3/s (where ZZ is a specified high flow event trigger)	< ZZ m3/s (where ZZ is the maximum release rate determined on case by case basis)	Electrical conductivity (uS/cm) <insert value determined on case specific basis but typically within a range of <3500 to <10,000 Sulphate (SO ₄ ²⁻) (mg/L) <insert limit to be determined based on achieving downstream target of 250 (Maximum)>

W12 The daily quantity of mine affected water released from each release point must be measured and recorded at the monitoring points in Table 1.

W13 Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

Notification of Release Event

W14 The environmental authority holder must notify the administering authority as soon as practicable and no later than 24 hours after commencing to release mine affected water to the receiving environment.

Notification must include the submission of written advice to the administering authority of the following information:

- a) release commencement date/time;
- b) expected release cessation date/time;
- c) release point/s;
- d) release volume (estimated);
- e) receiving water/s including the natural flow rate; and
- f) any details (including available data) regarding likely impacts on the receiving water(s).

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Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

W15 The environmental authority holder must notify the administering authority as soon as practicable (nominally within twenty-four (24) hours after cessation of a release event) of the cessation of a release notified under Condition W14 and within 28 days provide the following information in writing:

- a) release cessation date/time;
- b) natural flow volume in receiving water;
- c) volume of water released;
- d) details regarding the compliance of the release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
- e) all in-situ water quality monitoring results; and
- f) any other matters pertinent to the water release event.

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Note: Successive or intermittent releases occurring within twenty-four (24) hours of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with conditions W14 and W15, provided the relevant details of the release are included within the notification provided in accordance with conditions W14 and W15.

Notification of Release Event Exceedance

W16 If the release limits defined in Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.

W17 The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:

- a) the reason for the release;
- b) the location of the release;
- c) all water quality monitoring results;
- d) any general observations;
- e) all calculations; and
- f) any other matters pertinent to the water release event.

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EXPLANATORY NOTES – Water storage monitoring conditions:

Note: Conditions W18 and W19 can be removed if already conditioned in the authority or in the event that model conditions for regulated dams are finalised and they include relevant replacement conditions.

Monitoring of Water Storage Quality

W18 Water storages stated in Table 5 which are associated with the release points must be monitored for the water quality characteristics specified in Table 6 at the monitoring locations and at the monitoring frequency specified in Table 5.

Table 5 (Water Storage Monitoring)

Water Storage Description	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Monitoring Location	Frequency of Monitoring
XXXX	XXXX	XXXX	To be negotiated- will depend on the individual storage structure volume. This will deal with stratification – depth profiles and be appropriate to in situ quality characteristics.	Quarterly

W19 In the event that waters storages defined in Table 5 exceed the contaminant limits defined in Table 6, the holder of the environmental authority must implement measures, where practicable, to prevent access to waters by all livestock.

Table 6 (Onsite Water Storage Contaminant Limits)

Quality Characteristic	Test Value	Contaminant Limit
pH (pH unit)	Range	Greater than 4, less than 9 ²
EC (µS/cm)	Maximum	5970 ¹
Sulphate (mg/L)	Maximum	1000 ¹
Fluoride (mg/L)	Maximum	2 ¹
Aluminium (mg/L)	Maximum	5 ¹
Arsenic (mg/L)	Maximum	0.5 ¹
Cadmium (mg/L)	Maximum	0.01 ¹
Cobalt (mg/L)	Maximum	1 ¹
Copper (mg/L)	Maximum	1 ¹
Lead (mg/L)	Maximum	0.1 ¹
Nickel (mg/L)	Maximum	1 ¹
Zinc (mg/L)	Maximum	20 ¹

Note:

¹ Contaminant limit based on ANZECC & ARM CANZ (2000) stock water quality guidelines.

² Page 4.2-15 of ANZECC & ARM CANZ (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".

Note: Total measurements (unfiltered) must be taken and analysed

Receiving Environment Monitoring and Contaminant Trigger Levels

W20 The quality of the receiving waters must be monitored at the locations specified in Table 8 for each quality characteristic and at the monitoring frequency stated in Table 7.

Table 7 (Receiving Waters Contaminant Trigger Levels)

Quality Characteristic	Trigger Level	Monitoring Frequency
pH	6.5 – 8.5	Daily during the release
Electrical Conductivity (µS/cm)	1000 Note: for protection against toxicity this may need to be reduced in some circumstances e.g. where in close proximity upstream of a drinking water dam or regional waterway	
Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.	
Sulphate (SO ₄ ²⁻) (mg/L)	250 (Protection of drinking water Environmental Value)	
Sodium (mg/L)	TBA	

Table 8 (Receiving Water Upstream Background Sites and Down Stream Monitoring Points)

EXPLANATORY NOTES – Selection of monitoring sites:

The intent here is that that each discharge point has both an upstream and downstream monitoring point associated with it. These monitoring points should be located as close as practicable to the release point and the distances should be defined in the footnotes in Table 8. The location of flow monitoring points should also be considered in selecting upstream monitoring points. Other considerations include accessibility, particularly during wet weather conditions.

Monitoring Points	Receiving Waters Location Description	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)
Upstream Background Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Downstream Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX

Notes:

- a) The upstream monitoring point should be within Xkm the release point.
- b) the downstream point should not be greater than Xm from the release point.
- c) The data from background monitoring points must not be used where they are affected by releases from other mines.

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W21 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table 7 during a release event the environmental authority holder must compare the down stream results to the upstream results in the receiving waters and:

1. where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or

2. where the down stream results exceed the upstream results complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:

- (i) details of the investigations carried out; and
- (ii) actions taken to prevent environmental harm.

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Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W21(2) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

EXPLANATORY NOTES – Designing a REMP:

Generally the Receiving Environment Monitoring Program (REMP) should be used to assess the local receiving waters for the specified discharge locations. The monitoring should not be specifically designed to assess compliance of the release – this is covered by other conditions. The key purpose of the REMP is to assess the overall condition of the local receiving waters and assessment should be against water quality objectives and relevant guidelines. Note that in some cases where discharge occurs to ephemeral streams, there may be a need to include downstream sensitive receiving waters or environmental values outside of the specified REMP area. An example of this would be where there are no semi-permanent /permanent waterholes in the specific area but one is located further downstream prior to the confluence with the next major waterway. For further guidance on what to include in a REMP, please refer to the Draft DERM REMP Document for Fitzroy Coal Mines and Additional Information.

There is a potential for beneficial linkages of REMP monitoring to regional waterway monitoring programs, such as the Fitzroy Partnership monitoring program. For example DERM intends to maintain monitoring information compiled through individual REMP programs through an internal database under development. Industry has indicated its willingness to see this data shared with the Fitzroy Partnership for the purpose of a regional water monitoring program. Likewise it is possible for environmental authority holders to utilise relevant and available water monitoring information collected by other parties, such as the Fitzroy Partnership, as reference data for the purposes of the REMP required by this section.

W22 The environmental authority holder must develop and implement a Receiving Environment Monitoring Program (REMP) to monitor, identify and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity. This must include monitoring the effects of the mine on the receiving environment periodically (under natural flow conditions) and while mine affected water is being discharged from the site.

For the purposes of the REMP, the receiving environment is the waters of the XX and connected or surrounding waterways within XX (e.g. Xkm) downstream of the release. The REMP should encompass any sensitive receiving waters or environmental values downstream of the authorised mining activity that will potentially be directly affected by an authorised release of mine affected water.

W23 The REMP must:

- a) Assess the condition or state of receiving waters, including upstream conditions, spatially within the REMP area, considering background water quality characteristics based on accurate and reliable monitoring data that takes into consideration temporal variation (e.g. seasonality); and
- b) Be designed to facilitate assessment against water quality objectives for the relevant environmental values that need to be protected; and
- c) Include monitoring from background reference sites (e.g. upstream or background) and downstream sites from the release (as a minimum, the locations specified in Table 8); and
- d) Specify the frequency and timing of sampling required in order to reliably assess ambient conditions and to provide sufficient data to derive site specific background reference values in accordance with the *Queensland Water Quality Guidelines 2006*. This should include monitoring during periods of natural flow irrespective of mine or other discharges; and

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- e) Include monitoring and assessment of dissolved oxygen saturation, temperature and all water quality parameters listed in Table 2 and 3); and
- f) Include, where appropriate, monitoring of metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*); and
- g) Include, where appropriate, monitoring of macroinvertebrates in accordance with the AiusRivas methodology, and
- h) Apply procedures and/or guidelines from ANZECC & ARMCANZ 2000 and other relevant guideline documents; and
- i) Describe sampling and analysis methods and quality assurance and control; and
- j) Incorporate stream flow and hydrological information in the interpretations of water quality and biological data.

W24 A REMP Design Document that addresses each criterion presented in Conditions W22 and W23 must be prepared and submitted to the administering authority no later than 3 months after the date of issue of this environmental authority [include for new sites or expansion projects, remove for existing mine sites which already have REMP Design Documents]. Due consideration must be given to any comments made by the administering authority on the REMP Design Document and subsequent implementation of the program.

W25 A report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with conditions W22 and W23 must be prepared annually and made available on request to the administering authority. This must include an assessment of background reference water quality, the condition of downstream water quality compared against water quality objectives, and the suitability of current discharge limits to protect downstream environmental values.

Water Reuse

EXPLANATORY NOTES – Water reuse conditions

Mine affected water reuse conditions acknowledge that there is beneficial potential for using mine affected water. The conditions below provide examples of how such authorisation can be conditioned. The examples are not exhaustive and there may be valid proposals received to supply water to other industry types, or using different methods of transportation. In such cases it is important to consider any environmental risk associated with a proposal by considering what environmental values may be impacted by a given proposal, using an approach that accords with current criteria for environmental management decisions made by the administering authority, prior to presenting a recommendation to the relevant delegate for the decision.

- W26** Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party for the purpose of:
- i) supplying stock water subject to compliance with the quality release limits specified in Table 9; or
 - ii) supplying irrigation water subject to compliance with quality release limits in Table 10; or
 - iii) supplying water for construction and/or road maintenance in accordance with the conditions of this environmental authority.

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Table 9 (Stock Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	5000

Table 10 (Irrigation Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	Site specific value to be determined in accordance with ANZECC & ARMCANZ (2000) Irrigation Guidelines

W27 Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as dams or tanks, for the purpose of supplying water to <name adjoining mine>. The volume, pH and electrical conductivity of water transferred to <name adjoining mine> must be monitored and recorded.

W28 If the responsibility for mine affected water is given or transferred to another person in accordance with conditions **W26** or **W27**:

- a) the responsibility for the mine affected water must only be given or transferred in accordance with a written agreement (the third party agreement); and
- b) the third party agreement must include a commitment from the person utilising the mine affected water to use it in such a way as to prevent environmental harm or public health incidents and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters; and
- c) the third party agreement must be signed by both parties to the agreement.

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Water General

W29 All determinations of water quality and biological monitoring must be:

- a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
 - b) made in accordance with methods prescribed in the latest edition of the Department of Environment and Resource Management's Monitoring and Sampling Manual;
- Note: Condition W29 requires the Monitoring and Sampling Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.*
- c) collected from the monitoring locations identified within this environmental authority, within XX hour of each other where possible;
 - d) carried out on representative samples; and
 - e) analysed at a laboratory accredited (e.g. NATA) for the method of analysis being used.

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W30 The release of any contaminants as permitted by this environmental authority, directly or indirectly to waters, other than internal water management infrastructure that is installed and operated in accordance with a water management plan that complies with conditions W33 to W38 inclusive:

- a) must not produce any visible discolouration of receiving waters; and
- b) must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

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Annual Water Monitoring Reporting

W31 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:

- a) the date on which the sample was taken;
- b) the time at which the sample was taken;
- c) the monitoring point at which the sample was taken;
- d) the measured or estimated daily quantity of mine affected water released from all release points;
- e) the release flow rate at the time of sampling for each release point;
- f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority; and
- g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

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Temporary Interference with waterways

- W32** Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Environment and Resource Management *Guideline - Activities in a Watercourse, Lake or Spring associated with Mining Activities*.

Water Management Plan

- W33** A Water Management Plan must be developed by an appropriately qualified person and implemented by XX/XX/XXXX (WITHIN 3 MONTHS OF THE DATE OF ISSUE).

- W34** The Water Management Plan must:

- a) provide for effective management of actual and potential environmental impacts resulting from water management associated with the mining activity carried out under this environmental authority; and
- b) be developed in accordance with Department of Environment and Resource Management guideline *Preparation of water management plans for mining activities* and include:
 - i. a study of the source of contaminants;
 - ii. a water balance model for the site;
 - iii. a water management system for the site;
 - iv. measures to manage and prevent saline drainage;
 - v. measures to manage and prevent acid rock drainage;
 - vi. contingency procedures for emergencies; and
 - vii. a program for monitoring and review of the effectiveness of the water management plan.

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- W35** The Water Management Plan must be reviewed each calendar year and a report prepared by an appropriately qualified person. The report must:

- a) assess the plan against the requirements under condition W34;
- b) include recommended actions to ensure actual and potential environmental impacts are effectively managed for the coming year; and
- c) identify any amendments made to the water management plan following the review.

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- W36** The holder of this environmental authority must attach to the review report required by condition W35, a written response to the report and recommended actions, detailing the actions taken or to be taken by the environmental authority holder on stated dates:

- a) to ensure compliance with this environmental authority; and
- b) to prevent a recurrence of any non-compliance issues identified.

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- W37** The review report required by condition W35 and the written response to the review report required by condition W36 must be submitted to the administering authority with the subsequent annual return under the signature of the appointed signatory for the annual return.

W38 A copy of the Water Management Plan must be provided to the administering authority on request.

Saline Drainage

W39 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

W40 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water sediment controls

W41 An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.

W42 Stormwater, other than mine affected water, is permitted to be released to waters from:

- i) erosion and sediment control structures that are installed and operated in accordance with the Erosion and Sediment Control Plan required by condition W41; and
- ii) water management infrastructure that is installed and operated, in accordance with a Water Management Plan that complies with conditions W33 to W38 inclusive, for the purpose of ensuring water does not become mine affected water.

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W43 The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any receiving waters.

W44 Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters.

All Dams

EXPLANATORY NOTES – Dam conditions:

Note: Conditions W45 and W46 to be removed if already conditioned in the authority or in the event that model conditions for regulated dams are finalised and relevant replacement conditions are to be included into the EA.

W45 The hazard category of each dam must be determined by a suitably qualified and experienced person at least once in each two year period.

W46 Dams having a hazard category determined to be significant or high, must be specifically authorised by an environmental authority.

Definitions:

"acid rock drainage" means any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining activity.

"administering authority" means the Department of Environment and Resource Management or its successor.

"appropriately qualified person" means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods or literature.

"dam" means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. However; a dam does *not* mean a fabricated or manufactured tank or container designed to a recognised standard, *nor* does a dam mean a land-based structure where that structure is designed to an Australian Standard. In case there is any doubt, a levee (dyke or bund) is a dam, but (for example) a bund designed for spill containment to AS1940 is *not* a dam.

"environmental authority" means an environmental authority granted in relation to an environmentally relevant activity under the *Environmental Protection Act 1994*.

"environmental authority holder" means the holder of this environmental authority.

"flowable substance" means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

"hazard" in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

"hazard category" means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in "Manual for Assessing Hazard Categories and Hydraulic Performance of Dams", prepared by the Department of Environment and Resource Management, as amended from time to time.

"mine affected water" means the following types of water:

- i) pit water, tailings dam water, processing plant water;
- ii) water contaminated by a mining activity which would have been an environmentally relevant activity under Schedule 2 of the *Environmental Protection Regulation 2008* if it had not formed part of the mining activity;
- iii) rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage runoff containing sediment only, provided that this water has not been mixed with pit water, tailings dam water, processing plant water or workshop water;
- iv) groundwater which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated;
- v) groundwater from the mine's dewatering activities;
- vi) a mix of mine affected water (under any of paragraphs i)-v)) and other water.

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"natural flow" means the flow of water through waters caused by nature.

"receiving environment" means all groundwater, surface water, land, and sediments that are not disturbed areas authorised by this environmental authority.

"receiving waters" means all groundwater and surface water that are not disturbed areas authorised by this environmental authority.

"representative" means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

"saline drainage" The movement of waters, contaminated with salt(s), as a result of the mining activity.

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, and groundwater and any part thereof.



Floodwater undermines coal accord

Mark Ludlow

The Queensland government and Australia's largest coal producers have struck a compromise deal that will allow miners to release water from their operations in central Queensland next wet season to avoid a repetition of the lost production that followed this year's floods.

While the more flexible rules will assist companies such as BHP Billiton, Rio Tinto and Xstrata to deal with any future flooding, it will not help with the 500 gegalitres of water — the equivalent of Sydney Harbour — that remains in mine pits throughout the Bowen Basin.

The flooded pits contributed to a shortfall of up to 40 million tonnes in coal exports, worth \$7 billion, last financial year. This has had a major impact on Queensland and Australia's economic growth as well as the amount of coal royalties flowing into state coffers.

Coal companies are spending tens of millions of dollars to pump out excess water to enable them to mine their pits, because environmental regulations mean they cannot pump the water out

into nearby creeks or rivers, especially out of the wet season.

Queensland Resources Council chief executive Michael Roche said the industry was happy with the more flexible arrangements

proposed for next summer but companies were frustrated that the changes had not been implemented before the recent summer's floods.

"They are more sensible rules but we would have preferred they were in place two years ago," he told *The Australian Financial Review*.

"The industry now has a set of conditions which means they will be in better shape to handle above-average rainfall in the up-coming wet season," Mr Roche said.

"However, they are not so generous to offer much prospect for mines to deal with the legacy of water they already hold." Three-quarters of Queensland's 57 coalmines were affected by the summer's heavy rain, with 54 mines needing special approvals from the state government to deal with efforts to release excess water.

While some companies have been able to release water and return to full production, excess water has been an on-going issue for coal producers in central Queensland.

Coal exports from Queensland fell back to 12.7 million tonnes in July after reaching 14.7 million tonnes in June — the best month for the industry since November 2010.

The 12.7 million tonnes exported last month was 13 per cent below July last year and the lowest export

volume for that month since 2006.

Coal companies have experimented — with mixed success — with new ways to disperse the extra water, such as by irrigation, water treatment and evaporation.

The new rules for the discharge of water negotiated between the Department of Environment and Resource Management (DERM) and the coal industry can be adapted for each mine, depending on where they sit in the catchment.

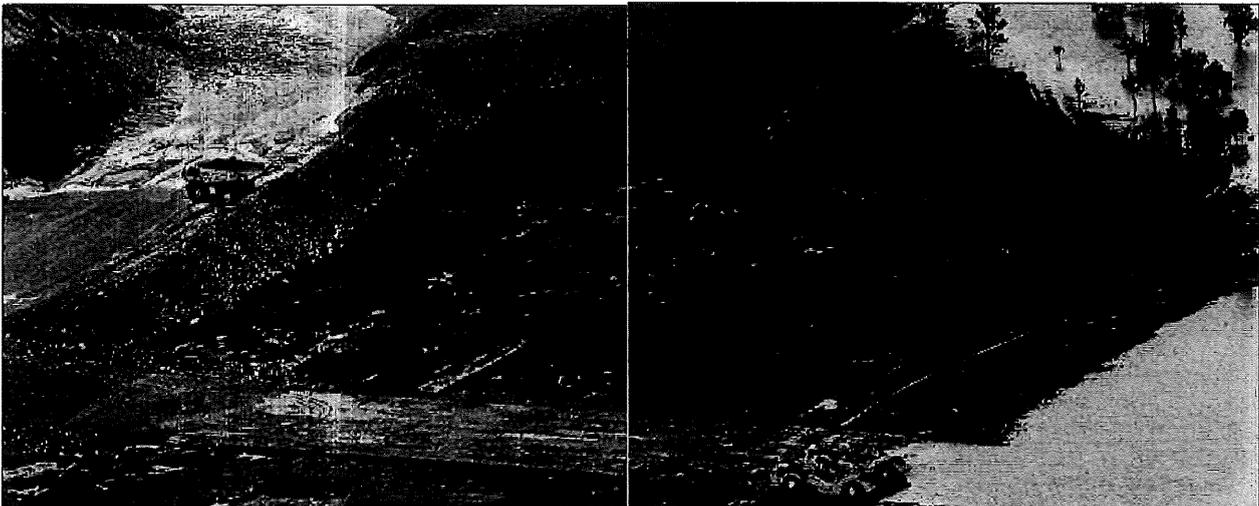
Importantly, the rules will give coal producers more opportunities to release excess water during high river flows while still meeting environmental standards.

DERM has previously defended the permit systems used last summer.

A spokesman for Xstrata Coal said the miner supported more practical solutions that would allow more timely, controlled discharges of water.

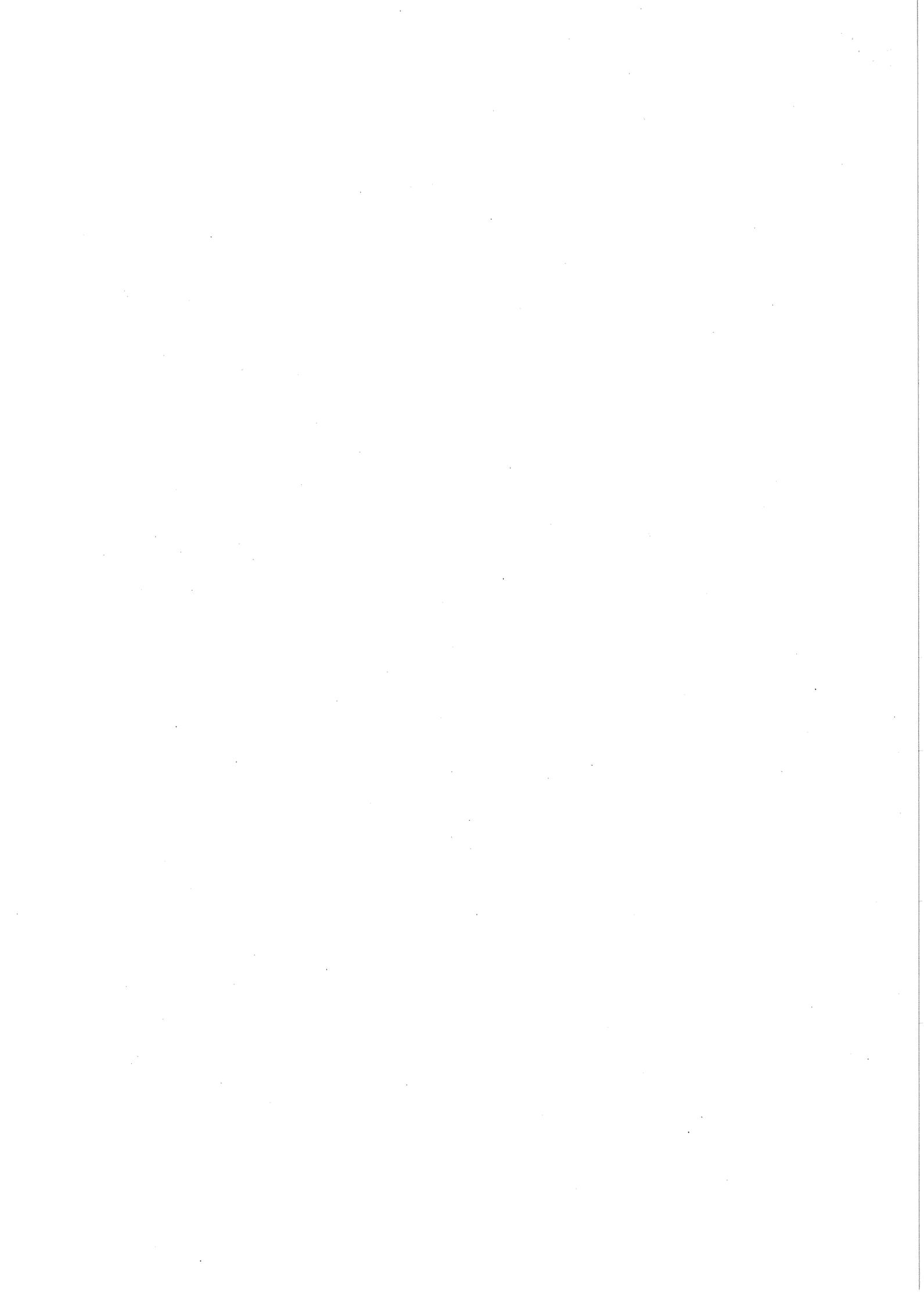
The company, which is the majority owner of the Rolleston open-cut mine, west of Gladstone, was looking into new ways to deal with extra water.

"We are currently investing significantly into capital works to alleviate water-management issues more efficiently across all of our sites," the Xstrata spokesman said.



In many cases, companies have not been able to pump out all the floodwater that swamped coalmines in central Queensland earlier this year.

Photo: REUTERS



Final Model Water Conditions for Coal Mines in the Fitzroy Basin

Note:

Explanatory notes are in green. DELETE prior to issue of EA.

Insertions required by applicants and or the administering authority are in blue. DELETE prior to issue.

Contaminant Release

- W1** Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activities, except as permitted under the conditions of this environmental authority.
- W2** Unless otherwise permitted under the conditions of this environmental authority, the release of mine affected water to waters must only occur from the release points specified in Table 1 and depicted in Figure 1 <this would be a plan or plans locating all monitoring (water quality and flow) and release points> attached to this environmental authority.
- W3** The release of mine affected water to internal water management infrastructure that is installed and operated in accordance with a water management plan that complies with conditions W33 to W38 inclusive is permitted.

Table 1 (Mine Affected Water Release Points, Sources and Receiving Waters)

EXPLANATORY NOTES – Determining Mine Affected Water Release Points:

Mine affected water release points should be specified in Table 1 where they represent a potential source of water contaminated by the mining activity. Release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage run-off containing sediment only that is not likely to contain contaminants or have properties that would cause environmental harm, do not need to be separately identified in Table 1.

Release Point (RP)	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Mine Affected Water Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	e.g. Stormwater Dam Spillway Overflow	Dam Spillway	Wet Creek
RP 2	XXXX	XXXX	e.g. Dam overflow pipe	Sampling Tap on pipe where the pipe enters Sandy Creek	Sandy Creek

- W4** The release of mine affected water to waters in accordance with condition W2 must not exceed the release limits stated in Table 2 when measured at the monitoring points specified in Table 1 for each quality characteristic.

Table 2 (Mine Affected Water Release Limits)

Quality Characteristic	Release Limits	Monitoring frequency	Comment
Electrical conductivity (uS/cm)	Release limits specified in Table 4 for variable flow criteria.	Daily during release (the first sample must be taken within 2 hours of commencement of	

		release)	
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
Turbidity (NTU)	Current limit or limit derived from suspended solids limit and demonstrated correlation between turbidity to suspended solids historical monitoring data for dam water*	Daily during release* (first sample within 2 hours of commencement of release)	Turbidity is required to assess ecosystems impacts and can provide instantaneous results.
Suspended Solids (mg/L)	Limit to be determined based on receiving water reference data and achievable best practice sedimentation control and treatment*	Daily during release* (first sample within 2 hours of commencement of release)	Suspended solids are required to measure the performance of sediment and erosion control measures.
Sulphate (SO ₄ ²⁻) (mg/L)	Release limits specified in Table 4 for variable flow criteria.	Daily during release* (first sample within 2 hours of commencement of release)	Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC.

Note: *Limit for suspended solids can be omitted if turbidity limit is included. Limit for turbidity not required if suspended solids limit included. Both indicators should be measured in all cases.

W5 The release of mine affected water to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2 and Table 3.

Note: the administering authority will take into consideration any extenuating circumstances prior to determining an appropriate enforcement response in the event condition W5 is contravened due to a temporary lack of safe or practical access. The administering authority expects the environmental authority holder to take all reasonable and practicable measures to maintain safe and practical access to designated monitoring locations.

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

EXPLANATORY NOTES – Table 3 Potential Contaminants:

The quality characteristics listed below should be assessed on a site by site basis by each mine prior to finalisation of amendment applications. Based on this assessment, the quality characteristic should be either disregarded if below trigger levels; or included as priority contaminants in Table 3 if above trigger levels. Assessment should involve comparison of representative data from dams that have historically been discharged or likely to be discharged from contaminant release points in Table 1. Data may include historical results or sampling undertaken for this specific purpose. The intent here is that not all dams on site would need to be sampled but those that would make up the majority of water in dams with release points. It could also be demonstrated based on existing water quality information that the water source and relative water quality of some dam are the same, in which case such dams may not need to be sampled individually. For metals and metalloids, trigger levels apply if dissolved results exceed trigger levels. However, total (unfiltered) results for metals and metalloids can be used to disregard a characteristic for inclusion in Table 3. Terms include SMD – slightly moderately disturbed level of protection, guideline - refers ANZECC & ARMCANZ (2000), LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical methods required to achieve LOR.

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level	Monitoring Frequency
Aluminium	55	For aquatic ecosystem protection, based on SMD guideline	Commencement of release and thereafter

Arsenic	13	For aquatic ecosystem protection, based on SMD guideline	weekly during release
Cadmium	0.2	For aquatic ecosystem protection, based on SMD guideline	
Chromium	1	For aquatic ecosystem protection, based on SMD guideline	
Copper	2	For aquatic ecosystem protection, based on LOR for ICPMS	
Iron	300	For aquatic ecosystem protection, based on low reliability guideline	
Lead	4	For aquatic ecosystem protection, based on SMD guideline	
Mercury	0.2	For aquatic ecosystem protection, based on LOR for CV FIMS	
Nickel	11	For aquatic ecosystem protection, based on SMD guideline	
Zinc	8	For aquatic ecosystem protection, based on SMD guideline	
Boron	370	For aquatic ecosystem protection, based on SMD guideline	
Cobalt	90	For aquatic ecosystem protection, based on low reliability guideline	
Manganese	1900	For aquatic ecosystem protection, based on SMD guideline	
Molybdenum	34	For aquatic ecosystem protection, based on low reliability guideline	
Selenium	10	For aquatic ecosystem protection, based on LOR for ICPMS	
Silver	1	For aquatic ecosystem protection, based on LOR for ICPMS	
Uranium	1	For aquatic ecosystem protection, based on LOR for ICPMS	
Vanadium	10	For aquatic ecosystem protection, based on LOR for ICPMS	
Ammonia	900	For aquatic ecosystem protection, based on SMD guideline	
Nitrate	1100	For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN	
Petroleum hydrocarbons (C6-C9)	20		
Petroleum hydrocarbons (C10-C36)	100		
Fluoride (total)	2000	Protection of livestock and short term irrigation guideline	
Sodium	TBA		
Include additional contaminants as required	Include additional contaminants as required		

Note:

1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.
2. The quality characteristics required to be monitored as per Table 3 can be reviewed once the results of two years monitoring data is available, or if sufficient data is available to adequately demonstrate negligible environmental risk, and it may be determined that a reduced monitoring frequency is appropriate or that certain quality characteristics can be removed from Table 3 by amendment.
3. SMD – slightly/moderately disturbed level of protection, guideline refers ANZECC & ARMCANZ (2000).
4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

W6 If quality characteristics of the release exceed any of the trigger levels specified in Table 3 during a release event, the environmental authority holder must compare the down stream results in the receiving waters to the trigger values specified in Table 3 and:

1. where the trigger values are not exceeded then no action is to be taken; or
2. where the down stream results exceed the trigger values specified Table 3 for any quality characteristic, compare the results of the down stream site to the data from background monitoring sites and;
 - (a) if the result is less than the background monitoring site data, then no action is to be taken; or
 - (b) if the result is greater than the background monitoring site data, complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

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Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W6 2(b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

- W7** If an exceedance in accordance with condition W6 2(b) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Mine Affected Water Release Events

- W8** The holder must ensure a stream flow gauging station/s is installed, operated and maintained to determine and record stream flows at the locations and flow recording frequency specified in Table 4.
- W9** Notwithstanding any other condition of this environmental authority, the release of mine affected water to waters in accordance with condition W2 must only take place during periods of natural flow events in accordance with the receiving water flow criteria for discharge specified in Table 4 for the release point(s) specified in Table 1.
- W10** The release of mine affected water to waters in accordance with condition W2 must not exceed the Electrical Conductivity and Sulphate release limits or the Maximum Release Rate (for all combined release point flows) for each receiving water flow criteria for discharge specified in Table 4 when measured at the monitoring points specified in Table 1.

Table 4 (Mine Affected Water Release during Flow Events)

EXPLANATORY NOTES – Table 4

Gauging station description:

The intent here is that every release point in Table 1 is associated with a gauging station that measures flow upstream of the discharge point. More than one discharge point may be associated with the same gauging station. The gauging station should be at a minimum distance from the discharge point such that water flow under trigger flow events will not significantly diminish by the time it reaches the discharge point. The location of the gauging station should ideally be such that it is not significantly affected by other upstream point source releases or times of discharge are limited to periods of "natural" flow.

Under certain circumstances it may be appropriate to have a downstream gauging station in addition to or in replace of an upstream gauging station. The location should ideally not be affected by the discharge (e.g. be measured off the main waterway). The need for this must be demonstrated on a case by case basis to show why an upstream gauging station is insufficient. This may be the case when mines are located in the upper parts of catchments or near the downstream confluence or a major waterway. Similarly, the gauging station should be at a distance from the discharge point such that water flow during triggered flow events will not significantly diminish between the discharge point and the measuring point (or the confluence with the creek being measured). For downstream flow triggers, some changes to calculation for flow triggers and maximum release flows would typically be required based on the relative sizes of the waterways involved.

Flow Triggers and EC Quality Criteria:

The intent for flow triggers is that the times of discharge are limited to times around natural flow events only. Different flow regime methodologies are used to define mine affected water release opportunities, provide flexibility for site operators and to protect identified environmental values within receiving waters. The expectation

is that where flow gauging data is available, it is used to calculate flow triggers. Where gauging data is not available or is insufficient, flow triggers should be based on runoff/stream flow estimates using appropriate hydrological calculations or models and known catchment area, rainfall estimations etc.

Separate methodologies for discharges which occur to local waterways rather than regional waterways will be applied as part of this revised approach. Due to the increased flexibility of the revised approach and consideration of a wider range of local factors the application of these model conditions to individual sites will require case-by-case assessment and require sufficient background information to be provided. For example, it should be noted that discharges upstream of dams or lakes may require special considerations and generally stricter controls. Also, where multiple mines discharge to the same or closely connected waterways consideration of cumulative impacts will be necessary as part of the assessment process.

Model conditions do not preclude applicants from proposing alternative or additional conditions, nor restrict the administering authority from using alternative conditions where the case warrants. However, applications proposing alternative approaches will need to be supported by sufficient environmental risk assessment and contingency planning information to allow the administering authority to adequately consider the proposal.

There may be instances where case-by-case proposals can be considered for conditions to address management of particularly heavy rainfall and flooding that is similar to previous events, where there is sufficient information available based on: previous transitional environmental programs, monitoring and analysis, the environmental values of the receiving environment together with the experience of impacts on those environmental values, rigorous contingency and disaster response planning, and with particular regard to actual and potential cumulative impacts. For example, there may be potential to tailor a schedule of conditions to be triggered upon reaching nominated thresholds of rainfall, flow, flooding (or a combination) based on learning from an event that has occurred in the past; possibly adopting a similar framework to previous discharge permissions granted in similar circumstances, provided the framework was demonstrated to adequately address environmental risk to the satisfaction of the delegate.

No/low flow stream conditions (best quality / low EC mine affected water):

Discharge water quality will need to meet or be better than water quality objectives (or long term background reference 75th / 80th percentile) for EC and will only be permitted for temporary periods after periods of significant flow. The focus of this is to allow "good" quality water to be released when collected rather than having it stored over long durations resulting in deteriorating water quality. Any discharges made under no/low flow stream conditions must not contribute to or cause erosion and due consideration should be given to road/rail access, stock crossings etc (particularly in relation to multiple mines discharging under no/low flow stream conditions on connected waterways). General principles include:

- Release at times when flow is on tail end of flow event only i.e. following a flow above specified event flow trigger and when the flow reduces below the flow trigger again. This trigger will commence a discharge window of 4-6 weeks for good quality water only.
- End of pipe WQ ≤ WQO (or long term background reference 75th/80th percentile). May require assessment of downstream environmental values where WQO is more stringent (e.g. drinking water supply).
- Duration of release is limited (dry ephemeral stream, 4 weeks after flow event ceases, use time after flow trigger for below – add additional time).
- Volume/rate will be considered on a case by case basis.

Medium flow stream conditions (medium quality mine affected water):

A flow trigger for the stream is required and will be set to avoid discharge of medium quality water during periods of no or low flow. General principles include:

- Requires the use of a stream flow trigger above which release can occur. The stream flow trigger must be representative of event flow and be above base/low flow (typically determined from hydrographs, historical flow/water quality data and/or modeling).

- End-of pipe EC <3500uS/cm. Options for either <1500uS/cm and <3500uS/cm as maximum limits can be considered which will result in different maximum discharge rates for different quality water. The better the quality of water to be released, the greater the volume that can be permitted.
- The design dilution/maximum discharge rate should be based on a site specific risk assessment. These should be designed to achieve an in-stream EC based on the location – upper (Zone 1), mid (Zone 2) or lower (Zone 3) catchment. The EC_{WQO high flow} should be adopted as background EC for design calculations.
 - o Zone 1, upper catchment mines, approximately <10km from top of waterway catchment.
EC_{in stream} = 1000uS/cm (toxicity guideline).
 - o Zone 2, mid catchment mines, zones not within Zone 1 or Zone 3
EC_{in stream} = 700uS/cm
 - o Zone 3, lower catchment mines (All regional waterways are considered Zone 3 from distance >50km from top of waterway catchment, refer to Zone 3 map) –
EC_{in stream} = EC_{high flow WQO} + multiplier x (EC_{WQO low flow} – EC_{WQO high flow})

e.g. multiplier = 0.2 for Isaac, Nogo, Dawson
- EC_{in stream} for calculations may vary according to other locally relevant environmental values that may need to be considered.

High flow stream conditions (poorer quality water):

This option might be used in some cases for mines that need to discharge higher EC wastewater than is allowable under medium flow stream conditions. Any discharge is required to have a higher level of dilution than with medium flow cases but still achieve a maximum incremental increase in the waterway. This option is most feasible for mines situated on regional waterways as the window for discharge is likely to be limited for local waterways. Some additional considerations on management of mixing zones and acute/chronic toxicity may be required in this case. General principles include:

- Requires the use of a stream flow trigger above which release can occur. The stream flow trigger must be representative of high event flow and be above medium flow (typically determined from hydrographs, historical flow/water quality data and/or modeling).
 - End-of pipe EC must be > 3500uS/cm (but <10,000uS/cm). The better the quality of water to be released, the greater the volume that can be permitted.
 - The design dilution/maximum discharge rate should be based on a site specific risk assessment. These should be designed to achieve an in-stream EC based on the location – upper (Zone 1), mid (Zone 2) or lower (Zone 3) catchment as described above. .
 - May need some additional indicators/requirements and requires case by case assessment.
 - This option is likely to be less feasible for Zone 1 and 2 mines.
-

Receiving waters/stream	Release Point (RP)	Gauging station	Gauging Station Latitude (decimal degree, GDA94)	Gauging Station Longitude (decimal degree, GDA94)	Receiving Water Flow Recording Frequency	Receiving Water Flow Criteria for discharge (m ³ /s)	Maximum release rate (for all combined RP flows)	Electrical Conductivity and Sulphate Release Limits
e.g. Wet Creek	Insert all release points that will release based on this gauging station flow. e.g. RP1, RP2 & RP3	e.g. Gauging station 1	XXXX	XXXX	Continuous (minimum daily)	Low Flow <XX m3/s for a period of <insert number of days> after natural flow events that exceed XX m3/s (where XX is a specified event flow trigger)	Insert < xx ML/day or < xx m3/s Volume/rate to be determined on case by case basis	Electrical conductivity (uS/cm): <insert water quality objective or 75 th percentile of long term background reference data> Sulphate (SO ₄ ²⁻): 250 mg/L
						Medium Flow > XX m3/s (where XX is specified event flow trigger)	< XX m3/s (where XX is the maximum release rate determined on case by case basis)	Electrical conductivity (uS/cm) <insert value determined on case specific basis but typically <1500 Sulphate (SO ₄ ²⁻) (mg/L) <insert limit to be determined based on achieving downstream target of 250 (Maximum) >
						< YY m3/s (where YY is the maximum release rate determined on case by case basis)	Electrical conductivity (uS/cm) <insert value determined on case specific basis but typically <3500 Sulphate (SO ₄ ²⁻) (mg/L) <insert limit to be determined based on achieving downstream target of 250 (Maximum)>	
						High Flow > ZZ m3/s (where ZZ is a specified high flow event trigger)	< ZZ m3/s (where ZZ is the maximum release rate determined on case by case basis)	Electrical conductivity (uS/cm) <insert value determined on case specific basis but typically within a range of <3500 to <10,000 Sulphate (SO ₄ ²⁻) (mg/L) <insert limit to be determined based on achieving downstream target of 250 (Maximum)>

W12 The daily quantity of mine affected water released from each release point must be measured and recorded at the monitoring points in Table 1.

W13 Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

Notification of Release Event

W14 The environmental authority holder must notify the administering authority as soon as practicable and no later than 24 hours after commencing to release mine affected water to the receiving environment.

Notification must include the submission of written advice to the administering authority of the following information:

- a) release commencement date/time;
- b) expected release cessation date/time;
- c) release point/s;
- d) release volume (estimated);
- e) receiving water/s including the natural flow rate; and
- f) any details (including available data) regarding likely impacts on the receiving water(s).

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Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

W15 The environmental authority holder must notify the administering authority as soon as practicable (nominally within twenty-four (24) hours after cessation of a release event) of the cessation of a release notified under Condition W14 and within 28 days provide the following information in writing:

- a) release cessation date/time;
- b) natural flow volume in receiving water;
- c) volume of water released;
- d) details regarding the compliance of the release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
- e) all in-situ water quality monitoring results; and
- f) any other matters pertinent to the water release event.

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Note: Successive or intermittent releases occurring within twenty-four (24) hours of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with conditions W14 and W15, provided the relevant details of the release are included within the notification provided in accordance with conditions W14 and W15.

Notification of Release Event Exceedance

W16 If the release limits defined in Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.

W17 The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:

- a) the reason for the release;
- b) the location of the release;
- c) all water quality monitoring results;
- d) any general observations;
- e) all calculations; and
- f) any other matters pertinent to the water release event.

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EXPLANATORY NOTES – Water storage monitoring conditions:

Note: Conditions W18 and W19 can be removed if already conditioned in the authority or in the event that model conditions for regulated dams are finalised and they include relevant replacement conditions.

Monitoring of Water Storage Quality

W18 Water storages stated in Table 5 which are associated with the release points must be monitored for the water quality characteristics specified in Table 6 at the monitoring locations and at the monitoring frequency specified in Table 5.

Table 5 (Water Storage Monitoring)

Water Storage Description	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Monitoring Location	Frequency of Monitoring
XXXX	XXXX	XXXX	To be negotiated- will depend on the individual storage structure volume. This will deal with stratification – depth profiles and be appropriate to in situ quality characteristics.	Quarterly

W19 In the event that waters storages defined in Table 5 exceed the contaminant limits defined in Table 6, the holder of the environmental authority must implement measures, where practicable, to prevent access to waters by all livestock.

Table 6 (Onsite Water Storage Contaminant Limits)

Quality Characteristic	Test Value	Contaminant Limit
pH (pH unit)	Range	Greater than 4, less than 9 ²
EC (µS/cm)	Maximum	5970 ¹
Sulphate (mg/L)	Maximum	1000 ¹
Fluoride (mg/L)	Maximum	2 ¹
Aluminium (mg/L)	Maximum	5 ¹
Arsenic (mg/L)	Maximum	0.5 ¹
Cadmium (mg/L)	Maximum	0.01 ¹
Cobalt (mg/L)	Maximum	1 ¹
Copper (mg/L)	Maximum	1 ¹
Lead (mg/L)	Maximum	0.1 ¹
Nickel (mg/L)	Maximum	1 ¹
Zinc (mg/L)	Maximum	20 ¹

Note:

¹ Contaminant limit based on ANZECC & ARMCANZ (2000) stock water quality guidelines.

² Page 4.2-15 of ANZECC & ARMCANZ (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".

Note: Total measurements (unfiltered) must be taken and analysed

Receiving Environment Monitoring and Contaminant Trigger Levels

W20 The quality of the receiving waters must be monitored at the locations specified in Table 8 for each quality characteristic and at the monitoring frequency stated in Table 7.

Table 7 (Receiving Waters Contaminant Trigger Levels)

Quality Characteristic	Trigger Level	Monitoring Frequency
pH	6.5 – 8.5	Daily during the release
Electrical Conductivity ($\mu\text{S/cm}$)	1000 Note: for protection against toxicity this may need to be reduced in some circumstances e.g. where in close proximity upstream of a drinking water dam or regional waterway	
Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.	
Sulphate (SO_4^{2-}) (mg/L)	250 (Protection of drinking water Environmental Value)	
Sodium (mg/L)	TBA	

Table 8 (Receiving Water Upstream Background Sites and Down Stream Monitoring Points)

EXPLANATORY NOTES – Selection of monitoring sites:

The intent here is that that each discharge point has both an upstream and downstream monitoring point associated with it. These monitoring points should be located as close as practicable to the release point and the distances should be defined in the footnotes in Table 8. The location of flow monitoring points should also be considered in selecting upstream monitoring points. Other considerations include accessibility, particularly during wet weather conditions.

Monitoring Points	Receiving Waters Location Description	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)
Upstream Background Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Downstream Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX

Notes:

- a) The upstream monitoring point should be within Xkm the release point.
- b) the downstream point should not be greater than Xkm from the release point.
- c) The data from background monitoring points must not be used where they are affected by releases from other mines.

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W21 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table 7 during a release event the environmental authority holder must compare the down stream results to the upstream results in the receiving waters and:

1. where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or

2. where the down stream results exceed the upstream results complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:

- (i) details of the investigations carried out; and
- (ii) actions taken to prevent environmental harm.

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Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W21(2) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

EXPLANATORY NOTES – Designing a REMP:

Generally the Receiving Environment Monitoring Program (REMP) should be used to assess the local receiving waters for the specified discharge locations. The monitoring should not be specifically designed to assess compliance of the release – this is covered by other conditions. The key purpose of the REMP is to assess the overall condition of the local receiving waters and assessment should be against water quality objectives and relevant guidelines. Note that in some cases where discharge occurs to ephemeral streams, there may be a need to include downstream sensitive receiving waters or environmental values outside of the specified REMP area. An example of this would be where there are no semi-permanent /permanent waterholes in the specific area but one is located further downstream prior to the confluence with the next major waterway. For further guidance on what to include in a REMP, please refer to the Draft DERM REMP Document for Fitzroy Coal Mines and Additional Information.

There is a potential for beneficial linkages of REMP monitoring to regional waterway monitoring programs, such as the Fitzroy Partnership monitoring program. For example DERM intends to maintain monitoring information compiled through individual REMP programs through an internal database under development. Industry has indicated its willingness to see this data shared with the Fitzroy Partnership for the purpose of a regional water monitoring program. Likewise it is possible for environmental authority holders to utilise relevant and available water monitoring information collected by other parties, such as the Fitzroy Partnership, as reference data for the purposes of the REMP required by this section.

W22 The environmental authority holder must develop and implement a Receiving Environment Monitoring Program (REMP) to monitor, identify and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity. This must include monitoring the effects of the mine on the receiving environment periodically (under natural flow conditions) and while mine affected water is being discharged from the site.

For the purposes of the REMP, the receiving environment is the waters of the XX and connected or surrounding waterways within XX (e.g. Xkm) downstream of the release. The REMP should encompass any sensitive receiving waters or environmental values downstream of the authorised mining activity that will potentially be directly affected by an authorised release of mine affected water.

W23 The REMP must:

- a) Assess the condition or state of receiving waters, including upstream conditions, spatially within the REMP area, considering background water quality characteristics based on accurate and reliable monitoring data that takes into consideration temporal variation (e.g. seasonality); and
- b) Be designed to facilitate assessment against water quality objectives for the relevant environmental values that need to be protected; and
- c) Include monitoring from background reference sites (e.g. upstream or background) and downstream sites from the release (as a minimum, the locations specified in Table 8); and
- d) Specify the frequency and timing of sampling required in order to reliably assess ambient conditions and to provide sufficient data to derive site specific background reference values in accordance with the *Queensland Water Quality Guidelines* 2006. This should include monitoring during periods of natural flow irrespective of mine or other discharges; and

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- e) Include monitoring and assessment of dissolved oxygen saturation, temperature and all water quality parameters listed in Table 2 and 3); and
- f) Include, where appropriate, monitoring of metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*); and
- g) Include, where appropriate, monitoring of macroinvertebrates in accordance with the AusRivas methodology, and
- h) Apply procedures and/or guidelines from ANZECC & ARMCANZ 2000 and other relevant guideline documents; and
- i) Describe sampling and analysis methods and quality assurance and control; and
- j) Incorporate stream flow and hydrological information in the interpretations of water quality and biological data.

W24 A REMP Design Document that addresses each criterion presented in Conditions W22 and W23 must be prepared and submitted to the administering authority **no later than 3 months after the date of issue of this environmental authority** [include for new sites or expansion projects, remove for existing mine sites which already have REMP Design Documents]. Due consideration must be given to any comments made by the administering authority on the REMP Design Document and subsequent implementation of the program.

W25 A report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with conditions W22 and W23 must be prepared annually and made available on request to the administering authority. This must include an assessment of background reference water quality, the condition of downstream water quality compared against water quality objectives, and the suitability of current discharge limits to protect downstream environmental values.

Water Reuse

EXPLANATORY NOTES – Water reuse conditions

Mine affected water reuse conditions acknowledge that there is beneficial potential for using mine affected water. The conditions below provide examples of how such authorisation can be conditioned. The examples are not exhaustive and there may be valid proposals received to supply water to other industry types, or using different methods of transportation. In such cases it is important to consider any environmental risk associated with a proposal by considering what environmental values may be impacted by a given proposal, using an approach that accords with current criteria for environmental management decisions made by the administering authority, prior to presenting a recommendation to the relevant delegate for the decision.

- W26** Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party for the purpose of:
- i) supplying stock water subject to compliance with the quality release limits specified in Table 9; or
 - ii) supplying irrigation water subject to compliance with quality release limits in Table 10; or
 - iii) supplying water for construction and/or road maintenance in accordance with the conditions of this environmental authority.

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Table 9 (Stock Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	5000

Table 10 (Irrigation Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	Site specific value to be determined in accordance with ANZECC & ARMCANZ (2000) Irrigation Guidelines

W27 Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as dams or tanks, for the purpose of supplying water to <name adjoining mine>. The volume, pH and electrical conductivity of water transferred to <name adjoining mine> must be monitored and recorded.

W28 If the responsibility for mine affected water is given or transferred to another person in accordance with conditions **W26** or **W27**:

- a) the responsibility for the mine affected water must only be given or transferred in accordance with a written agreement (the third party agreement); and
- b) the third party agreement must include a commitment from the person utilising the mine affected water to use it in such a way as to prevent environmental harm or public health incidents and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters; and
- c) the third party agreement must be signed by both parties to the agreement.

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Water General

W29 All determinations of water quality and biological monitoring must be:

- a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
 - b) made in accordance with methods prescribed in the latest edition of the Department of Environment and Resource Management's Monitoring and Sampling Manual;
- Note: Condition W29 requires the Monitoring and Sampling Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.*
- c) collected from the monitoring locations identified within this environmental authority, within XX hour of each other where possible;
 - d) carried out on representative samples; and
 - e) analysed at a laboratory accredited (e.g. NATA) for the method of analysis being used.

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W30 The release of any contaminants as permitted by this environmental authority, directly or indirectly to waters, other than internal water management infrastructure that is installed and operated in accordance with a water management plan that complies with conditions W33 to W38 inclusive:

- a) must not produce any visible discolouration of receiving waters; and
- b) must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

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Annual Water Monitoring Reporting

W31 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:

- a) the date on which the sample was taken;
- b) the time at which the sample was taken;
- c) the monitoring point at which the sample was taken;
- d) the measured or estimated daily quantity of mine affected water released from all release points;
- e) the release flow rate at the time of sampling for each release point;
- f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority; and
- g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

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Temporary Interference with waterways

W32 Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Environment and Resource Management *Guideline - Activities in a Watercourse, Lake or Spring associated with Mining Activities*.

Water Management Plan

W33 A Water Management Plan must be developed by an appropriately qualified person and implemented by **XX/XX/XXXX (WITHIN 3 MONTHS OF THE DATE OF ISSUE)**.

W34 The Water Management Plan must:

- a) provide for effective management of actual and potential environmental impacts resulting from water management associated with the mining activity carried out under this environmental authority; and
- b) be developed in accordance with Department of Environment and Resource Management guideline *Preparation of water management plans for mining activities* and include:
 - i. a study of the source of contaminants;
 - ii. a water balance model for the site;
 - iii. a water management system for the site;
 - iv. measures to manage and prevent saline drainage;
 - v. measures to manage and prevent acid rock drainage;
 - vi. contingency procedures for emergencies; and
 - vii. a program for monitoring and review of the effectiveness of the water management plan.

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W35 The Water Management Plan must be reviewed each calendar year and a report prepared by an appropriately qualified person. The report must:

- a) assess the plan against the requirements under condition W34;
- b) include recommended actions to ensure actual and potential environmental impacts are effectively managed for the coming year; and
- c) identify any amendments made to the water management plan following the review.

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W36 The holder of this environmental authority must attach to the review report required by condition W35, a written response to the report and recommended actions, detailing the actions taken or to be taken by the environmental authority holder on stated dates:

- a) to ensure compliance with this environmental authority; and
- b) to prevent a recurrence of any non-compliance issues identified.

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W37 The review report required by condition W35 and the written response to the review report required by condition W36 must be submitted to the administering authority with the subsequent annual return under the signature of the appointed signatory for the annual return.

W38 A copy of the Water Management Plan must be provided to the administering authority on request.

Saline Drainage

W39 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

W40 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water sediment controls

W41 An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.

W42 Stormwater, other than mine affected water, is permitted to be released to waters from:

- i) erosion and sediment control structures that are installed and operated in accordance with the Erosion and Sediment Control Plan required by condition W41; and
- ii) water management infrastructure that is installed and operated, in accordance with a Water Management Plan that complies with conditions W33 to W38 inclusive, for the purpose of ensuring water does not become mine affected water.

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W43 The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any receiving waters.

W44 Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters.

All Dams

EXPLANATORY NOTES – Dam conditions:

Note: Conditions W45 and W46 to be removed if already conditioned in the authority or in the event that model conditions for regulated dams are finalised and relevant replacement conditions are to be included into the EA.

W45 The hazard category of each dam must be determined by a suitably qualified and experienced person at least once in each two year period.

W46 Dams having a hazard category determined to be significant or high, must be specifically authorised by an environmental authority.

Definitions:

“acid rock drainage” means any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining activity.

“administering authority” means the Department of Environment and Resource Management or its successor.

“appropriately qualified person” means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods or literature.

“dam” means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. However; a dam does *not* mean a fabricated or manufactured tank or container designed to a recognised standard, *nor* does a dam mean a land-based structure where that structure is designed to an Australian Standard. In case there is any doubt, a levee (dyke or bund) is a dam, but (for example) a bund designed for spill containment to AS1940 is *not* a dam.

“environmental authority” means an environmental authority granted in relation to an environmentally relevant activity under the *Environmental Protection Act 1994*.

“environmental authority holder” means the holder of this environmental authority.

“flowable substance” means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

“hazard” in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

“hazard category” means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in “Manual for Assessing Hazard Categories and Hydraulic Performance of Dams”, prepared by the Department of Environment and Resource Management, as amended from time to time.

“mine affected water” means the following types of water:

- i) pit water, tailings dam water, processing plant water;
- ii) water contaminated by a mining activity which would have been an environmentally relevant activity under Schedule 2 of the *Environmental Protection Regulation 2008* if it had not formed part of the mining activity;
- iii) rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage runoff containing sediment only, provided that this water has not been mixed with pit water, tailings dam water, processing plant water or workshop water;
- iv) groundwater which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated;
- v) groundwater from the mine's dewatering activities;
- vi) a mix of mine affected water (under any of paragraphs i)-v)) and other water.

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“natural flow” means the flow of water through waters caused by nature.

“receiving environment” means all groundwater, surface water, land, and sediments that are not disturbed areas authorised by this environmental authority.

“receiving waters” means all groundwater and surface water that are not disturbed areas authorised by this environmental authority.

“representative” means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

“saline drainage” The movement of waters, contaminated with salt(s), as a result of the mining activity.

“waters” includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, and groundwater and any part thereof.

CTS No. [CTS No] 13393/11

Department of Environment and Resource Management
GENERAL BRIEFING NOTE

<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Not Approved <input type="checkbox"/> Noted <input type="checkbox"/> Further information required
Signed: [Redacted]
Dated: 3 12/01/11

TO: General Manager – Strategic
Implementation, Coal and Coal Seam Gas

SUBJECT: Fitzroy Model Water Conditions for Coal Mines

TIMEFRAME

- Approval/Noting of this brief is required urgently to complete the review of model conditions within committed timeframes.

RECOMMENDATION

It is recommended that you:

- endorse the final Fitzroy Model Water Conditions for Coal Mines as attached (Attachment 1).
- endorse the enclosed Ministerial briefing note advising of the completion of the model condition review (Attachment 2).

BACKGROUND

- Following severe flooding in 2008 the former Environmental Protection Agency authorised a release of water (150 gigalitres) trapped at the Ensham Coal Mine near Emerald into the Nogoa River.
- High salinity in the discharge impacted waterways and affected drinking water supplies at Rockhampton and surrounds resulting in intense scrutiny of departmental actions.
- A number of actions occurred, including: the Premier commissioning Professor Barry Hart to provide a report on the incident; a study of cumulative impacts by the Department; formation of the Fitzroy Water Quality Advisory Group consisting of industry, government and conservation group representatives; and an improved approach to providing water quality information to the community via web published information.
- The Department resolved to improve its Environmental Authority (EA) conditions for coal mine water discharges, develop local water quality guidelines for the Fitzroy Basin, and develop a model for assessing cumulative impacts across the region.
- Model conditions for coal mine water management (the Fitzroy Model Water Conditions) were developed in 2009 and were scheduled for review in October 2011 to coincide with the anticipated scheduling of local water quality objectives.

CURRENT ISSUES

- The review of model conditions is now complete, subject to your endorsement of the final model conditions.
- Key changes to the conditions include the development and inclusion of alternative discharge conditioning methodology based on variable locations for mines and flow conditions in receiving waters.
- Other changes include the development of a definition for 'mine affected water', improved accountability with respect to Water Management Plans, and a number of changes to improve the literal wording of conditions and currency of the model condition package.
- There has been significant consultation undertaken throughout this review, most notably with the Queensland Resources Council (QRC) and the members of the Fitzroy Water Quality Advisory Group.

Author Name: [Redacted] Position: Director, Coal Operations Tel No: [Redacted] Date: 29 July 2011	Cleared by Name: Position: Tel No: <hr/> Name: Position: Tel No:	Cleared by Name: Position: Tel No: <hr/> Name: Position: Tel No:	Recommended: Name: [Redacted] Position: Director, Coal Operations Tel No: [Redacted] Date: 29 July 2011
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- Internally, work contributed by the Aquatic Ecosystem Risk & Decision Support team in the Environment and Resource Sciences Division has been invaluable, as has contributions from the Central West Region and Environment and Natural Resource Regulation Division.
- The model conditions have been prepared with due regard to comments received from stakeholders, while maintaining the Department's intent to protect environmental values throughout the Fitzroy Basin.
- Comments and proposed responses to QRC (to be provided following your endorsement of the conditions) are at Attachment 3.
- The Department has committed to provide a report outlining changes to the next Fitzroy Water Quality Advisory Group meeting.

RESOURCE/IMPLEMENTATION IMPLICATIONS

- The Department expects to process a significant number of Environmental Authority applications as mining companies seek to incorporate the new model conditions into their operations. This will create a service demand that will be met through existing resource levels.
- The increase in amendment assessment demand will be offset somewhat by a reduced potential for TEP applications in future, although it is estimated that just under half of mines seeking TEPs to discharge during the 2010-11 wet season may seek a similar approval in future during a wet season of a similar magnitude.
- In consultation with Environment and Resource Sciences Division the Department may undertake to provide a workshop for mine companies to provide case examples of information required to work through the new conditioning methodology.

PROPOSED ACTION

- Endorse the model conditions to allow progression of Environmental Authority amendments and associated departmental compliance activities around coal mine water management throughout the Fitzroy Basin.

COMMENTS

ATTACHMENTS

- Attachment 1. Proposed Final Fitzroy Model Water Conditions for Coal Mines.
- Attachment 2. Proposed Ministerial Briefing Note advising of completion of the review.
- Attachment 3. QRC comments and proposed responses.

Author Name: [REDACTED] Position: Director, Coal Operations Tel No: [REDACTED] Date: 29 July 2011	Cleared by Name: Position: Tel No: <hr/> Name: Position: Tel No:	Cleared by Name: Position: Tel No: <hr/> Name: Position: Tel No:	Recommended: Name: [REDACTED] Position: Director, Coal Operations Tel No: [REDACTED] Date: 29 July 2011
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Model Water Conditions for Coal Mines in the Fitzroy Basin

Note:

Explanatory notes are in green. DELETE prior to issue of EA.

Insertions required by applicants and or the administering authority are in blue. DELETE prior to issue.

Contaminant Release

W1 Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this environmental authority.

W2 The release of mine affected water to waters must only occur from the release points specified in Table 1 and depicted in Figure 1 <this would be a plan or plans locating all monitoring (water quality and flow) and release points> attached to this environmental authority. For the purpose of this condition only, 'waters' does not include:

- a) <list any on-site water management infrastructure that for the purpose of effective site water management in accordance with the conditions of the EA should not be prohibited from receiving mine affected water i.e. infrastructure identified in the Water Management Plan>;
- b) <e.g. internal dam to dam transfer for managing internal dam free board. Infrastructure needs to be clearly identified as per site plans e.g. Dam 1, Dam 2>;
- c) <e.g. internal stormwater channel used to transfer mine affected water on-site>; etc

EXPLANATORY NOTES – Exclusions from the 'waters' definition for condition W2

The need for including specific exclusions from the 'waters' definition for the release condition acknowledges that the deliberately broad definition of 'waters' can literally capture on-site water storage and transfer infrastructure. Reasonable consideration should be given to the need for practical on-site management. Exclusions from the 'waters' definition should not include natural waterways, stormwater channels that will flow directly to natural waterways, or other waters with identified environmental values requiring protection.

Table 1 (Mine Affected Water Release Points, Sources and Receiving Waters)

EXPLANATORY NOTES – Determining Mine Affected Water Release Points:

Mine affected water release points should be specified in Table 1 where they represent a potential source of water contaminated by the mining activity. Release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage run-off containing sediment only that is not likely to contain contaminants or have properties that would cause environmental harm, do not need to be separately identified in Table 1.

Release Point (RP)	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Contaminant Source and Location	Monitoring Point	Receiving waters description
RP 1	XXXX	XXXX	e.g. Stormwater Dam Spillway Overflow	Dam Spillway	Wet Creek
RP 2	XXXX	XXXX	e.g. Dam overflow pipe	Sampling Tap on pipe where the pipe enters Sandy Creek	Sandy Creek

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W3 The release of mine affected water to waters in accordance with condition W2 must not exceed the release limits stated in Table 2 when measured at the monitoring points specified in Table 1 for each quality characteristic.

Table 2 (Mine Affected Water Release Limits)

Quality Characteristic	Release Limits	Monitoring frequency	Comment
Electrical conductivity (uS/cm)	Release limits specified in Table 4 for variable flow criteria.	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	
Turbidity (NTU)	Current limit or limit derived from suspended solids limit and demonstrated correlation between turbidity to suspended solids historical monitoring data for dam water*	Daily during release* (first sample within 2 hours of commencement of release)	Turbidity is required to assess ecosystems impacts and can provide instantaneous results.
Suspended Solids (mg/L)	Limit to be determined based on receiving water reference data and achievable best practice sedimentation control and treatment*	Daily during release* (first sample within 2 hours of commencement of release)	Suspended solids are required to measure the performance of sediment and erosion control measures.
Sulphate (SO ₄ ²⁻) (mg/L)	Limit to be determined based on achieving downstream target of 250 (Maximum) (Protection of drinking water Environmental Value)	Daily during release* (first sample within 2 hours of commencement of release)	Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC.

*Note: *Limit for suspended solids can be omitted if turbidity limit is included. Limit for turbidity not required if suspended solids limit included. Both indicators should be measured in all cases.*

W4 The release of mine affected water to waters from the release points must be monitored at the locations specified in Table 1 for each quality characteristics and at the frequency specified in Table 2 and Table 3.

Note: the administering authority will take into consideration any extenuating circumstances prior to determining an appropriate enforcement response in the event condition W4 is contravened due to a temporary lack of safe or practical access. The administering authority expects the environmental authority holder to take all reasonable and practical measures to maintain safe and practical access to designated monitoring locations.

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

EXPLANATORY NOTES – Table 3 Potential Contaminants:

The quality characteristics listed below should be assessed on a site by site basis by each mine prior to finalisation of amendment applications. Based on this assessment, the quality characteristic should be either disregarded if below trigger levels; or included as priority contaminants in Table 3 if above trigger levels. Assessment should involve comparison of representative data from dams that have historically been discharged or likely to be discharged from contaminant release points in Table 1. Data may include historical results or sampling undertaken for this specific purpose. The intent here is that not all dams on site would need to be sampled but those that would make up the majority of water in dams with release points. It could also be demonstrated based on existing water quality information that the water source and relative water quality of some dam are the same, in which case such dams may not need to be sampled individually. For metals and metalloids,

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trigger levels apply if dissolved results exceed trigger levels. However, total (unfiltered) results for metals and metalloids can be used to disregard a characteristic for inclusion in Table 3. Terms include SMD – slightly moderately disturbed level of protection, guideline - refers ANZECC & ARMCANZ (2000), LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical methods required to achieve LOR.

Table 3 (Release Contaminant Trigger Investigation Levels) Potential Contaminants

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level	Monitoring Frequency
Aluminium	55	<i>For aquatic ecosystem protection, based on SMD guideline</i>	Commencement of release and thereafter weekly during release
Arsenic	13	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Cadmium	0.2	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Chromium	1	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Copper	2	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Iron	300	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Lead	4	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Mercury	0.2	<i>For aquatic ecosystem protection, based on LOR for CV FIMS</i>	
Nickel	11	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Zinc	8	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Boron	370	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Cobalt	90	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Manganese	1900	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Molybdenum	34	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
Selenium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Silver	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Uranium	1	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Vanadium	10	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
Ammonia	900	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
Nitrate	1100	<i>For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN</i>	
Petroleum hydrocarbons (C6-C9)	20		
Petroleum hydrocarbons (C10-C36)	100		
Fluoride (total)	2000	<i>Protection of livestock and short term irrigation guideline</i>	
Include additional contaminants as required	Include additional contaminants as required		

Note:

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1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.
2. The quality characteristics required to be monitored as per Table 3 can be reviewed once the results of two years monitoring data is available and it may be determined that a reduced monitoring frequency is appropriate or that certain quality characteristics can be removed from Table 3 by amendment.
3. SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARMCANZ (2000).
4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

- W5** If quality characteristics of the release exceed any of the trigger levels specified in Table 3 during a release event, the environmental authority holder must compare the down stream results in the receiving waters to the trigger values specified in Table 3 and:
1. where the trigger values are not exceeded then no action is to be taken; or
 2. where the down stream results exceed the trigger values specified Table 3 for any quality characteristic, compare the results of the down stream site to the data from background monitoring sites and;
 - (a) if the result is less than the background monitoring site data, then no action is to be taken; or
 - (b) if the result is greater than the background monitoring site data, complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W5 2(b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

- W6** If an exceedance in accordance with condition W5 2(b) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Contaminant Release Events

- W7** The holder must install, operate and maintain a stream flow gauging station to determine and record stream flows at the locations upstream of each Release Point as specified in Table 4 for any receiving water into which a release occurs.
- W8** Notwithstanding any other condition of this environmental authority, the release of mine affected water to waters in accordance with condition W2 must only take place during, or immediately following, periods of natural flow events in accordance with the electrical conductivity quality and receiving water flow criteria specified in Table 4 for the release point(s) specified in Table 1.
- W8(a)** The release of mine affected water to waters in accordance with condition W2 must not exceed the Electrical Conductivity release limits for each receiving water flow criteria stated in Table 4 when measured at the monitoring points specified in Table 1.

Table 4 (Mine Affected Water Release during Flow Events)

EXPLANATORY NOTES – Table 4

Gauging station description:

The intent here is that every release point in Table 1 is associated with a gauging station that measures flow upstream of the discharge point. More than one discharge point may be associated with the same gauging station. The gauging station should be at a minimum distance from the discharge point such that water flow under trigger flow events will not significantly diminish by the time it reaches the discharge point. The location of the gauging station should ideally be such that it is not significantly affected by other upstream point source releases or times of discharge are limited to periods of "natural" flow.

Under certain circumstances it may be appropriate to have a downstream gauging station in addition to or in replace of an upstream gauging station. The location should ideally not be affected by the discharge (e.g. be

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measured off the main waterway). The need for this must be demonstrated on a case by case basis to show why an upstream gauging station is insufficient. This may be the case when mines are located in the upper parts of catchments or near the downstream confluence or a major waterway. Similarly, the gauging station should be at a distance from the discharge point such that water flow during triggered flow events will not significantly diminish between the discharge point and the measuring point (or the confluence with the creek being measured). For downstream flow triggers, some changes to calculation for flow triggers and maximum release flows would typically be required based on the relative sizes of the waterways involved.

Flow Triggers and EC Quality Criteria:

The intent for flow triggers is that the times of discharge are limited to times around natural flow events only. Different flow regime methodologies are used to define mine affected water release opportunities, provide flexibility for site operators and to protect identified environmental values within receiving waters. The expectation is that where flow gauging data is available, it is used to calculate flow triggers. Where gauging data is not available or is insufficient, flow triggers should be based on runoff/stream flow estimates using appropriate hydrological calculations or models and known catchment area, rainfall estimations etc.

Separate methodologies for discharges which occur to local waterways rather than regional waterways will be applied as part of this revised approach. Due to the increased flexibility of the revised approach and consideration of a wider range of local factors the application of these model conditions to individual sites will require case-by-case assessment and require sufficient background information to be provided. For example, it should be noted that discharges upstream of dams or lakes may require special considerations and generally stricter controls. Also, where multiple mines discharge to the same or closely connected waterways consideration of cumulative impacts will be necessary as part of the assessment process.

No/low flow stream conditions (best quality / low EC mine affected water):

Discharge water quality will need to meet or be better than water quality objectives (or long term background reference 75th / 80th percentile) for EC and will only be permitted for temporary periods ~~after periods of significant~~ flow. The focus of this is to allow "good" quality water to be released when collected rather than having it stored over long durations resulting in deteriorating water quality. Any discharges made under no/low flow stream conditions must not contribute to or cause erosion and due consideration should be given to road/rail access, stock crossings etc (particularly in relation to multiple mines discharging under no/low flow stream conditions on connected waterways). General principles include:

- Release when below 20th percentile flow is on tail end of flow event only i.e. following a flow above 20th percentile the trigger is when the flow reduces below the 20th percentile again. This trigger will commence a discharge window of 4-6 weeks for good quality water only.
- End of pipe WQ ≤ WQO (or long term background reference 75th/80th percentile). May require assessment of downstream environmental values and where WQO is more stringent (e.g. drinking water supply) ~~and where they could be significantly affected by the release.~~
- Duration of release is limited (dry ephemeral stream, 4 weeks after flow event ceases, use time after flow trigger for below – add additional time)
- Volume/rate will be considered on a case by case basis.

Medium flow stream conditions (medium quality mine affected water):

A flow trigger for the stream is required and will be set to avoid discharge of medium quality water during periods of no or low flow. General principles include:

- Require flow trigger > 20th percentile flow (above base flow).
- End-of pipe EC <3500uS/cm. Options for <1500uS/cm and <3500uS/cm can be considered which will result in different maximum discharge rates for different quality water.
- The better the quality of water to be released, the greater the volume that can be permitted.
- Design dilution/maximum discharge rate based on risk assessment and should achieve in-stream EC for design based on location – upper (Zone 1), mid (Zone 2) or lower (Zone 3) catchment. All regional waterways are considered Zone 3.

Comment [NJ1]: See below for particular comments - Recommend in all cases that downstream assimilative capacity to ensure industry doesn't contribute to WQOs not being met in dry (ambient) conditions be considered using best available model (DERMs cumulative impact IQQM).

Comment [r2]: The models are not yet in a state that they can be used to make fine scale decisions for licensing. Hopefully, these can be improved in the future. Regardless, modelling should be used where a significant risk is identified (this is not necessarily required in the model conditions).

Comment [NJ3]: Define if not defined already

Comment [r4]: Change made

Deleted: over the wet season

Comment [NJ5]: WQOs for salinity in downstream catchments are often more stringent (eg Fitzroy lower than Isaacs). If not already underway it may pay for DERM and the mines to start thinking about how this statement transpires in practical terms. It will also require a modelling approach and be cognisant of cumulative impacts.

Comment [r6]: True in regards to drinking catchments. The reality is that there is some spatial component to this comment in addition to the size of the release. It is probably in the order of up to 50 km. We deliberately haven't defined this on the basis case specific consideration is needed. We have added some words to clarify the point.

Deleted:

Comment [NJ7]: Define if not defined already

Comment [r8]: Agreed - this whole section has been rewritten to tidy up and the zone 3 regional waterways are better defined now – with zone 3 map in development.

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- o Zone 1, upper catchment mines – in stream EC = 1000uS/cm (toxicity guideline), May vary according to other locally relevant environmental values.
 - o Zone 2, mid catchment mines – in stream EC = 700uS/cm (assume high flow background EC) or high flow EC + YY% (WQO low – EC high) where YY is closer to 1.
 - o Zone 3, lower catchment mines (regional waterway) – in stream EC = high flow EC WQO + XX% (WQO low – EC high)
- Depending on site specific risk assessment, may need to consider downstream limits (least restrictive) to cease discharge for EC, pH, sulphate.
 - Map outlining catchment Zones delineates these zones for assessment (yet to be provided).

High flow stream conditions (poorer quality water):

A minimum flow trigger for the stream needs to be set at an 80th percentile of natural stream flow. This option might be used in some cases for mines that need to discharge higher EC wastewater than is allowable under medium flow stream conditions. Any discharge is required to have a higher level of dilution than with medium flow cases but still achieve a maximum incremental increase in the waterway. This option is most feasible for mines situated on regional waterways as the window for discharge is likely to be limited for local waterways. Some additional considerations on management of mixing zones and acute/chronic toxicity may be required in this case. General principles include:

- Flow trigger > 80th percentile flow.
- End-of pipe EC > 3500uS/cm (but <10,000uS/cm).
- The better the quality of water to be released, the greater the volume that can be permitted.
- Design dilution/maximum discharge rate based on risk assessment. Should achieve in-stream EC for design based on location – upper (Zone 1), mid (Zone 2) or lower (Zone 3) catchment. All regional waterways considered Zone 3.
- May need some additional indicators/requirements and requires case by case assessment.
- Not likely to be feasible for Zone 1 and 2 mines.
- Depending on site specific risk assessment, may need to consider downstream limits (least restrictive) to cease discharge for EC, pH, sulphate.

Comment [NJ9]: Where is the safety margin built in? Recommend a rigorous, open and transparent approach if this is the case. Also need to prove that the assimilative capacity for all downstream environs to meet ambient WQOs is guaranteed by the amount of water that will come down the creek once it hits low flow (below 20th percentile).

Comment [r10]: The safety margin is factored in by the flow trigger and confinement to event flow. The only point on the hydrograph where this design factor is relevant is the trigger point.

Comment [NJ11]: Define if not defined already.

Comment [NJ12]: Consider providing a worked example to minimise confusion?

Comment [NJ13]: Consider providing a worked example to minimise confusion.

Comment [ac14]: This section reworked in model condition package.

Comment [NJ15]: Consider including provisions for requirement of diffusion technology to minimise the hypersaline zone in the waterway.

Comment [r16]: Not necessary for medium flow as we consider flow will be turbulent.

Comment [NJ17]: Refer comments on zone 1

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Receiving waters description	Release Point	Gauging station	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Electrical Conductivity Release Limits (uS/cm)	Receiving Water Flow Criteria	Volume / Percentage for maximum release	Flow recording Frequency
e.g. Wet Creek	e.g. RP1	e.g. Gauging station 1	XXXX	XXXX	<insert water quality objective or 75 th / 80 th percentile of long term background reference>	Following a natural flow event that exceeds the 20 th percentile flow, mine affected water meeting this quality limit is permitted to be released for a period of <insert 4 – 6 weeks depending on mine location / receiving water characteristics> following the day that the natural flow recedes below the 20 th percentile flow volume. The volume of flow can be determined by height of water or flow. The actual flow must be a quantifiable measure. Example: > or = 5 m ³ /sec	Volume to be determined on case by case basis	Continuous (minimum daily)
					Quality determined on case specific basis but typically <1500	Greater than 20 th percentile flow (above base flow)	% to be determined on case by case basis	
					Quality determined on case specific basis but typically <3500	Greater than 20 th percentile flow (above base flow)	% to be determined on case by case basis	
					Quality determined on case specific basis but typically within a range of <3500 to <10,000	Greater than 80 th percentile flow (above base flow)	% to be determined on case by case basis	

***Note: Flow must also be measured at the Wet Creek gauging station for release to be permitted based on this flow trigger.**

- W9** The volume of mine affected water released through the release point(s) must not exceed:
- the maximum allowable flow at any time determined by multiplying the recorded receiving water flow at the corresponding gauging station in Table 4 with the corresponding percentages for maximum release in Table 4; or
 - the stated volume for maximum release where specified in Table 4.
- W10** The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in Table 1.
- W11** Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

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Notification of Release Event

W12 The environmental authority holder must notify the administering authority as soon as practicable and no later than 24 hours after commencing to release mine affected water to the receiving environment. Notification must include the submission of written advice to the administering authority of the following information:

- a) release commencement date/time;
- b) expected release cessation date/time;
- c) release point/s;
- d) release volume (estimated);
- e) receiving water/s including the natural flow rate; and
- f) any details (including available data) regarding likely impacts on the receiving water(s).

Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

W13 The environmental authority holder must notify the administering authority as soon as practicable, (nominally within twenty-four (24) hours after cessation of a release event) of the cessation of a release notified under Condition W12 and within 28 days provide the following information in writing:

- a) release cessation date/time;
- b) natural flow volume in receiving water;
- c) volume of water released;
- d) details regarding the compliance of the release with the conditions of Agency Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
- e) all in-situ water quality monitoring results; and
- f) any other matters pertinent to the water release event.

Note: Successive or intermittent releases occurring within twenty-four (24) hours of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with conditions W12 and W13, provided the relevant details of the release are included within the notification provided in accordance with conditions W12 and W13.

Notification of Release Event Exceedance

W14 If the release limits defined in Table 2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.

W15 The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:

- a) the reason for the release;
- b) the location of the release;
- c) all water quality monitoring results;
- d) any general observations;
- e) all calculations; and
- f) any other matters pertinent to the water release event.

Monitoring of Water Storage Quality

W16 Water storages stated in Table 5 which are associated with the release points must be monitored for the water quality characteristics specified in Table 6 at the monitoring locations and at the monitoring frequency specified in Table 5.

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Table 5 (Water Storage Monitoring)

Water Storage Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)	Monitoring Location	Frequency of Monitoring
XXXX	XXXX	XXXX	To be negotiated- will depend on the individual storage structure volume. This will deal with stratification – depth profiles and be appropriate to in situ quality characteristics.	Quarterly

W17 In the event that waters storages defined in Table 5 exceed the contaminant limits defined in Table 6, the holder of the environmental authority must implement measures, where practicable, to prevent access to waters by all livestock.

Table 6 (Onsite Water Storage Contaminant Limits)

Quality Characteristic	Test Value	Contaminant Limit
pH (pH unit)	Range	Greater than 4, less than 9 ²
EC (µS/cm)	Maximum	5970 ¹
Sulphate (mg/L)	Maximum	1000 ¹
Fluoride (mg/L)	Maximum	2 ¹
Aluminium (mg/L)	Maximum	5 ¹
Arsenic (mg/L)	Maximum	0.5 ¹
Cadmium (mg/L)	Maximum	0.01 ¹
Cobalt (mg/L)	Maximum	1 ¹
Copper (mg/L)	Maximum	1 ¹
Lead (mg/L)	Maximum	0.1 ¹
Nickel (mg/L)	Maximum	1 ¹
Zinc (mg/L)	Maximum	20 ¹

Note:

¹ Contaminant limit based on ANZECC & ARM CANZ (2000) stock water quality guidelines.

² Page 4.2-15 of ANZECC & ARM CANZ (2000) "Soil and animal health will not generally be affected by water with pH in the range of 4–9".

Note: Total measurements (unfiltered) must be taken and analysed

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Receiving Environment Monitoring and Contaminant Trigger Levels

W18 The quality of the receiving waters must be monitored at the locations specified in Table 8 for each quality characteristic and at the monitoring frequency stated in Table 7.

Table 7 (Receiving Waters Contaminant Trigger Levels)

Quality Characteristic	Trigger Level	Monitoring Frequency	Comments
pH	6.5 – 8.5	Daily during the release	See Table 2 comments
Electrical Conductivity (µS/cm)	1000 Note: for protection against toxicity this may need to be reduced in some circumstances e.g. where upstream of a drinking water dam or regional waterway		
Suspended solids (mg/L)	To Be Determined. Turbidity may be required to assess ecosystems impacts and can provide instantaneous results.		
Sulphate (SO ₄ ²⁻) (mg/L)	250 (Protection of drinking water Environmental Value)		

Comment [NJ18]: Aren't all mines in the Fitzroy above drinking water supplies?

Comment [r19]: True in regards to drinking catchments. The reality is that there is some spatial component to this component in addition to the size of the release. It is probably in the order of up to 50 km. We deliberately haven't defined this to emphasise need for case specific risk assessments. Have added words 'in close proximity' to model conditions package.

Table 8 (Receiving Water Upstream Background Sites and Down Stream Monitoring Points)

EXPLANATORY NOTES – Selection of monitoring sites:

The intent here is that that each discharge point has both an upstream and downstream monitoring point associated with it. These monitoring points should be located as close as practicable to the release point and the distances should be defined in the footnotes in Table 8. The location of flow monitoring points should also be considered in selecting upstream monitoring points. Other considerations include accessibility, particularly during wet weather conditions.

Monitoring Points	Receiving Waters Location Description	Latitude or northing (GDA94)	Longitude or easting (GDA94)
Upstream Background Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres upstream of RP XX	XXXX	XXXX
Downstream Monitoring Points			
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX
Monitoring Point XX	XXXX Creek XX metres downstream of RP XX	XXXX	XXXX

Comment [NJ20]: Consist including the method in which distance is determined, ie does it relate to stream order and rainfall gradients and what equation is applied?

Comment [r21]: There is a methodology but difficult to include here (is locally specific). Will work up better support material on approach for training purposes.

Notes:

- a) The upstream monitoring point should be within 10km the release point.

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- b) the downstream point should not be greater than Xkm from the release point.
c) The data from background monitoring points must not be used where they are affected by releases from other mines.

Comment [NJ22]: Consider including the method in which this distance is determined. Does it relate to stream order and rainfall gradients and what equation is applied?

- W19** If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table 7 during a release event the environmental authority holder must compare the down stream results to the upstream results in the receiving waters and:
1. where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or
 2. where the down stream results exceed the upstream results complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - (i) details of the investigations carried out; and
 - (ii) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with W19(2) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

EXPLANATORY NOTES – Designing a REMP:

Generally the Receiving Environment Monitoring Program (REMP) should be used to assess the local receiving waters for the specified discharge locations. The monitoring should not be specifically designed to assess compliance of the release – this is covered by other conditions. The key purpose of the REMP is to assess the overall condition of the local receiving waters and assessment should be against water quality objectives and relevant guidelines. Note that in some cases where discharge occurs to ephemeral streams, there may be a need to include downstream sensitive receiving waters or environmental values outside of the specified REMP area. An example of this would be where there are no semi-permanent/permanent waterholes in the specific area but one is located further downstream prior to the confluence with the next major waterway. For further guidance on what to include in a REMP, please refer to the Draft DERM REMP Document for Fitzroy Coal Mines and Additional Information.

- W20** The environmental authority holder must develop and implement a Receiving Environment Monitoring Program (REMP) to monitor, identify and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity. This must include monitoring the effects of the mine on the receiving environment periodically (under natural flow conditions) and while mine affected water is being discharged from the site.

For the purposes of the REMP, the receiving environment is the waters of the XX and connected or surrounding waterways within XX (e.g. Xkm) downstream of the release. The REMP should encompass any sensitive receiving waters or environmental values downstream of the authorised mining activity that will potentially be directly affected by an authorised release of mine affected water.

- W21** The REMP must:
- a) Assess the condition or state of receiving waters, including upstream conditions, spatially within the REMP area, considering background water quality characteristics based on accurate and reliable monitoring data that takes into consideration temporal variation (e.g. seasonality); and
 - b) Be designed to facilitate assessment against water quality objectives for the relevant environmental values that need to be protected; and
 - c) Include monitoring from background reference sites (e.g. upstream or background) and downstream sites from the release (as a minimum, the locations specified in Table 8); and
 - d) Specify the frequency and timing of sampling required in order to reliably assess ambient conditions and to provide sufficient data to derive site specific background reference values in accordance with

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the *Queensland Water Quality Guidelines* 2006. This should include monitoring during periods of natural flow irrespective of mine or other discharges; and

- e) Include monitoring and assessment of dissolved oxygen saturation, temperature and all water quality parameters listed in Table 2 and 3); and
- f) Include, where appropriate, monitoring of metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of AS5667.1 *Guidance on Sampling of Bottom Sediments*); and
- g) Include, where appropriate, monitoring of macroinvertebrates in accordance with the AusRivas methodology, and
- h) Apply procedures and/or guidelines from ANZECC & ARMCANZ 2000 and other relevant guideline documents; and
- i) Describe sampling and analysis methods and quality assurance and control; and
- j) Incorporate stream flow and hydrological information in the interpretations of water quality and biological data.

W22 A REMP Design Document that addresses each criterion presented in Conditions W20 and W21 must be prepared and submitted to the administering authority no later than 3 months after the date of issue of this environmental authority [include for new sites or expansion projects, remove for existing mine sites which already have REMP Design Documents]. Due consideration must be given to any comments made by the administering authority on the REMP Design Document and subsequent implementation of the program.

W22(a) A report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with conditions W20-W22 must be prepared annually and made available on request to the administering authority. This must include an assessment of background reference water quality, the condition of downstream water quality compared against water quality objectives, and the suitability of current discharge limits to protect downstream environmental values.

Water Reuse

W23 Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority for the purpose of supplying stock water to properties owned by the environmental authority holder or a third party and subject to compliance with the quality release limits specified in Table 9.

Table 9 (Stock Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	5000

W24 Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority for the purpose of supplying irrigation water to properties owned by the environmental authority holder or a third party and subject to compliance with quality release limits in Table 10.

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Table 10 (Irrigation Water Release Limits)

Quality characteristic	Units	Minimum	Maximum
pH	pH units	6.5	8.5
Electrical Conductivity	µS/cm	N/A	Site specific value to be determined in accordance with ANZECC & ARMCANZ (2000) Irrigation Guidelines

- W25** Mine affected water may be piped or trucked off the mining lease for the purpose of supplying water to a third party for purpose of construction and/or road maintenance in accordance with the conditions of this environmental authority.
- W26** Mine affected water may be piped or trucked for the purpose of supplying water to <name adjoining mine> in accordance with the conditions of this environmental authority. The volume, pH and electrical conductivity of water transferred to <name adjoining mine> must be monitored and recorded.
- W27** If the responsibility for mine affected water is given or transferred to another person in accordance with conditions **W23, W24, W25 or W26**:
- the responsibility for the mine affected water must only be given or transferred in accordance with a written agreement (the third party agreement); and
 - include in the third party agreement a commitment from the person utilising the mine affected water to use it in such a way as to prevent environmental harm or public health incidents and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters.

Water General

- W28** All determinations of water quality and biological monitoring must be:
- performed by a person or body possessing appropriate experience and qualifications to perform the required measurements;
 - made in accordance with methods prescribed in the latest edition of the Department of Environment and Resource Management's Monitoring and Sampling Manual;
- Note: Condition W28 requires the Monitoring and Sampling Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.*
- collected from the monitoring locations identified within this environmental authority, within XX hour of each other where possible;
 - carried out on representative samples; and
 - analysed at a laboratory accredited (e.g. NATA) for the method of analysis being used.
- W29** The release of mine affected water directly or indirectly to waters:
- must not produce any visible discolouration of receiving waters; and
 - must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual Water Monitoring Reporting

- W30** The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format with each annual return:
- the date on which the sample was taken;

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- b) the time at which the sample was taken;
- c) the monitoring point at which the sample was taken;
- d) the measured or estimated daily quantity of the contaminants released from all release points;
- e) the release flow rate at the time of sampling for each release point;
- f) the results of all monitoring and details of any exceedences with the conditions of this environmental authority; and
- g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with waterways

- W31** Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Environment and Resource Management *Guideline - Activities in a Watercourse, Lake or Spring associated with Mining Activities*.

Water Management Plan

- W32** A Water Management Plan must be developed by an appropriately qualified person and implemented by XX/XX/XXXX (WITHIN 3 MONTHS OF THE DATE OF ISSUE).

- W33** The Water Management Plan must:

- a) provide for effective management of actual and potential environmental impacts resulting from water management associated with the mining activity carried out under this environmental authority; and
- b) be developed in accordance with Department of Environment and Resource Management guideline *Preparation of water management plans for mining activities* and include:
 - i. a study of the source of contaminants;
 - ii. a water balance model for the site;
 - iii. a water management system for the site;
 - iv. measures to manage and prevent saline drainage;
 - v. measures to manage and prevent acid rock drainage;
 - vi. contingency procedures for emergencies; and
 - vii. a program for monitoring and review of the effectiveness of the water management plan.

- W34** The Water Management Plan must be reviewed each calendar year and a report prepared by an appropriately qualified person. The report must:

- a) assess the plan against the requirements under condition W33;
- b) include recommended actions to ensure actual and potential environmental impacts are effectively managed; and
- c) identify any amendments made to the water management plan following the review.

- W34(a)** The holder of this environmental authority must attach to the review report required by condition W34, a written response to the report and recommended actions, detailing the actions taken or to be taken on stated dates:

- a) by the holder of this environmental authority to ensure compliance with this environmental authority; and
- b) to prevent a recurrence of any non-compliance issues identified.

- W34(b)** The review report required by condition W34 and the written response to the review report required by condition W34(a) must be submitted to the administering authority with the subsequent annual return under the signature of the appointed signatory for the annual return.

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W35 A copy of the Water Management Plan must be provided to the administering authority on request.

Saline Drainage

W36 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

W37 The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water sediment controls

W38 An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of storm water.

W39 The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any receiving waters.

W40 Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters.

All Dams

EXPLANATORY NOTES – Dam conditions:

Note: Conditions W41 and W42 to be removed if already conditioned in the authority.

W41 The hazard category of each dam must be determined by a suitably qualified and experienced person at least once in each two year period.

W42 Dams having a hazard category determined to be significant or high, must be specifically authorised by an environmental authority.

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Definitions:

"20th percentile flow" means the 20th percentile of all daily flow measurements (or estimations) of daily flow over the period of record for a particular site where there is sufficient data. The 20th percentile calculation should only include days where flow has been measured (or estimated), i.e. not dry weather days.

Comment [NJ23]: Consider including 80th percentile

Comment [NJ24]: Perhaps the period on record rather than just 10 years?

Deleted: a 10 year period

Comment [r25]: Agree with comment but definition deleted as only previously used in explanatory text and following a clean up of that section it is no longer necessary.

"acid rock drainage" means any contaminated discharge emanating from a mining activity formed through a series of chemical and biological reactions, when geological strata is disturbed and exposed to oxygen and moisture as a result of mining activity.

"administering authority" means the Department of Environment and Resource Management or its successor.

"appropriately qualified person" means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods or literature.

"certify" or "certification" or "certified" in relation to any other matter other than a design plan, 'as constructed' drawings or an annual report regarding dams in this environmental authority means a Statutory Declaration by a suitably qualified person accompanying the written document stating that:

- i) all relevant material has been considered in the written document; and
- ii) that the content of the written document is accurate and true; and
- iii) that the written document meets the requirements of the relevant conditions of the environmental authority.

"dam" means a land-based structure or a void that is designed to contain, divert or control flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works. However, a dam does *not* mean a fabricated or manufactured tank or container designed to a recognised standard, *nor* does a dam mean a land-based structure where that structure is designed to an Australian Standard. In case there is any doubt, a levee (dyke or bund) is a dam, but (for example) a bund designed for spill containment to AS1940 is *not* a dam.

"environmental authority" means an environmental authority granted in relation to an environmentally relevant activity under the *Environmental Protection Act 1994*.

"environmental authority holder" means the holder of this environmental authority.

"flowable substance" means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

"hazard" in relation to a dam as defined, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

"hazard category" means a category, either low significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (Version 2.0, 2009) published by the Environmental Protection Agency on its website.

"mine affected water" means:

- i) water that has been used for a task in the mining activity (e.g. pit water, tailings dam water, processing plant water and water contaminated by workshop activities); and
- ii) rainfall runoff contacting any disturbed and non-rehabilitated areas of the mining activity; and
- iii) groundwater that has contacted disturbed and non-rehabilitated areas of the mining activity; and
- iv) groundwater from dewatering activities.

"natural flow" means the flow of water through waters caused by nature.

"receiving environment" means all groundwater, surface water, land, and sediments that are not disturbed areas authorised by this environmental authority.

"receiving waters" means all groundwater and surface water that are not disturbed areas authorised by this environmental authority.

"representative" means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

"saline drainage" The movement of waters, contaminated with salt(s), as a result of the mining activity.

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"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, and groundwater and any part thereof.

Fitzroy Model Water Conditions Review
DERM/QRC Internal Workshop 2
29 June 2011
(EA Conditions)

Issue:	Discussion:
Coordinator	██████████, A/Director, Coal Operations is managing coordination of the review.
Conditions W1 and W2 Definition of Mine Affected Water	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ Industry was generally satisfied with the intent but still felt that 'mine affected water' was not appropriately defined, particularly given the definition of mining activity in section 147 of the EP Act. Water not intended to be captured by the definition, possibly still would be e.g. water used to irrigate rehabilitation areas. ▪ QRC suggested that a listing be developed of either what is included or excluded in the definition and offered to assist with wording. ▪ QRC was concerned that the word 'contaminants' in W1 still has overly restrictive literal consequences given that the conditions for Water Management Plan and Soil Erosion Control Management Plan do not actually permit a release of 'contaminants'. ▪ QRC advised that there needs to be provisions applied in the above plans and that the intent be reflected in the conditions. ▪ QRC noted that the wording 'on-site water management infrastructure' in W2 could reference a schedule in the relevant water management plan. <p>1 Action: QRC to provide written considerations for improvements to the above conditions. COMPLETED</p>
Water Management Plan conditions (W32-W34(c))	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ The group noted the requirement for increasing rigour around the plans. ▪ The group did not see the need for third party certification of plans. ▪ It was suggested that an appropriate Industry person sign-off that a water management plan was in place in the Annual Return process as it will meet current accountability processes. ▪ DERM briefly highlighted to the group that there were differences in the quality of water management plans from across Industry. ▪ QRC mentioned that there had been delays by DERM in providing responses to the quality of water management plans required under the current Fitzroy conditions. ▪ Other suggestions / comments included: <ul style="list-style-type: none"> - Condition W33 should specifically link to water management as at present it refers generally to environmental harm. - In condition W34 the wording be amended to remove reference to annual certification. - in condition W34a) the wording could be amended to "as soon as reasonably practicable, implementing measures or taking necessary action to ensure compliance with the requirements of this environmental authority, if necessary." - In condition W34(a)b) the wording could be amended to "as soon as reasonably practicable, implementing measures or taking necessary action to ensure compliance with the requirements of this environmental authority, if necessary." ▪ The group generally agreed to the intent for these conditions and agreed to settle condition wording out of session through liaison between DERM and QRC. <p>2 Action: QRC/DERM to work together to finalise appropriate wording for the above conditions. COMPLETED</p>
Model conditions and extraordinary events	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ DERM advised that following consideration it had determined that model conditions are not an appropriate document to attempt to deal with extraordinary events for reasons outlined in the response to Action items from the first workshop. ▪ Industry suggested that a condition be added for DERM to liaise with Industry on a site by site basis to enable discharge in emergency/extraordinary conditions. ▪ DERM agreed to insert an explanatory note referring to the ability to consider cases beyond the scope of model conditions, where adequate contingency planning and risk assessment information can be demonstrated by the applicant. <p>3 Action: DERM to develop an appropriate explanatory note for insertion into the working draft.</p>
Investigation triggers (W5-W19)	<ul style="list-style-type: none"> ▪ In relation to W5 2(b), the group agreed to DERM's proposal to remove the wording "ANZECC and ARMCANZ 2000 methodology" following discussion of DERM's consideration outlined in the responses to Workshop 1 Action items. No further action required.
Monitoring point accessibility (W4)	<ul style="list-style-type: none"> ▪ The group agreed to the additional noting developed for W4. No further action required.
TSS / Turbidity, EC / Sulphate, Metals (Tables 2 and 3)	<ul style="list-style-type: none"> ▪ The group agreed to the changes in Tables 2 and 3. No further action required.
REMP template status / REMF revised conditions	<ul style="list-style-type: none"> ▪ The group was advised that the contact person for Industry to ask any questions on the REMP's is through the Regional Managers in their regional areas. ▪ The group agreed to the amendments for W20, W21 and W28. No further action required.
Fitzroy Partnership	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ QRC asked whether DERM is considering how the REMP design and reporting will fit within the Fitzroy Partnership modelling from a data management aspect. ▪ DERM advised that it is anticipated that coordination of data from REMP's and the linkage into the Fitzroy Partnership will be via the WATERS system. The WATERS system is under development and is to be

	<ul style="list-style-type: none"> implemented for Fitzroy coal mines in 2012. ▪ DERM will share data, including REMP data, with the Fitzroy Basin Association. ▪ The group requested that wording be included in the explanatory notes regarding the intent of the linkages.
	<p>4 Action: DERM to develop an appropriate explanatory note for insertion into the working draft.</p>
Internal dam to dam transfer (W2)	<ul style="list-style-type: none"> ▪ The group agreed to the addition to W2 regarding internal dam to dam transfer. No further action required. ▪ The group brought up the issue of the regulated dams review and concern about how any suggestions made by Industry did not appear to be captured in the review. The group mentioned that they would like the opportunity to workshop the regulated dams model conditions, in the same way as the Fitzroy Model Condition review. ▪ Andrew Brier mentioned that he would pass on Industry's request to the relevant officers undertaking that review.
Notification requirements (W12)	<ul style="list-style-type: none"> ▪ The group agreed to the amendments to W12. No further action required.
Reuse conditions (W23-W24)	<ul style="list-style-type: none"> ▪ The group agreed to the intent of amendments to W23 and W24, but highlighted that the issues with W1 and W2 and the definition of mine affected water still created a restrictive issue for these conditions, which can be resolved by further refinement of those conditions. <p>See Action Item 1.</p>
Dams references eg cattle access	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ The group felt that conditions W41 and W42 were of minimal use by themselves and covered by the regulated dams model conditions. Industry also said W17 was captured by the regulated dams model conditions. ▪ It was suggested that these conditions could remain for now but could all be covered by a note similar to that already existing for W41 and W42, stating the conditions can be deleted if they are already conditioned in the authority and referencing the regulated dams model conditions. <p>5 Action: DERM to refine notes for W17, W41 and W42.</p>
Revised discharge conditioning – the science	<ul style="list-style-type: none"> ▪ Ian Ramsay explained the science of the revised discharge conditions (Table 4). ▪ The group requested clarity around calculator outcomes and approaches for different zones, particularly zone 3 multipliers. <p>6 Action: DERM to develop discharge mapping for Zone 3 management areas and distribute to the group for comment.</p> <p>7 Action: DERM to circulate the presented Fitzroy catchment discharge calculator to the group, through Bronwyn Story.</p>
Revised discharge conditioning – the structure	<p>DERM outlined the following:</p> <ul style="list-style-type: none"> ▪ EC monitoring remains linked to Table 2 and condition W4. ▪ Release windows modified by amendment to condition W8 and Table 4. ▪ EC limits now imposed by condition W8(a) and Table 4. ▪ Release volume continued to be capped by Table 4 and condition W9 with amendment to provide volume in low or no flow periods. ▪ Definition of 20th percentile over 10 years to be removed. ▪ Table 4 to be clearer with an EC flow rate included on a site by site basis.
General	<ul style="list-style-type: none"> ▪ A copy of a working draft of the model conditions to be circulated to the Fitzroy Water Quality Advisory Group this week for discussion at the meeting on 7 July. ▪ Final comments on the working draft of the model conditions due to DERM by 22 July. ▪ Any further consultation with Industry will occur via email and phone calls. ▪ It is intended that the model conditions will be finalised by 31 July.
Implementation	<ul style="list-style-type: none"> ▪ Discussions within DERM to occur regarding strategies for implementation of the model conditions. ▪ There was a suggestion that DERM may hold information sessions for Industry to assist them with being compliant with the revised model conditions. ▪ Industry asked that the planned pending automatic inclusion of the regulated dams model conditions upon application for any EA amendment, not apply for applications to amend to include the revised model Fitzroy Water Conditions. ▪ DERM agreed to consider this option and provide a response to QRC <p>8. <u>DERM to consider excluding the automatic inclusion of the regulated dams conditions into EAs when companies apply for the Fitzroy conditions and provide a response to QRC.</u></p>
Salinity Trading Scheme	<ul style="list-style-type: none"> ▪ QRC updated the group on the status of the Salinity Trading Scheme study. ▪ The group agreed that any data submitted to DERM regarding EC flow could be used for the salinity trading scheme study. Companies may also have extended information that they wish to supply. Contact with companies should be through head office not site personnel. ▪ It is proposed that a workshop for the study would be held at the end of August/early September.

**Fitzroy Model Water Conditions Review
DERM/QRC Internal Workshop 1
31 May 2011
(Licensing Conditions)**

Participants: Andrew Brier (RSD – CCSG), [REDACTED] (RSD – CCSG), Chris Loveday (RSD – ES CW), [REDACTED] (RSD – ES SW), [REDACTED] (RSD – CCSG), Frances Hayter and [REDACTED] (QRC), [REDACTED] (Anglo), [REDACTED] (Yancoal), [REDACTED] (Leanne Bowie Lawyers), [REDACTED] (Ison Environmental), [REDACTED] (Peabody), [REDACTED] and [REDACTED] (BIMA), [REDACTED] (RTCA), [REDACTED] (Xstrata Coal) [REDACTED] (Macarthur Coal)

Issue:	Discussion:
Coordinator	[REDACTED] A/Director, Coal Operations is managing coordination of the review.
Introduction	<p>Andrew Brier opened the workshop and advised that:</p> <ul style="list-style-type: none"> ▪ Model conditions provide a minimum set of standards that are acceptable to the administering authority and will not replace EAs and TEPs ▪ EAs are the appropriate tool for authorising discharges ▪ The model conditions are a basic tool. If companies need consideration of options outside what the model conditions provide, then they are to negotiate conditions in their EA, or alternatively submit a detailed TEP outlining appropriate water management strategies and a transition to compliance with the EA.
EAs vs TEPs	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ Andrew Connor provided an overview of the background context leading to this review, the development of water quality objectives, use of TEPs and DERM's forward strategy continuing to be based on protecting identified environmental values within the Fitzroy Basin waterways and the need to consider cumulative effects. ▪ QRC members were concerned that it was not possible to discharge water ahead of the wet season flows and TEPs did not provide management options at all sites. ▪ There was concern that the end of pipe limit does not provide flexibility to discharge low volumes of water containing high EC while still maintaining the desired dilution outcome. ▪ It was acknowledged that the TEPs would have been of greater value if they had been in place ahead of the wet season.. ▪ The key advantage of the TEP approach was the flexibility it provided to release higher concentrations of EC based on achieving downstream limits. ▪ It was considered that TEPs helped overall but the review should focus on attempting to avoid the need for future use in similar circumstances. ▪ [REDACTED] (Anglo) commented that the TEP provided little relief in their situation, however said that the EA conditions are OK normally but it was the extreme nature of rainfall received over the wet season that is the key issue. ▪ Participants agreed that the objective is the need to maximise options for water disposal whilst achieving environmental objectives. The preference is for EAs, as EA conditions can manage extreme rainfall events. <p>1 <u>Action:</u> [REDACTED] to circulate a copy of DERM's PowerPoint presentation to workshop participants.</p>
Mine Affected Water – Definition	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ In relation to condition W2, it was agreed that definitions for "mine affected water" and "waters" needed to be developed. ▪ QRC commented that the commonwealth was adopting 'worked water' terminology but said the specific term used was not the priority here, rather that it is well defined. ▪ QRC also requested that condition W1 be reviewed as the term 'contaminants' and 'environmental harm' when defined are sufficiently broad so as to make most activities on site, or even activities occurring adjacent to the site, to be prohibited by a literal interpretation of the condition. ▪ Diversions are being used as a key water management strategy and the model conditions need to clearly define what can be diverted. ▪ The number of plans required for different authorisations, e.g. sediment control plan / water management plan is a requirement under the model conditions. These plans should be key documents to identify 'clean' water over land flow vs mine affected water. ▪ DERM suggested that these plans could include maps which had been certified by a third party. The plans would then be required to be reviewed annually and also available upon request. ▪ It was suggested that a statement be provided in the EA annual return advising that a certified map has been produced and is available on request, rather than sending the maps to DERM. <p>3 <u>Action:</u> DERM to review conditions W1 and W2 and a definition for 'mine affected water' to provide a draft for consideration at the next workshop.</p> <p>4 <u>Action:</u> DERM to consider the certification issue and provide advice for discussion at the next workshop.</p>
Discharge Conditions	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ [REDACTED] provided an overview of the concepts under development for revised model discharge conditions, including low/no flow, medium and high flow discharge options. ▪ DERM advised that from analysing applications it was found that TEPs submitted by coal mines contained very little information demonstrating an assessment of the environmental risk and impact on nearby environmental values for each individual proposal and this made the decision making process difficult. ▪ QRC raised its concern over the current rigid end of pipe limit approach promoted by the existing model conditions. An approach providing greater flexibility to use smaller volumes of higher concentration water during flow events based on achieving the in stream dilution objective would aid effective on-site water management. ▪ DERM commented that from a compliance perspective it is important to have a measurable limit on discharge, but the point raised was valid and would be considered further prior to the next workshop.

Issue:	Discussion:
Data Review Use	<p>DERM is reviewing the data provided by Industry and is compiling TEP information to:</p> <ul style="list-style-type: none"> ▪ analyse completeness ▪ analyse environmental risks ▪ analyse difference between local and regional waterways ▪ develop case studies to test licensing approach. <p>The results from this data analysis will be discussed in more detail at the next workshop.</p>
Emergency Releases	<ul style="list-style-type: none"> ▪ DERM advised of legal advice obtained about the use of the emergency provisions in the Environmental Protection Act 1994 with respect to requests to discharge water from mine sites. ▪ QRC acknowledged it would prefer to deal with release options through the conditions of the EA but had sought emergency directions on the basis the EA did not provide options. ▪ It was agreed to work forward from here and that any request for exercising emergency powers would only be required if there was an imminent risk of dam failure that could cause an even greater amount of environmental harm or public risk than a controlled release would. ▪ QRC maintains that there is a need to give consideration to how EAs might deal with extraordinary rainfall events. ▪ A case point was raised about a mine in the headwaters that has 5-10,000 EC water on-site. DERM restated that the model conditions would only provide so much but that if a mine operator presented a well reasoned argument including a risk assessment demonstrating that identified environmental values could be protected using an alternative approach, DERM would consider it. ▪ DERM also acknowledged that each mine site would have its own set of environmental constraints to work within and that any proposal should include a full analysis of alternative options, such as water treatment. <p>5 <u>Action:</u> DERM to give consideration to whether model conditions could be structured to deal with extraordinary events.</p>
Monitoring Point	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ In relation to condition W19, QRC raised an issue in an investigation being triggered even where the downstream value of EC was only 1 uS/cm higher than the upstream. The comment being that on-site Environmental Officers were tied up doing investigations into small variations rather than applying themselves to maximise water management effectiveness. ▪ QRC suggested that condition W19 be reworded to be more pragmatic. ▪ DERM noted the condition only triggers an investigation to determine whether the mine is causing the elevated receiving environment levels and discussed difficulties in setting a percentage increase. A QRC member also commented that there would still be occasion to question what to do when you are only 1uS/cm over the new limit. <p>6 <u>Action:</u> DERM to review condition W19 and provide a response for the next workshop.</p> <ul style="list-style-type: none"> ▪ With regard to monitoring locations, QRC considers wording needs to be included along the lines of “as long as the location is safely accessible”. ▪ DERM will consider the argument out of session, but noted that selection of monitoring points and making provisions for access also remain a responsibility of the mine operator and are typically defined through agreement with DERM during EA assessment. <p>7 <u>Action:</u> DERM to consider accessibility issue between workshops.</p>
Parameters and Receiving Water Flow Rate	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ Regarding TSS/turbidity QRC suggested that a turbidity measurement be used as the default measurement. It was noted this had been discussed previously and it was agreed that mines could present information to demonstrate the correlation for their sites for TSS and turbidity for DERM to consider the appropriate limit. ▪ QRC also raised correlation between EC and sulphate and questioned why the need to measure sulphate. Ian Ramsay said the sulphate was an indicator of mine water in the area. DERM did note there was a possibility to remove the end of pipe sulphate limit on the basis of including a more serious downstream number for sulphate. ▪ For Metals, QRC believe frequency is too often. DERM acknowledged that where adequate data exists (i.e. two years monitoring data) then on a case by case basis the frequency of metals monitoring could be evaluated. This is addressed in the foot note to Table 3. It was proposed that DERM review the footnote to Table 3 to clarify the possibility of reducing monitoring frequency following submission of two years data demonstrating no issues with particular metals. <p>8 <u>Action:</u> DERM to consider relevant conditions and explanatory text in internal workshop and provide a draft for consideration at the next QRC workshop.</p> <p>9 <u>Action:</u> DERM to review footnotes for Table 3 and provide a draft for consideration at the next workshop.</p>
Proposed Changes to REMP Conditions	<p>Industry advised that there was confusion as to whether there is a final version of the draft REMP template.</p> <p>10 <u>Action:</u> DERM to clarify the status of the REMP template and advise accordingly.</p> <p>██████████ discussed a paper titled “Draft REMP conditions to replace conditions W20 to W22”.</p> <p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ The word “contaminants” should be replaced by “mine affected water” (or a similar definition once developed) in W20. ▪ There was concern that the order of condition W21 was confusing and should be revised. ▪ Condition WXX should be removed as it was similar to condition W28. ▪ QRC emphasised the need for DERM to capture data submitted over time for future reference to avoid requests for information. ██████████ discussed a system for collecting data that should be ready by the end of the year. QRC stated its preference was that mines hold off on submitting required reports in the interim

while this system is developed. DERM said that in the interim mine companies should comply with their EA requirements and submit reports when necessary.

- 11 **Action:** DERM to consider above suggestions and review conditions W20-W22 and provide a draft for consideration at the next workshop.

Issue:	Discussion:
Link with Regulated Dam Requirements	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ There was discussion about how the regulated dam guideline and model conditions relate and/or overlap and whether each regulated dam needed to be listed as a release point. ▪ DERM explained that the regulated dam guideline relates to minimum design, operational and decommissioning requirements for the dam structures and the model conditions are designed to protect environmental values from water discharged to the receiving environment. ▪ There was concern about the potential to capture dams managed under the erosion and sediment control plans through the risk assessment for regulated dams. ▪ QRC was seeking clarity around any distinction between sediment dams under the ESCPs and the regulated dams guideline.
	<p>12 Action: DERM to clarify how sediment control dams are to be dealt with under the regulated dams guideline – links to defined release points in model conditions but may be more a consideration for regulated dams guideline.</p>
Timing of Current TEPs	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ TEPs seeking a straight discharge with no additional transition to a new standard will no longer be accepted by DERM. ▪ QRC enquired about interim release arrangements for low/no flow events while the model conditions review is being completed. DERM replied that industry can apply for extensions to current TEPs which will be considered on a case by case basis by DERM in the context of risk to environmental values. ▪ Industry will be required to provide detailed information in TEP applications regarding transition to appropriate water management strategies to manage a sustainable water cycle.
Water Management Plans	<ul style="list-style-type: none"> ▪ QRC clearly stated its view that what is currently in the conditions is acceptable and there is no requirement for third party certification of WMPs. ▪ It was discussed that where sites had failed to do enough with their WMPs they now had to deal with the consequences of excessive water on-site. ▪ DERM commented that this included seeking permission to discharge. QRC said that this was true of all mines given the extreme rainfall experienced and not just those that may have been tardy with WMPs. ▪ DERM discussed the advantages it could see in third party certification of WMPs, including comfort in defining the separation of waters from mine affected waters. DERM agreed to consider this further out of session in light of QRC's views on the topic.
Notification Requirements	<p>Discussion by the group considered the following:</p> <ul style="list-style-type: none"> ▪ There was concern regarding the requirement of two different timeframes for compliant releases, both of which are more stringent than the 24 hours provided for notifying of a breach of conditions. ▪ DERM pointed out that the timeframes for notification applied to both compliant and non-compliant water discharges (i.e. any water discharge). ▪ QRC suggested that water releases should have a 24 hour notification requirement to be consistent with other industries and EA conditions. ▪ Issues around practical site considerations (e.g. mobile coverage) were discussed in the context of complying with 6 hours. ▪ There was concern that some breaches identified and being considered by DERM for enforcement action were for failure to meet the notification requirement rather than for a compliance issue (e.g. breach due to environmental harm). ▪ It was suggested that condition W12 be reviewed to clearly define notification timeframes for compliant/non compliant activities and notification requirement times.
	<p>13 Action: DERM to review condition W12 and provide a draft for consideration at the next workshop.</p>
Other Drafting Considerations	<ul style="list-style-type: none"> ▪ There was agreement to review the need for condition W43 in the model conditions. ▪ In relation to water re-use, conditions W23-W24 need to ensure that supply of water to a third party is not constrained. ▪ QRC proposed the wording "other than a natural watercourse" needs to be added to conditions W23-W24. ▪ The wording "dry weather" in conditions W23-W24 needs to be clarified/defined.
	<p>14 Action: DERM to review conditions W23, W24 and W43 and provide a draft for consideration at the next workshop.</p>
General	<p><i>It is anticipated that the next DERM/QRC Workshop will be held on Wednesday 29 June and will focus on the science data in the model conditions. Venue to be confirmed.</i></p>

DERM / QRC WORKSHOP 1 – ACTION ITEMS AND CONSIDERATIONS

** SORTED **

ACTION ITEM 1

Brief -	DERM Consideration -	Modification to Model Conditions: Yes/No – Explain
<p>██████████ to circulate a copy of DERM's PowerPoint presentation to workshop participants.</p>	<p>Action completed.</p>	<p>No</p>

ACTION ITEM 2

Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
<p>Review of Conditions (W1 + W2) – DERM to review conditions W1 and W2 and a definition for 'mine affected water' to provide a draft for consideration at the next workshop.</p>	<p>Review considerations:</p> <ul style="list-style-type: none"> - Definition of 'contaminants' is defined by EP Act. No amendment to this definition is proposed but excluding the term from condition W2 is accepted with the insertion of 'mine affected water' and an associated definition. - Definition of 'waters' is deliberately broad and acknowledge argument that current definition can capture on-site water management infrastructure in a literal sense. Propose to specifically exclude identified on-site infrastructure from definition of 'waters' through amendment to condition W2. - This may not be as problematic within W1 as it would be in combination with the original W2 given the reference here to 'except otherwise permitted" There remains a need from DERM's perspective to ensure other contaminants are captured here. Original proposal to include only mine 	<p>W1 No change. There remains a need from DERM's perspective to ensure other contaminants are captured here. QRC proposal to include only mine affected water and solid waste in one definition is not sufficient to capture other possible contamination sources such as diesel / oil / other chemical spills from contained storages. Given the reference in W1 to 'except otherwise permitted by the EA", the solution to condition W2 should deal with drafting concerns raised.</p> <p>W2 Modified. Replacement of the word 'contaminants' with 'mine affected water'. This negates the argument about the broad definition of contaminants within the EP Act and the restrictive nature of the former condition in a very literal sense. Also included explanatory text to provide specific 'exclusions' from the 'waters' definition for the purposes of condition W2.</p>

DERM Review Actions

	affected water and solid waste in one definition is not sufficient to capture other possible contamination sources such as diesel / oil / other chemical spills.	
ACTION ITEM 3		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
DERM to consider the certification issue and provide advice for discussion at the next workshop.	<p>DERM's main interest here is to achieve a robust process of review and improvement through on-site actions to achieve compliance with EA conditions.</p> <p>Considerations include annual third party review of water management plans and certification of recommended actions to improve site water management practices. DERM notes industry opposition and request for further discussion. Draft WMP conditions are included in the working draft document for discussion purposes.</p>	Yes – modification to conditions W32 to W35 for further discussion at next workshop.
ACTION ITEM 4		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
DERM to give consideration to whether model conditions could be structured to deal with extraordinary events.	<p>Both industry and DERM agree that a desirable outcome of the model conditions review is to reduce the need for future TEP applications in similar circumstances.</p> <p>DERM's review of data provided by mines to date, while incomplete, indicates the proposed approach to providing low/no flow, medium and high flow discharge options would have reduced the need for TEPs this wet season, but would not have eliminated it entirely.</p>	No – there is no particular condition drafted to cater for unknown extraordinary events, however the proposed changes to the discharge conditions attempt to minimise the need for future TEP applications by providing greater windows of opportunity for discharges to occur while aiming to protect environmental values within the system.

DERM Review Actions

	<p>It is also apparent that there are technological options available to better manage mine water to effectively maximise discharge opportunities for mines, including water treatment.</p> <p>Given this there exists a potential to transition to a new standard of water management which would suit the intent of a future TEP for reduced numbers of mines faced with similar circumstances in the future.</p> <p>Model conditions do not appear to be an appropriate place to provide discharge options in exceptional circumstances, given the inability to give prior consideration to factors only relevant to the unknown circumstance. DERM must consider possible impacts on water quality objectives and cumulative effects, which are important and obligatory considerations for making an environmental management decision, including imposing EA conditions.</p>	
ACTION ITEM 5		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
<p>DERM to review condition W19 and provide a response for the next workshop.</p>	<p>The key industry concern with this condition is the perceived sensitivity in the trigger for the upstream / downstream variation in water quality; in particular given the measurement of a quality parameter just one unit higher than an upstream measurement would trigger a 2 year water quality investigation.</p> <p>In DERM's internal discussion it was agreed that there is little benefit in continuing such lengthy investigations for small variations, however it was acknowledged the previous condition was drafted in order to add to data collections for broader consideration of cumulative impacts.</p> <p>It is noted that an exceedance only triggers one investigation</p>	<p>Yes – remove reference to investigation in accordance with ANZECC methodology in conditions W5 and W19.</p>

DERM Review Actions

	i.e. multiple exceedances do not trigger separate investigations if one is already occurring, but DERM agreed to remove reference to ANZECC methodology to provide greater flexibility to scale the size of an investigation according to the nature of the trigger exceedance.	
ACTION ITEM 6		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
DERM to consider accessibility issue between workshops.	<p>Industry raised an issue about safely accessing defined monitoring locations during extreme events and proposed to have words such as “as long as the location is safely <u>accessible and practical</u> ” inserted into condition W4 and any other monitoring location requirement.</p> <p>While acknowledging this issue was raised in good faith and following real access issues resulting from recent disaster events, consideration of inserting the words proposed or any alternative wording raises unintended risk areas for DERM as follows:</p> <ol style="list-style-type: none"> 1. Shifts onus of proof onto DERM to demonstrate that access is safe if failure to monitor occurs. 2. While unlikely, could provide incentive for an operator to neglect maintenance of safe access i.e. reduce maintenance and monitoring costs and still achieve compliance. <p>DERM agrees it is possible to include a note under condition W4 about considering circumstances around safe access prior to determining enforcement action in response to any perceived contravention of the condition.</p>	No – however a proposed note is included under condition W4 to address the issue raised.

ACTION ITEM 7		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
<p>DERM to consider relevant conditions and explanatory text in internal workshop and provide a draft for consideration at the next QRC workshop.</p>	<p>Review considerations –</p> <p>TSS / Turbidity: Industry suggested that a turbidity measurement be used as the default measurement as opposed to TSS. The existing Table 2 and footnote provide for a turbidity limit to be derived from TSS correlation. The footnote already states clearly that a limit for suspended solids can be omitted if a turbidity limit is included. No further action required.</p> <p>EC / sulphate: Industry also raised correlation between EC and sulphate and questioned why the need to measure both.</p> <p>At DERM's internal workshop it was concluded that there is insufficient data to provide a blanket approach through model conditions for an EC / sulphate correlation. In addition to this, DERM's review of water quality data provides cause to ensure the end of pipe limit for sulphate is maintained and this will be discussed further at the next workshop. It was determined that the limit can be reviewed based on achieving a downstream target of 250 mg/L to ultimately protect downstream drinking water values. Amend Table 2 to this effect.</p> <p>Metals: Industry believes the monitoring frequency is too often. DERM acknowledges that where adequate data exists (i.e. two years monitoring data) then on a case by case basis the frequency of metals monitoring can be evaluated. This issue is essentially agreed. The outcome of the review is to amalgamate both 'Table 3s' in the existing model conditions and call them all 'potential contaminants', including and</p>	<p>TSS / Turbidity: No change required.</p> <p>EC / sulphate: Yes - Table 2 amended to provide for review of sulphate EoP limit based on achieving downstream target of 250 mg/L. Table 2 also amended generally to remove references to 'interim' limits and 'future limits'.</p> <p>Metals: Yes - Amalgamation of previous 'two' Table 3s and amendments to foot notes to Table 3. Review has also determined that the trigger levels for Aluminium and Lead do not currently match the accepted LORs, an amendment has been proposed accordingly.</p>

DERM Review Actions

	amendment to footnotes to capture the 2 year data collection which can lead to reduced frequency and / or removal of monitoring requirements for particular parameters – considered on a case by case basis.	
ACTION ITEM 8		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
DERM to review footnotes for Table 3 and provide a draft for consideration at the next workshop.	As above for Action 7.	Yes – Agreed and to be modified as per above
ACTION ITEM 9		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
DERM to clarify the status of the REMP template and advise accordingly.	DERM has not produced a template for REMP documents. The draft documents referred to in the explanatory text for updated REMP conditions are two existing 'draft' documents produced in March and October of 2010, which were intended to provide additional guidance to mining companies for the production of REMP documents. The reference to these documents will not be replicated in the EA conditions, it only occurs in explanatory text.	No

ACTION ITEM 10		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
<p>DERM to consider above suggestions and review conditions W20-W22 and provide a draft for consideration at the next workshop.</p>	<p>Comments made related to draft REMP condition package. The revisions to the REMP conditions are not material in nature but where instead an attempt to clarify the pre-existing requirements of the REMP. The following comments were made:</p> <ol style="list-style-type: none"> 1. The word “contaminants” should be replaced by “mine affected water” (or a similar definition once developed) in W20. Agreed. 2. There was concern that the order of condition W21 was confusing and should be revised. DERM has revised the order of W21. 3. Condition WXX should be removed as it was similar to condition W28. Agreed, however there is a resultant need to amend condition W28 to ensure all monitoring, including biological monitoring, carried out under the water schedule is captured. 	<p>Yes –</p> <ol style="list-style-type: none"> 1. W20 removed ‘contaminants’ and inserted ‘mine affected water’. 2. W21 Order revised in working draft. 3. W28 Included ‘biological monitoring’ and general tidy up e.g. reference to former department’s name amended.
ACTION ITEM 11		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
<p>DERM to clarify how model conditions can provide a clear</p>	<p>Clarification on internal dam transfers will be achieved by excluding on-site water management infrastructure from the definition of ‘waters’. There is no requirement for a regulated dam to be defined as a release point for the purpose of an EA.</p>	<p>Yes – included provision for excluding on-site water management infrastructure from the definition of ‘waters’ in condition W2 to ensure allowance made for dam to dam transfers etc.</p>

DERM Review Actions

<p>framework for internal dam to dam transfers and how sediment control dams are to be dealt with under the regulated dams guideline – links to defined release points in model conditions but may be more a consideration for regulated dams guideline.</p>	<p>Release points will only be included where the dam is intended to form part of a normal operation release management framework e.g. a tailings dam at a gold mine will be a regulated dam, however EA conditions will not authorise a release from such a dam, despite the safety requirement for the dam to contain a spillway. For such dams operators must manage the structure not to discharge – in exceptional circumstances where a discharge occurs from such a structure DERM would investigate the circumstances and likely determine the company had breached its EA conditions.</p>	
<p>ACTION ITEM 12</p>		
<p>Brief -</p>	<p>DERM Consideration -</p>	<p>Modification to Model Conditions Completed: Yes/No – Explain</p>
<p>DERM to review condition W12 and provide a draft for consideration at the next workshop.</p>	<p>This issue is due to perceived inconsistency in approach to mining as opposed to other industries and also the complexity created by having different notification timelines for deliberate vs uncontrolled releases.</p> <p>There is adequate justification for the initial decision to impose more stringent timeframes on notifications of water discharges, particularly where considerations of cumulative impacts are critical to DERM's decision making processes in times where releases are occurring and the period of data collection that has occurred now since 2008.</p> <p>DERM has already accepted arguments presented about the practicality of complying with 6 hours for uncontrolled release in the November 2010 review. That acceptance resulted in the two tiered approach of 6 and 12 hours and is adequate justification to not revert to a single 6 hour notification window.</p>	<p>Yes – W12 modified to remove two tier notification requirements and include 24 hour maximum notification timeframe.</p>

DERM Review Actions

	<p>In practice the revised condition is not adequately clear and enforceable and given the risk associated with a non-deliberate release is higher than that of a deliberate release in accordance with EA conditions; there is no environmental risk based justification for a tighter timeframe to exist for deliberate releases. It is arguable that all releases from authorised discharge points are controlled given they are designed to release when full. An uncontrolled release is not defined.</p> <p>A 12 hour limit on email notification as opposed to 24 hour limit as applied in most other industries is unlikely to yield any great benefit to DERM as regulator. It is accepted that for email notification the vast majority will be made or received during business hours.</p> <p>Other industry standards currently require notification as soon as practicable and no later than 24 hours after commencement.</p> <p>To remove uncertainty and complexity, and to improve consistency DERM proposes to restore the maximum notification timeframe to a single duration of 24 hours, while maintaining the requirement to notify as soon as practicable and reinforcing the message that same day notification will continue to be expected from the regulator where it is practical to do so.</p>	
ACTION ITEM 13		
Brief -	DERM Consideration -	Modification to Model Conditions Completed: Yes/No – Explain
DERM to review conditions W23, W24 and W43 and provide a draft for consideration at the next workshop.	<p>DERM agreed to review conditions W23 and W24 to improve clarity of the conditions and provide for reuse options in accordance with water quality limits.</p> <p>DERM also agreed to consider the ongoing need for condition W43</p>	<p>Yes</p> <p>W23 and W24 amended.</p> <p>W43 deleted from model condition package.</p>

DERM Review Actions

Fitzroy Model Water Conditions Review
DERM Internal Workshop 1
9/10 May 2011
(Licensing Conditions)

Participants: Andrew Brier (RSD – CCSG), [REDACTED] (RSD – CCSG), [REDACTED] (RSD – ES CW), Chris Loveday (RSD – ES CW), [REDACTED] (RSD – ES SW), [REDACTED] (RSD – ES SW), [REDACTED] (ERS), [REDACTED] (ERS), [REDACTED] (ERS), Lindsay Delzoppo (ENRR), [REDACTED] (ENRR), Jon Womersley (ENRR), [REDACTED] (RSD – CCSG)

Issue:	Discussion:
Coordinator	<ul style="list-style-type: none"> [REDACTED] A/Director, Coal is undertaking the main coordination of the review.
Terms of Reference (ToR)	<ul style="list-style-type: none"> Slight changes were made to the ToR. Input is required from Andrew Connor, [REDACTED] Melissa Wells, [REDACTED] and [REDACTED] Changes to the ToR to be finalised by Thursday 12 May. The final ToR will then be circulated on 12 May to DERM workshop participants, QRC and the Fitzroy Water Quality Advisory Group for information. [REDACTED] to distribute the ToR to the FWQAG on behalf of DERM.
Model conditions	<ul style="list-style-type: none"> The working draft of the model conditions is to be finalised by 20 May. Documentation is to be circulated to QRC on 23 May for review prior to the DERM/QRC workshop on 31 May.
DERM/QRC Workshop 31 May	<ul style="list-style-type: none"> It was agreed that at the first DERM/QRC workshop, discussion would not go into the detail of the science but would be focussed on the licensing conditions. Andrew Brier to do an opening presentation at this workshop. This presentation is to include: <ul style="list-style-type: none"> - background/framework for the review - explanation that the model conditions is to be used a basic approval tool - WOLA - obligations for companies to work within TEPs - explanation that EAs are the appropriate tool for authorising discharges – the model conditions are a basic tool and if companies want more, they are to negotiate conditions in their EA, or alternatively submit a proper TEP.
Brainstorming	<ul style="list-style-type: none"> The following three questions were used to guide discussion throughout this session: <ul style="list-style-type: none"> - Should it be in the model conditions? - Should it be site specific? - Can we manage the cumulative impacts?
Issue 4 Key Consideration 1 (comparative study EAs/TEPs)	<ul style="list-style-type: none"> Ed Donohue is the point of contact for the presentation on Key Consideration 1. Ed to develop a powerpoint presentation for this consideration and return to [REDACTED] and [REDACTED] by Wednesday 18 May. Lindsay Delzoppo to assist [REDACTED] with wording for presentation in relation to “Old EAs vs new EAs”. [REDACTED] to assist Ed with wording for presentation in relation to “Compare EAs vs TEPs”.
Issue 5 Key Consideration 2 (discharge conditions)	<ul style="list-style-type: none"> No/Low flow discharge limits (nothing - insignificant): <ul style="list-style-type: none"> - Aiming to use EOP limits - Discharge limit – maximum volume to be set once the data has been analysed - Discharge rate (release up to a certain number of weeks) – to be developed once the data has been analysed Medium flow discharge limits (insignificant - 20%) <ul style="list-style-type: none"> - Maximum EOP EC limit to be developed (currently 1500 in original conditions – anticipated to move to larger number once data has been analysed) - Dilution rate – EC trigger downstream – to be developed once the data has been analysed (it is anticipated that the current ratio of 20% is too restrictive) High flow discharge limits (20% - 80%) <ul style="list-style-type: none"> - High EC – may be able to adopt slightly higher figures of 4000-10000 – final figures to be developed once the data has been analysed - Case by case assessment is required - Higher limits may be authorised via written approval by DERM – to be reviewed further. [REDACTED] to develop ½ page of information as outlined below and return to [REDACTED] and [REDACTED] by Wednesday 18 May. Paragraphs to include: <ul style="list-style-type: none"> - DERM’s considerations in developing no/low flow, medium flow and high flow discharge conditions - Outlining what information is required from QRC (eg. What did QRC experience; what are the concerns/issues; do QRC’s members want straight dilution etc).
Issue 6 Key Consideration 3 (mine affected water)	<ul style="list-style-type: none"> It was determined that a possible definition of “mine affected water” could be “water contaminated by mining activities”. [REDACTED] to contact QRC to clarify why it raised this issue.
Issue 7 Key Consideration 4 (passive and active discharges)	<ul style="list-style-type: none"> Condition W12 is to be reviewed/redrafted. [REDACTED] to add wording to condition W12 along the following lines: <ul style="list-style-type: none"> - Multiple releases from the same discharge point within X for active discharges and Y for passive discharges (anticipated X = 24 hours; Y = 6 hours – to be reviewed/clarified at DERM/QRC workshop). [REDACTED] to contact QRC to clarify if it had any further concerns with this consideration.
Issue 8 Key Consideration 5	<ul style="list-style-type: none"> Condition W32-35 is to be reviewed/redrafted. [REDACTED] to provide wording from the dam regulations in relation to certification requirements

(linkages with WMPs)

and annual inspection/return submissions and return to [REDACTED] and [REDACTED] by Wednesday 18 May.

Issue 9
Key Consideration 9
(populating right parameters and limits)

- It was agreed to defer this condition at the moment until the data can be analysed.
- If any workshop participants have concerns with Tables 2, 3 or 7 – please submit to Andrew Connor and Ian Ramsay by 18 May.

Issue 10
Key Consideration 10 (monitoring and reporting requirements)

- Conditions W18-W22 to reviewed/redrafted.
- Wording to be finalised once release conditions are finalised.
- [REDACTED] **to provide reviewed draft wording for these conditions through to [REDACTED] and [REDACTED] by Wednesday 18 May.**

Issue 11
Key Consideration 11 (use of gullies, etc)

- This condition is to be flagged for discussion with QRC at the DERM/QRC workshop.

Issue 12
Key Consideration 12 (notification requirements)

- This point was discussed under Issue 7 / Key Consideration 4.

Issue 13
Key Consideration 13 (evaluating dilution rate)

- Relates specifically to explanatory text in Table 4 (gauging stations).
- If anyone has concerns or would like amendment to the wording, please advise Andrew Connor by Wednesday 18 May.

Model Water Conditions for Coal Mines in the Fitzroy Basin

Industry Training

25 August 2011

Introductions

- Name, company/client representing, role
- Sign Attendance list

Day Overview

Introduction (Overview, Objective of the Day, Background)

Release limits, triggers and indicators (Table 2 & 3)

Release during Events (Table 4) – *Part 1*

12.30pm Lunch

Release during Events (Table 4) – *Part 2*

Receiving water monitoring, triggers & programs

Individual/General Questions/Wrap-up

4pm Finish

Objectives for the Day:

- Help understand revised model water conditions for coal mines in the Fitzroy Basin.
- Providing guidance/support to assist companies in providing quality EA amendment applications.
- Focus will primarily be on technical aspects of release condition/limits

Background – Role of Model Conditions

- Provide a base structure for Environmental Authority conditions.
- Improve consistency of conditioning approaches.
- Provide transparency to applicants for environmental performance expectations.
- Model conditions do not prevent applicants from proposing alternative conditions, nor restrict DERM from using alternative conditions where the site or proposed activity warrant it.

Background – Intent of Model Condition Review

- Planned for end of 2011, brought forward 6 months
- Retain intent of previous model conditions
- Review limits and approaches based on available data and experience (request for data)
- Provide greater flexibility to avoid TEPs where possible but not cause environmental harm or cumulative impacts

Note: Amended EAs will NOT include all TEP approaches, e.g. local EVs must be assessed/protected

Key Review Outcomes:

- ‘Mine affected water’ definition finalised
- Low / medium / high flow discharge methodology introduced
- Conditions simplified where possible (e.g. release notification)
- Receiving Environment Monitoring Program expectations clarified
- Water Management Plan reviews tied to infrastructure improvement commitments.

The Bottom Line:

- Regulation of mine water discharges will continue to be based on management against WQO and protecting EVs.
- Assessment and conditioning of EAs must continue to consider cumulative impacts.
- The review outcomes are not a ‘compromise’ on environmental protection, but it was aided by lessons learned from recent wet season experiences & data.
- Extreme events are mentioned in explanatory notes - not specifically conditioned. Planning is required.

Release Permissions:

Mine affected water:

1. Controlled releases with end of pipe quality and quantity limits;
or
2. To internal water management infrastructure

Non mine affected water:

1. ESCP releases – no end of pipe specified, but in-stream monitoring of TSS will trigger investigation if not managed;
2. Water management plan diversions.

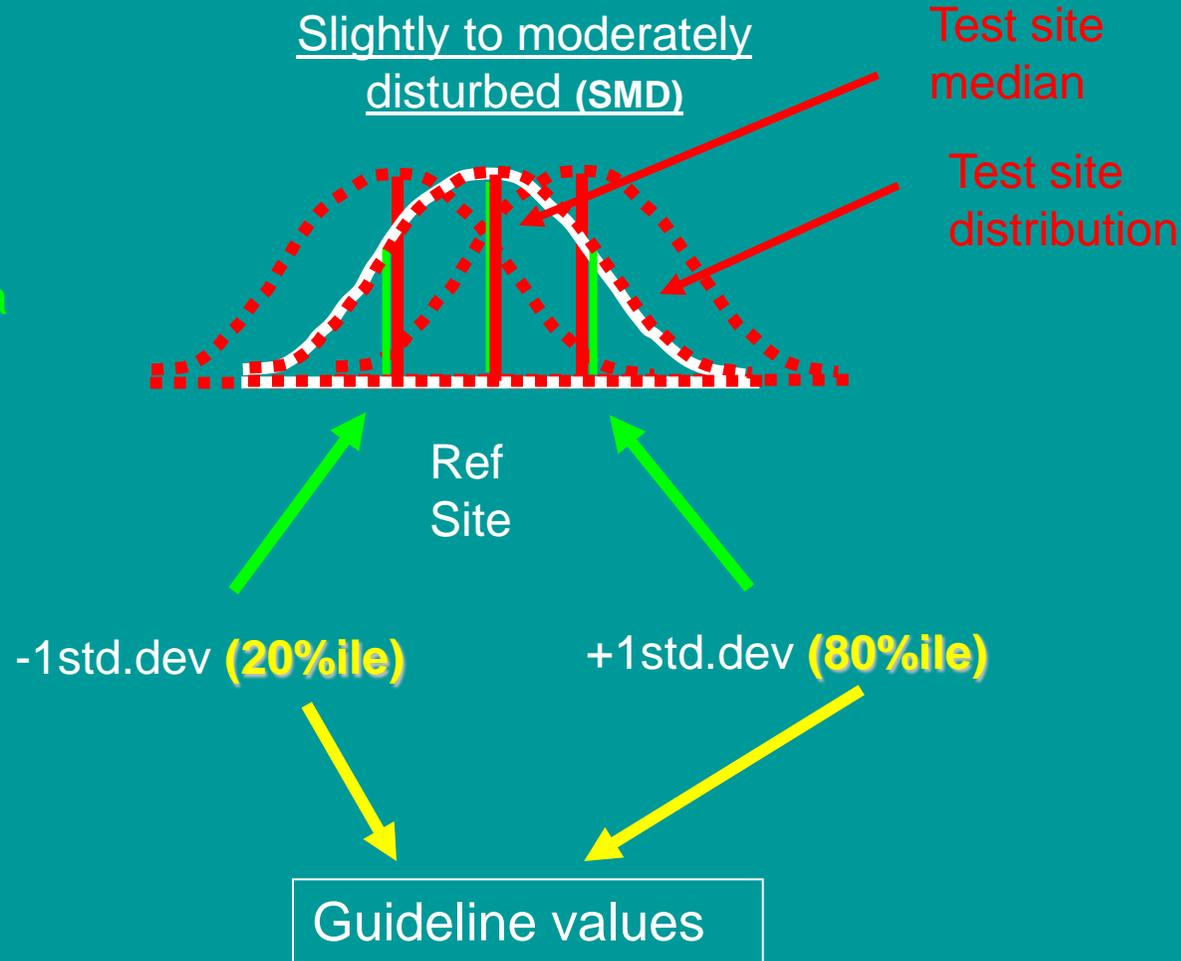
Release Limits, Triggers & Indicators Model Conditions - Table 2 & 3

Table 2 – Suspended solids

- Suspended solids (SS) traditionally used to regulate discharges
- Dried solids > 0.45 μm filter
- Limit often determined from treatment design for sedimentation
- SS impact by smothering/silting ecosystems
- Naturally high in Fitzroy during events - use reference data (80th percentile to check/derive limit)
- Delay in getting results

ANZECC 2000 recommendations on reference-based guideline values

Distribution of Indicator values at a REFERENCE SITE



Developing/applying Guidelines

Method

Referential approach:

- benchmarking against reference systems

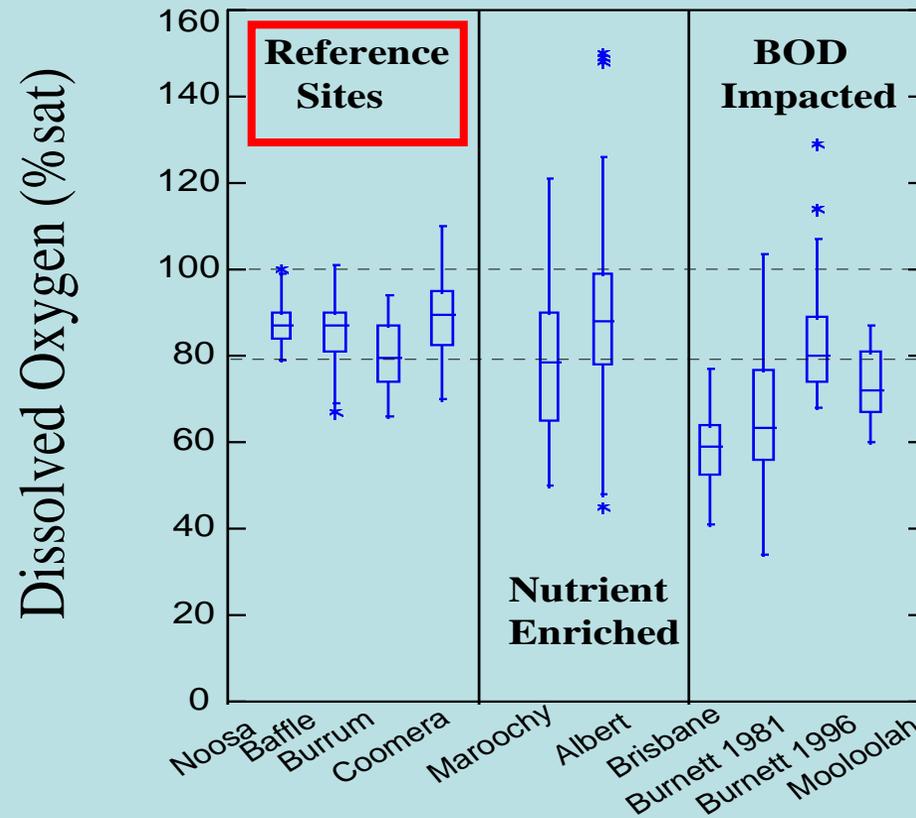


Table 2 – Turbidity

- Turbidity traditional as an ecosystem measure
- Measures light scatter – finer material dominate
- Difficult to remove via treatment – need to flocculate
- **I**mpact by blocking light to benthic communities
- In-situ measurement - quick result
- Can correlate with SS. May be rough and dependent on particle size distribution etc

Table 2 – Suspended solids vs. Turbidity

Model Conditions guidance

Suspended solids (mg/L) – primary focus:

- Limit based on receiving water reference data and achievable treatment
- Limit can be omitted if turbidity limit is included – still measure

Table 2 – Suspended solids vs. Turbidity

Model Conditions guidance

Turbidity (NTU) – secondary focus:

- Current limit or limit derived from suspended solids
- Need demonstrated correlation between turbidity to suspended solids historical monitoring data for dam water
- Limit can be omitted SS limit is included – still measure

Table 2 – Sulphate

- Previously: fixed limit in Table 2 – current limit or 1000mg/L
- Now: limit used to protect Drinking Water (250mg/L). Could be specified in Table 2 if 250mg/L limit is applied.
- Now: For variable flow criteria and higher limit, specify in Table 4 (like EC approach).

Table 3 – Potential Contaminants

- All contaminants now considered as potentially relevant – one table, with triggers
- Some minor change to LOR triggers, sodium added
- Option 1 – Adopt all indicators & triggers from Model Conditions
- Option 2 – Screen contaminants or adjust triggers on a site by site basis for each mine.

Table 3 – Potential Contaminants

Screening contaminants

- Contaminants may be removed from Table 3 where it can be demonstrated they are not of concern for a site.
- Need representative & historical data of all dams which have or could release.
- Essentially, field filtered results need to be < or near trigger values for whole data set.

Table 3 – Potential Contaminants

Modifying trigger levels

- Applicable to metal/metalloids only.
- Need sufficient data from reference sites (non mine affected), e.g. two years, >24 data points.
- Need field filtered data, grab samples – disregard other data.
- Compare 95th percentile of data to ANZECC trigger. If greater, derive 80th percentile reference guideline as per previous.

Release during Events - Table 4 Part 1

Overview

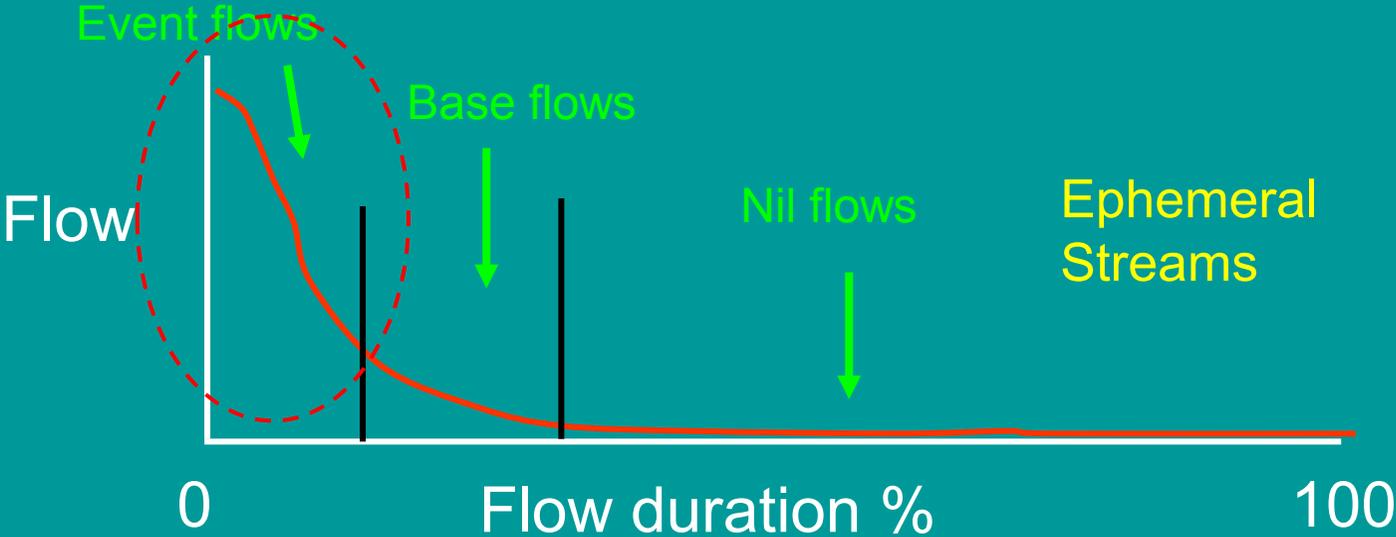
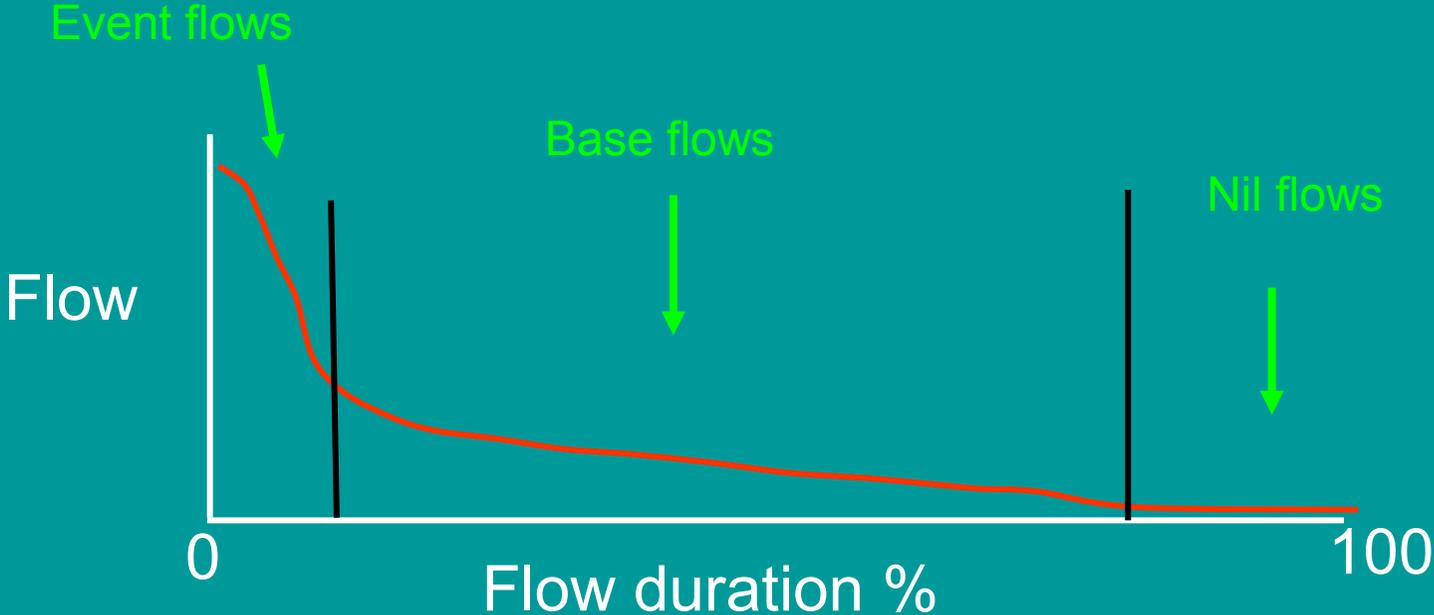
Part 1

- Flow regimes and flow triggers
- No/low flow stream & example
- Zone overview & rules

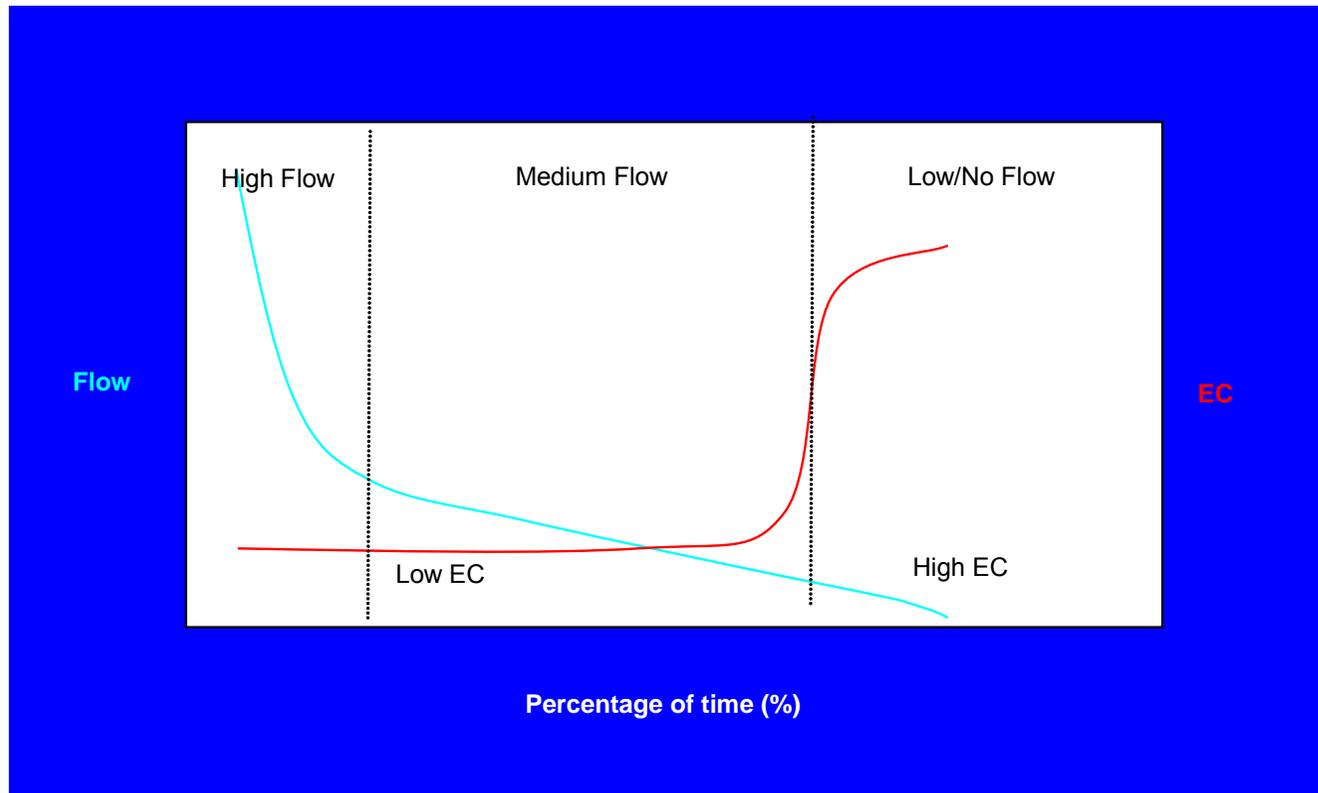
Flow regimes and flow triggers

- Three different flow regimes for possible discharge of different qualities:
 - no/low flow, medium flow (event), high flow.
- Need to develop two flow triggers: event commencement (used for no/flow & medium discharge) and high flow Need case-by-case assessment & data to calculate triggers
- Gauging station location important, e.g. upstream vs downstream, local vs major waterway

Flow regime considerations



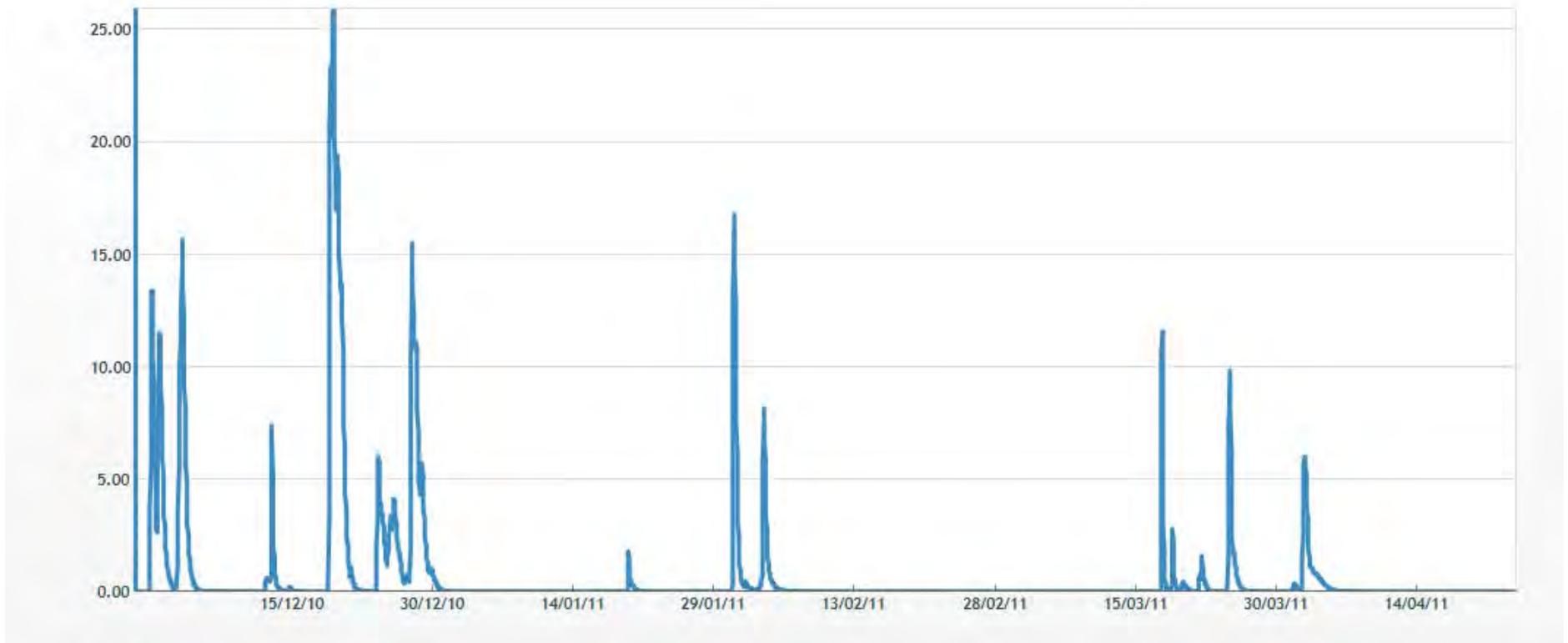
Flow Regime – Flow Regimes & EC



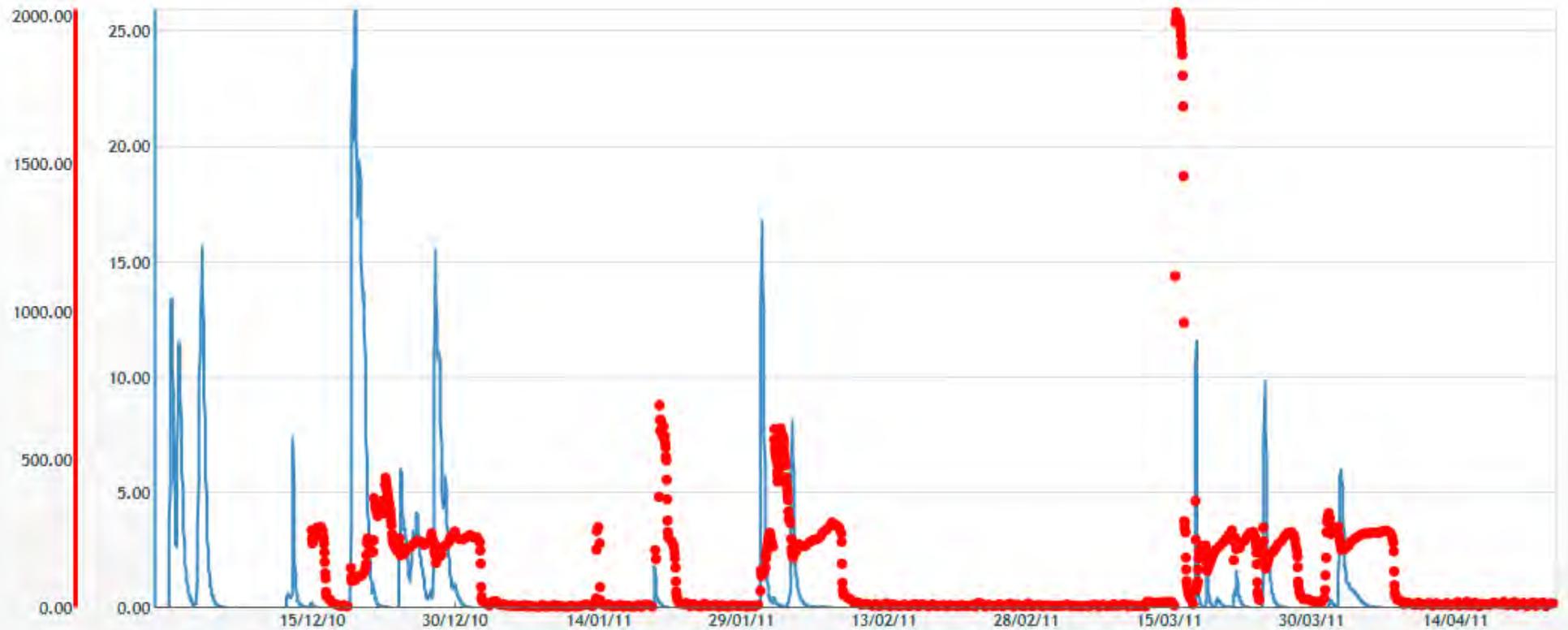
How to determine event flow triggers?

- Plot flow (cumecs) versus EC – more data the better
- Find point where EC increases and starts to exceed event guideline (usually $250\mu\text{S}/\text{cm}$)
- Estimate flow at this point – becomes event trigger.
- Release flow trigger can be any point at or above this flow.
- Where limited data, estimates using catchment area correlations/models

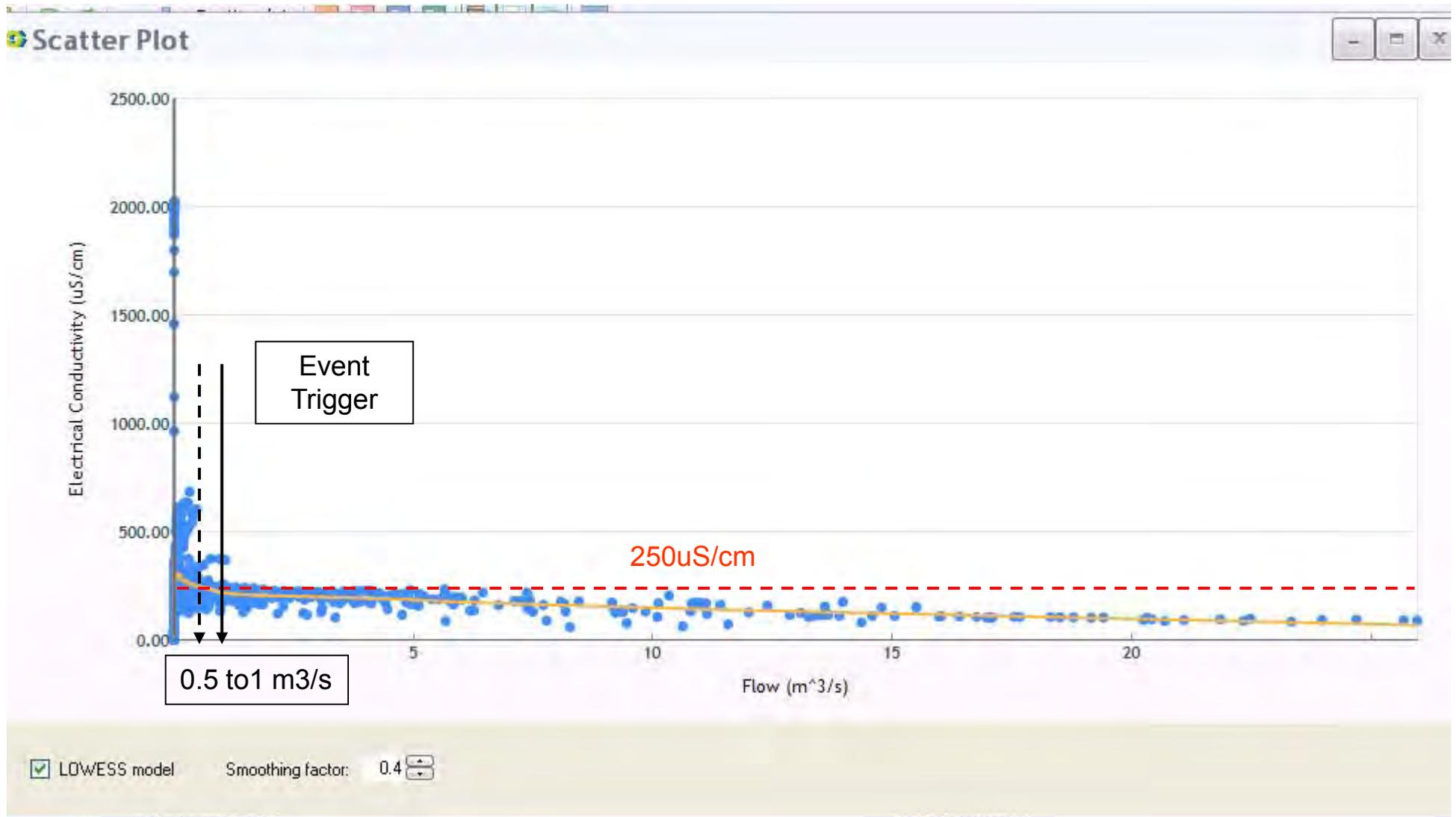
Example – North Goonyella data using WQA (flow)



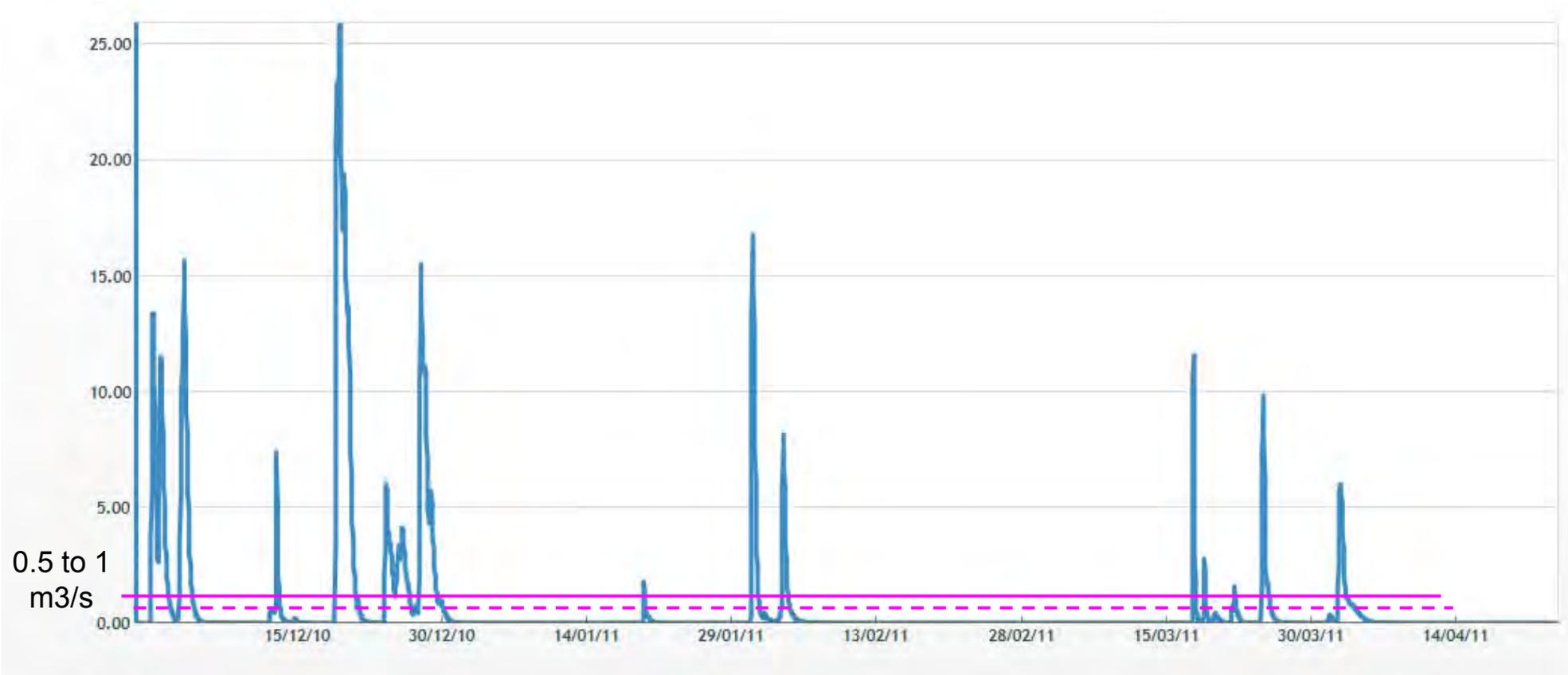
Example – North Goonyella data using WQA (Flow & EC)



Example – North Goonyella data using WQA (EC vs Flow)



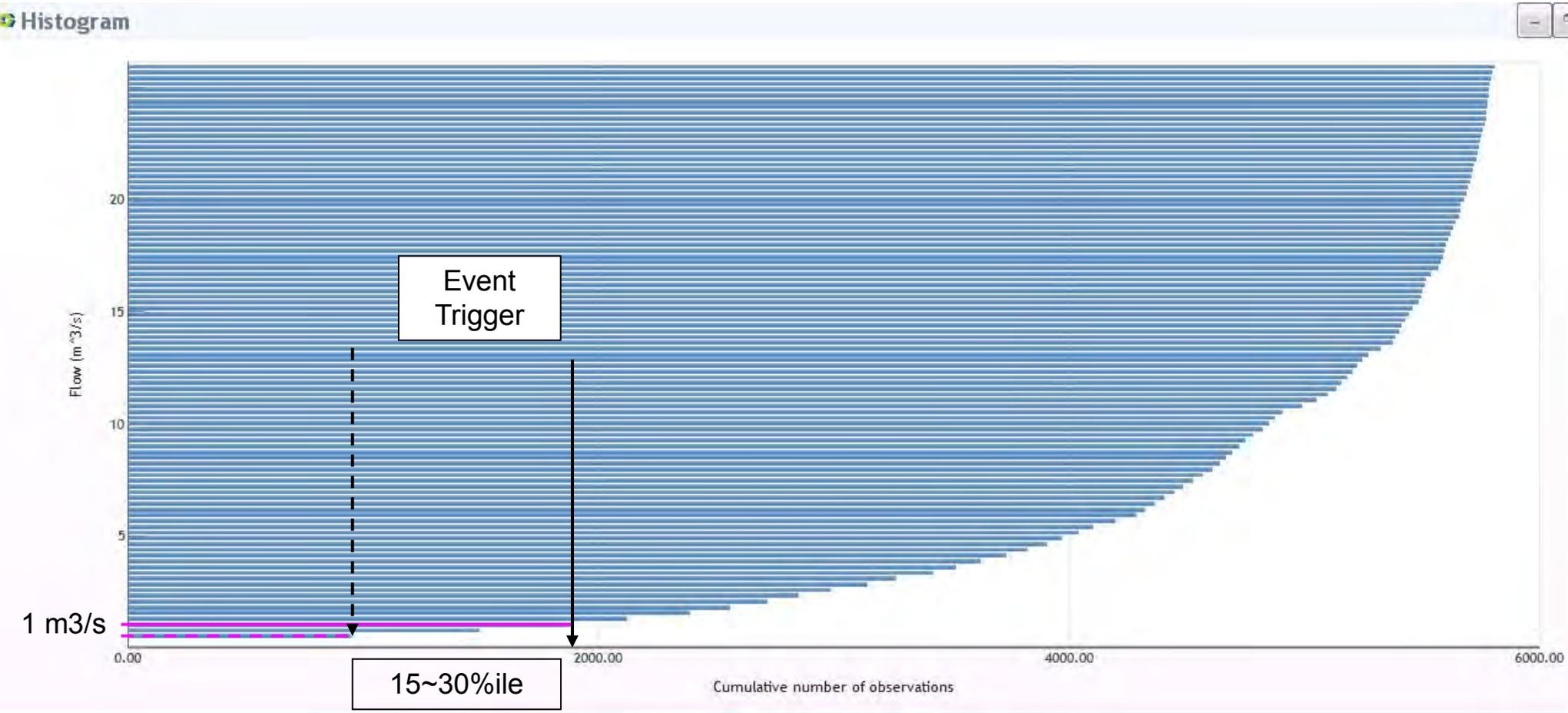
Example – North Goonyella data using WQA (flow) Event Trigger



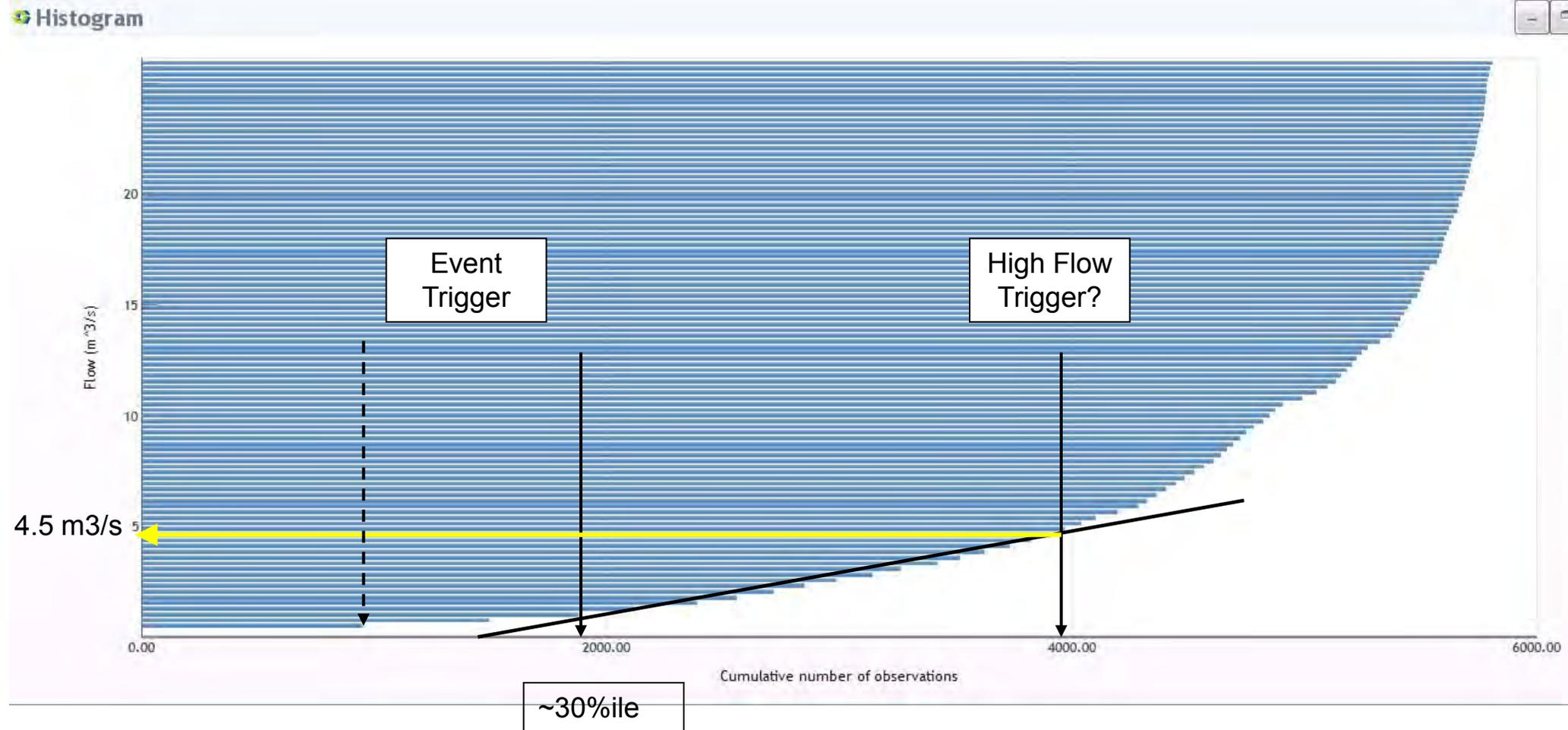
How to determine high flow triggers?

- Proposed method is visual, may be others.
- Need hydrograph, remove no/low flow data
- Examine cumulative frequency curve for flow
- Mark event trigger and draw line, where line significantly departs from curve represents high flow commencement & trigger

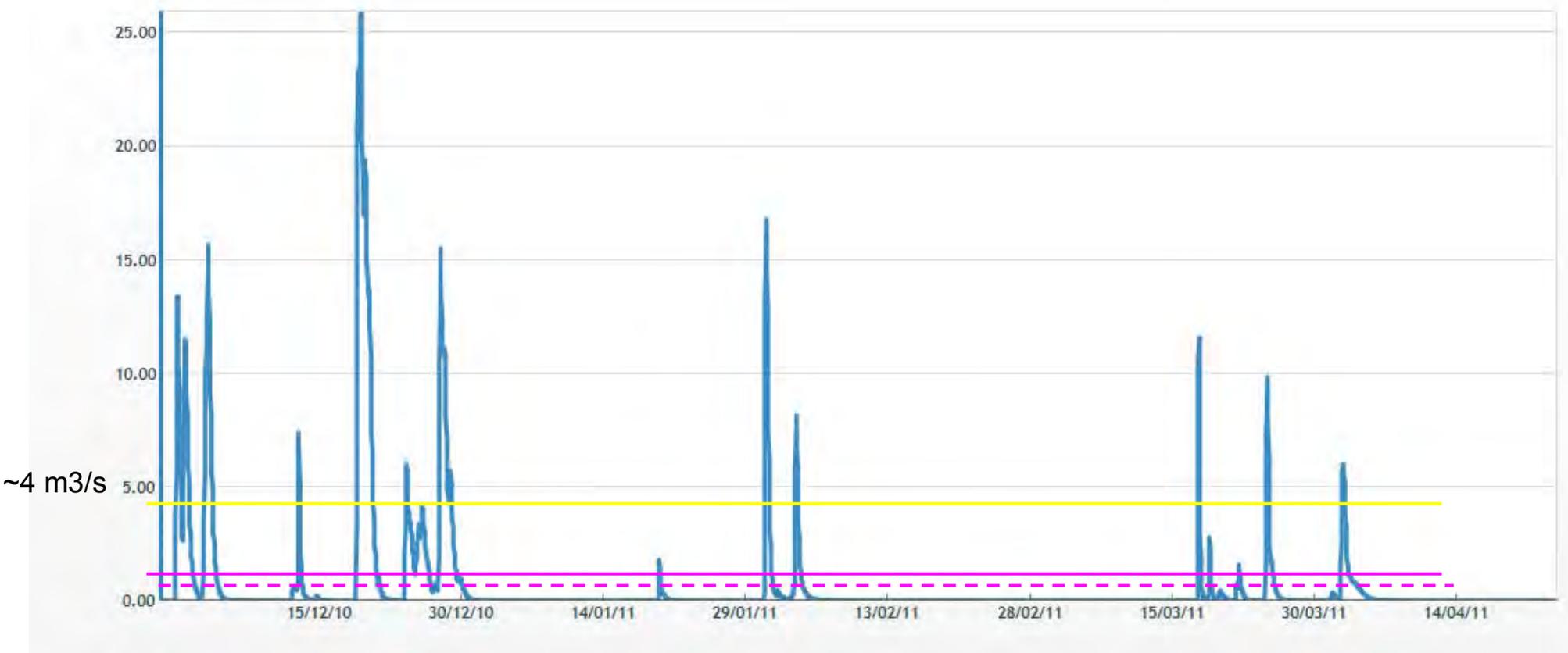
Example – North Goonyella data using WQA (flow, histogram, <0.5 cumecs removed)



Example – North Goonyella data using WQA (flow, histogram, <0.5 cumecs removed)



Example – North Goonyella data using WQA (flow) High Flow Trigger



No/low flow stream (1)

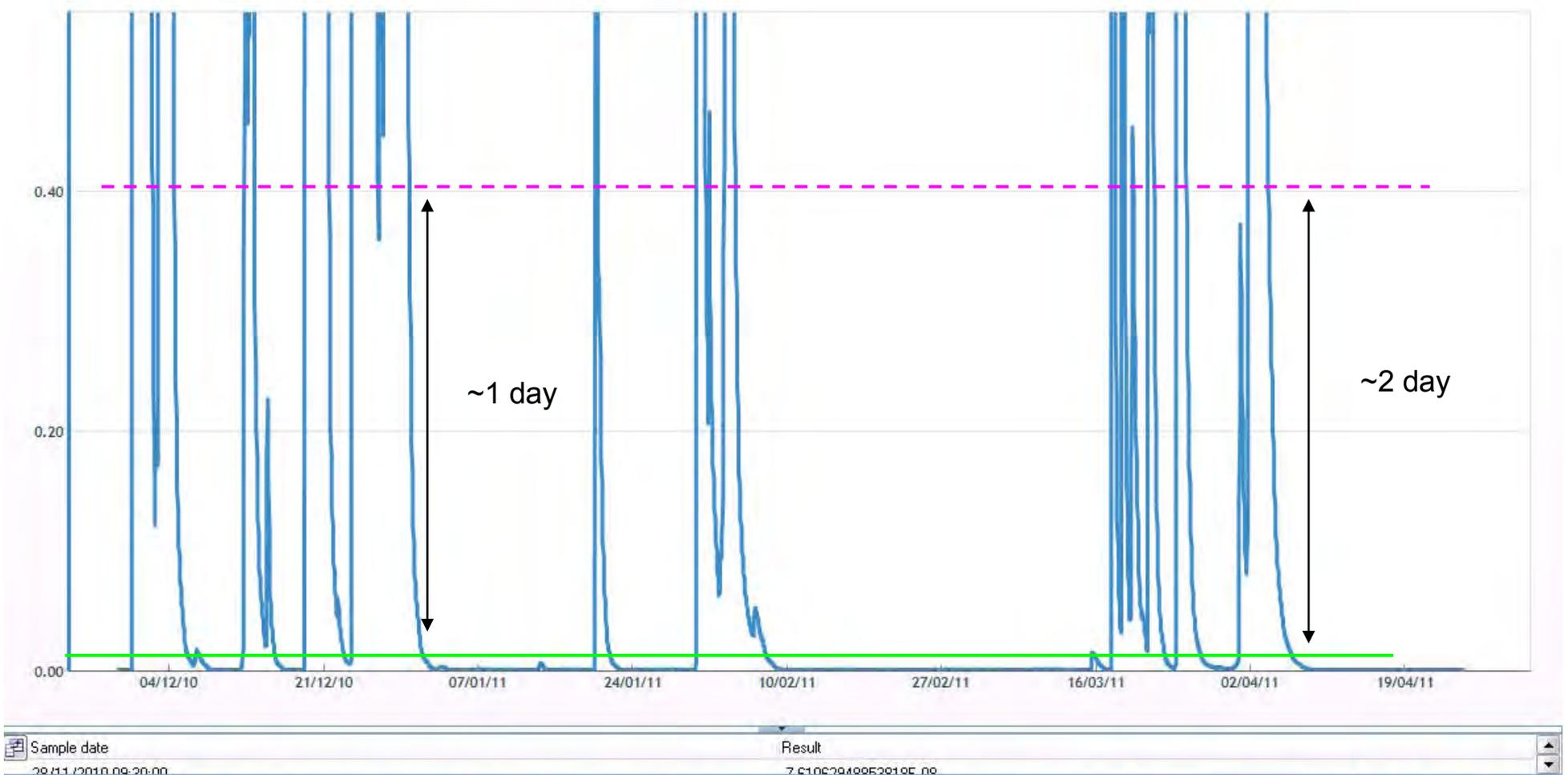
- Discharge of “good” quality water, meet WQO for EC end-of-pipe.
- Discharge only permitted temporarily after significant flow, avoid storage.
- Other consideration – erosion, road/rail access, stock crossings etc
- Volume/rate will be considered on a case by case basis.

No/low flow stream (2)

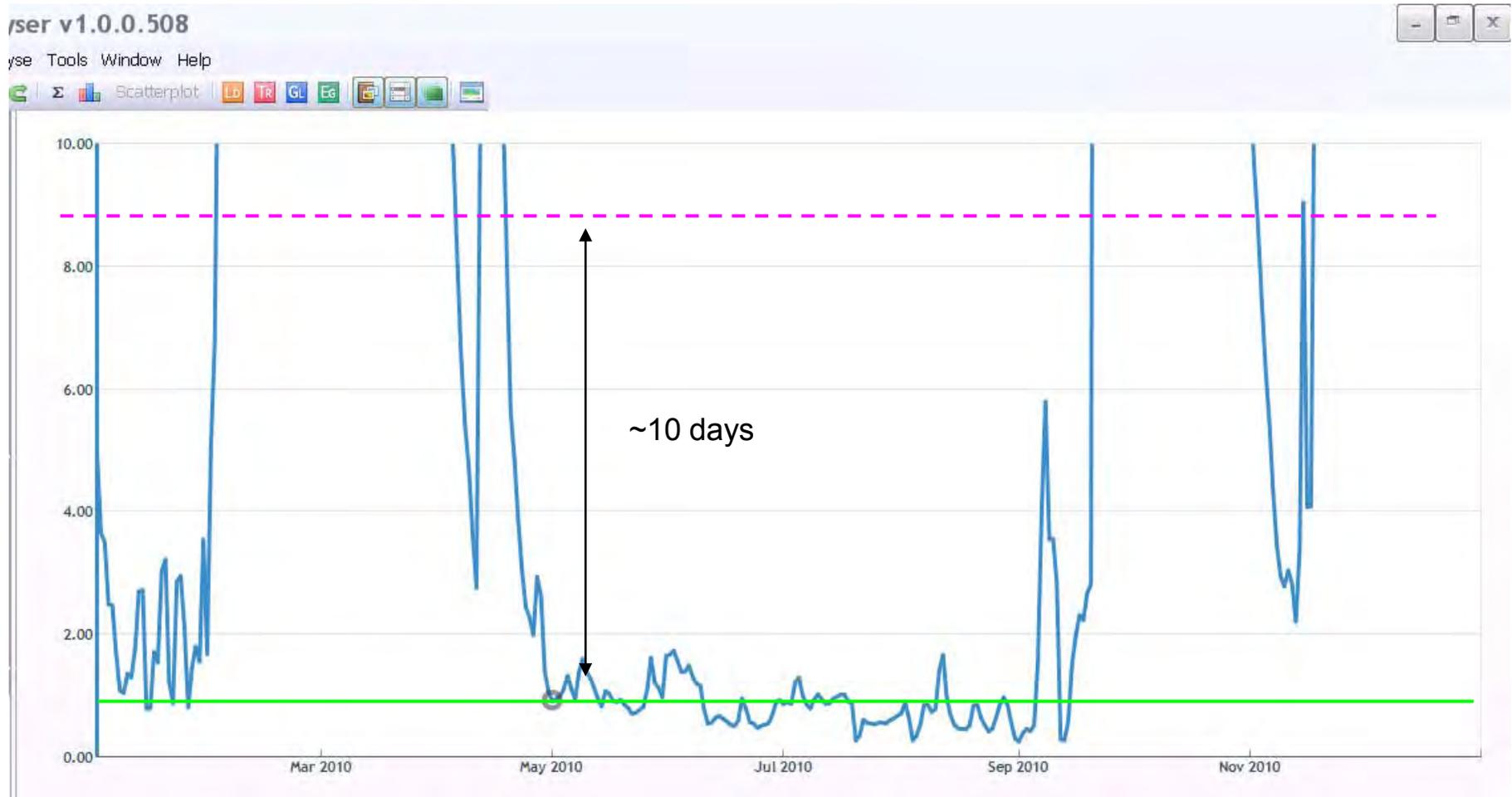
Methodology

- Release following flow above event flow trigger and flow reduces below the flow trigger
- Discharge window of 4 weeks plus typical time for flow to reduce from event trigger to 5% to 10% of event trigger.
- End of pipe $WQ \leq WQO$ or long term background reference 75th percentile.
- May require assessment of downstream environmental values where WQO is more stringent (e.g. drinking water supply).
- Volume/rate will be considered on a case by case basis.

Example – North Goonyella data using WQA (flow) No/low flow duration



Example – Nogoia Duckponds data using WQA (flow) No/low flow duration

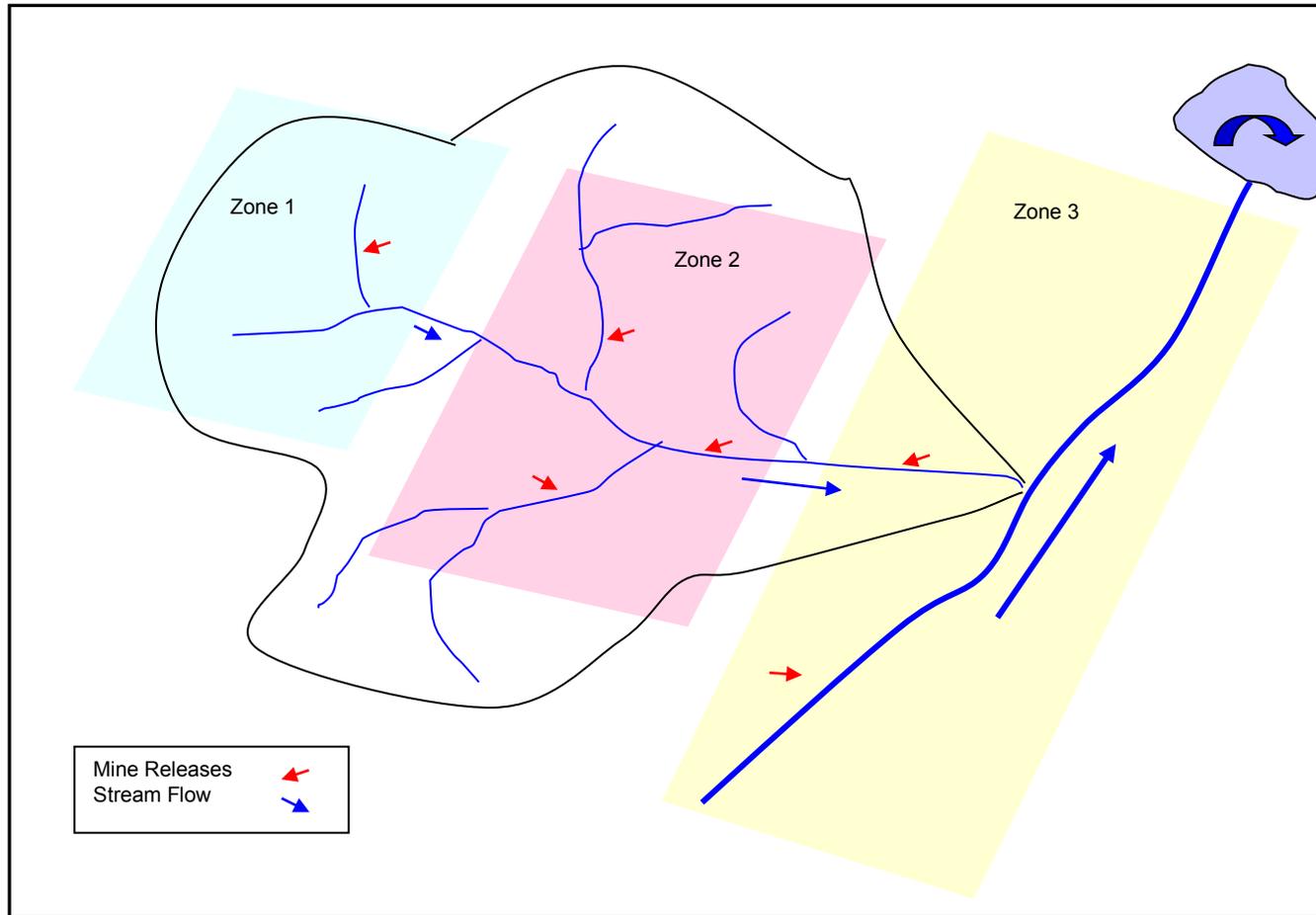


Zone Overview and Rules

Three zones for different event release strategies.

- Upper (Zone 1), mid (Zone 2) or lower (Zone 3) catchment.
- Zone 1, upper catchment mines, approximately <10km from top of waterway catchment.
- Zone 2, mid catchment mines, zones not within Zone 1 or 3
- Zone 3, lower catchment mines (All regional waterways are considered Zone 3 from distance >50km from top of waterway catchment, refer to Zone 3 map)

Discharge Approach – conceptual model for Zones



Potential Zone 3 Areas





Potential Zone 3 Areas

DERM Draft EV Map

Burton Gorge Dam



Central tributaries



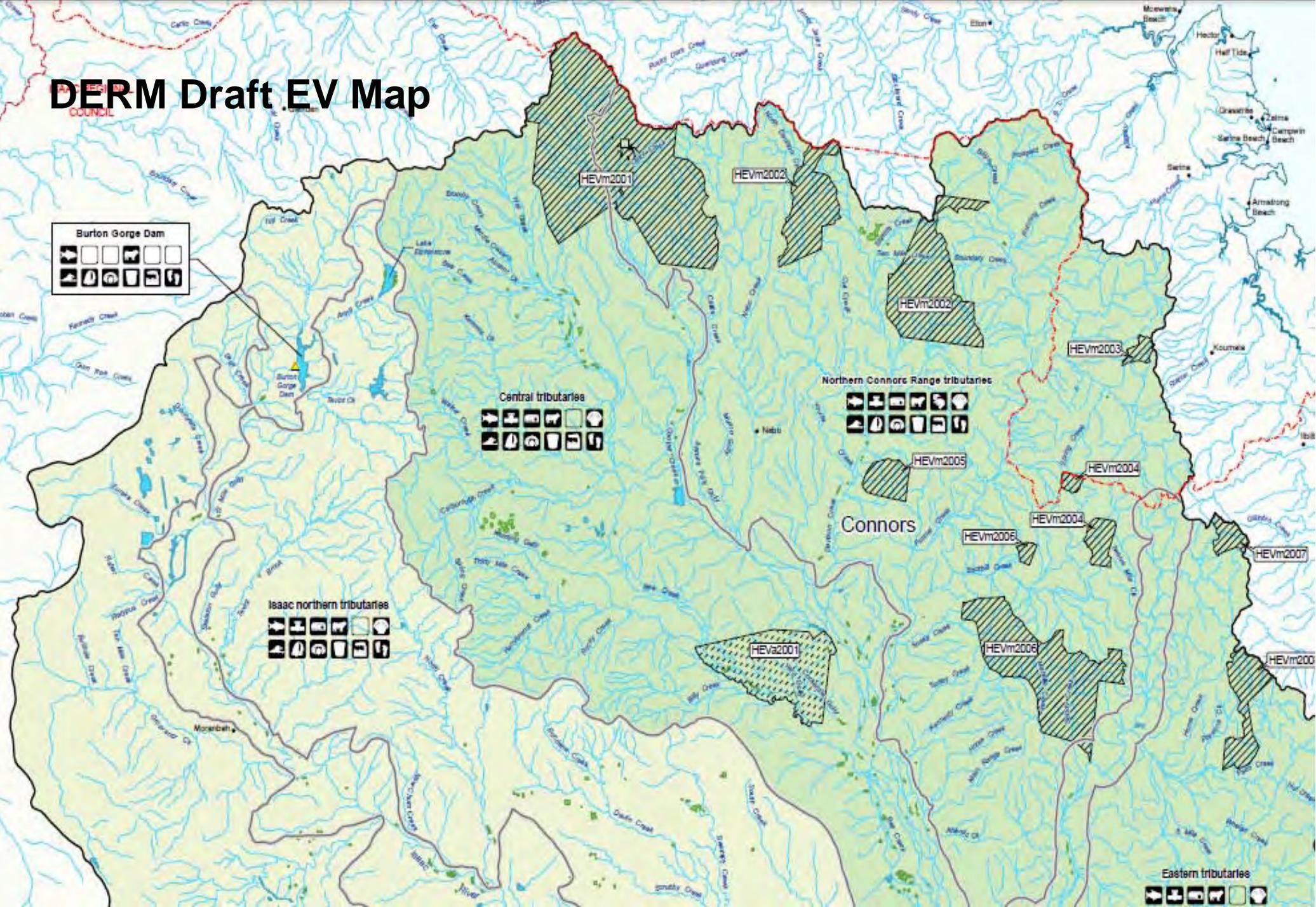
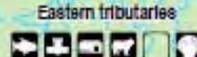
Northern Connors Range tributaries



Isaac northern tributaries



Eastern tributaries



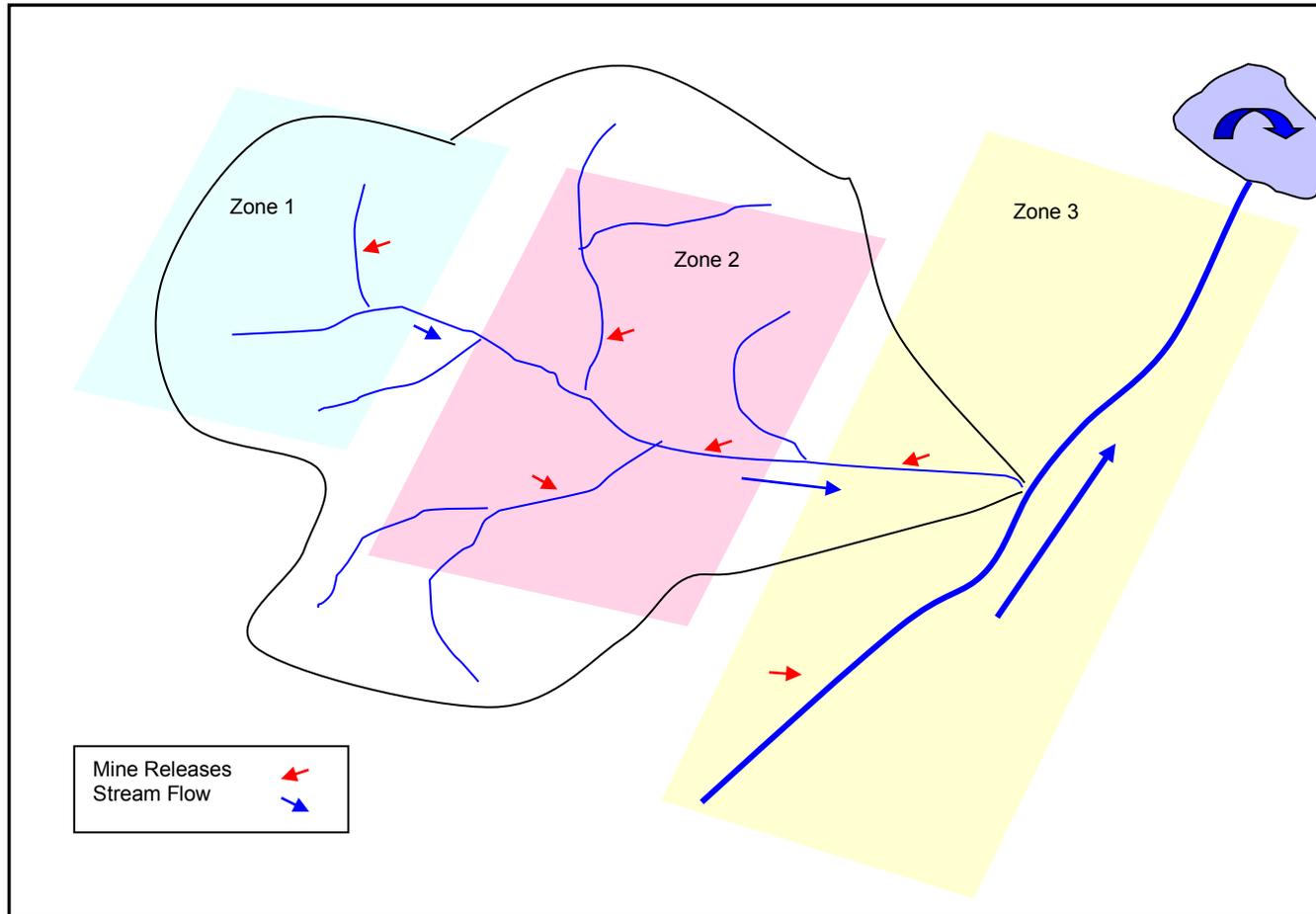
Release during Events - Table 4 Part 2

Overview

Part 1

- Zone approaches for determining EC limit for medium flow
 - Zone 1 – upper catchment
 - Zone 2 – middle catchment
 - Zone 3 – lower catchment
- High flow limits

Discharge Approach – conceptual model for Zones



Zone approaches for determining EC for medium flow

- Medium flow focus of previous model conditions, may be same
- New approach – more flexible for EC limit (1500 & 3500 EOP)
- Conceptually use assimilative capacity for limit design based on WQOs & event concentrations
- In place of catchment model, adopt Zone 1, 2 & 3 with varying approaches
- Design dilution/maximum discharge rate based on a site specific risk assessment

EVs, WQOs & Guidelines

Other EV considerations

Drinking Water/Reservoirs

- Generally $EC < 300 \mu S/cm$ target probably required, or 75th percentile, e.g.
 - Mackenzie (Bedford weir 224), (Bingegang 270)
 - Nogoa (Fairbairn 258)
 - Dawson (Glebe 190), (Theodore 274)
 - Fitzroy (Eden Ban 227)
- Proposed approach not applicable for release to or immediately above lakes/reservoirs.

EVs, WQOs & Guidelines

Other EV considerations

Aquatic Ecosystem

- Semi permanent/permanent water hole locations

Drinking Water

- Assumed potential farm drinking water in most cases –
EC<700 μ S/cm, sulphate<250mg/L.

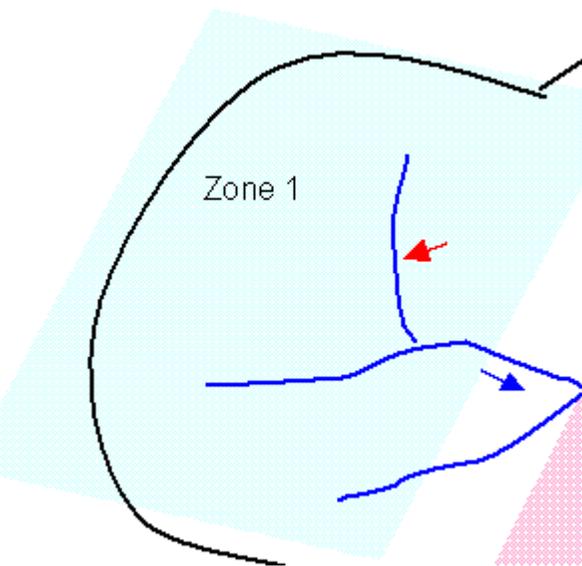
Irrigation/Stock

- EC guideline higher. Consider for emergency release, flow considerations.

UNDERTAKE RISK ASSESSMENT

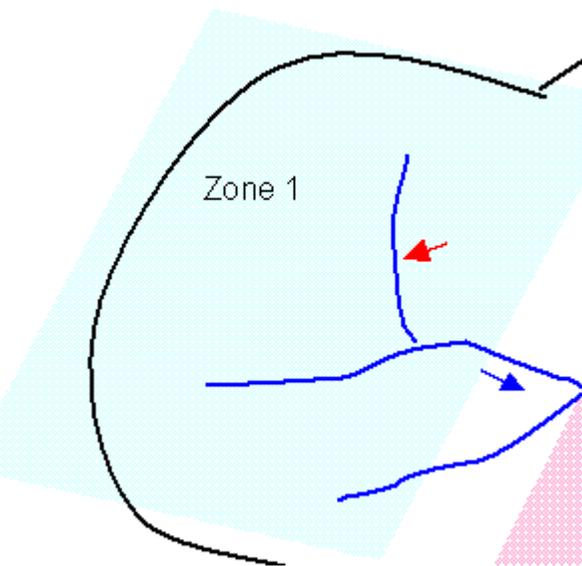
-

Zone 1 approach for determining EC for medium flow



1. Select EC_{event} , e.g. 210 or 250 $\mu\text{S}/\text{cm}$
2. Design $EC_{\text{in stream}} = 1000 \mu\text{S}/\text{cm}$
(~ecosystem toxicity)
3. Allowable $\Delta EC = 750 \mu\text{S}/\text{cm}$
4. Determine event flow trigger, e.g. 0.05 m³/s

Zone 1 approach for determining EC for medium flow



5. Choose end-of-pipe EC, e.g. $<1500 \mu\text{S}/\text{cm}$
6. Calculate maximum discharge rate:

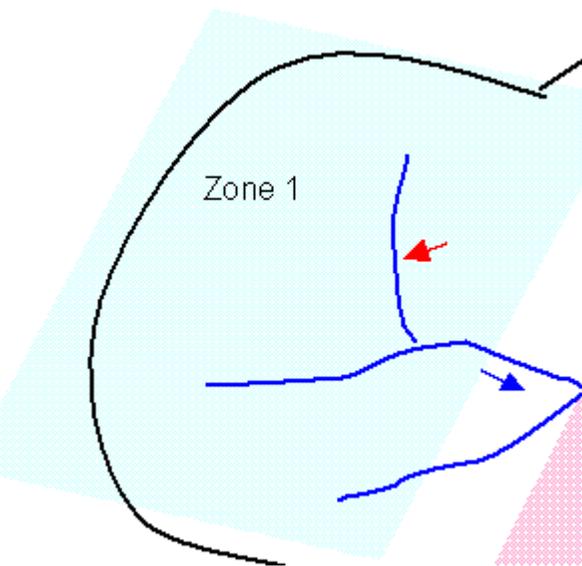
$$= \text{Flow Trigger} * \Delta\text{EC} / (\text{EC}_{\text{limit}} - (\text{EC}_{\text{event}} + \Delta\text{EC}))$$

$$= 0.05 \times 750 / (1500 - (250 + 750))$$

$$= 0.05 \times 750 / 500 = \underline{0.075 \text{ m}^3/\text{s}}$$

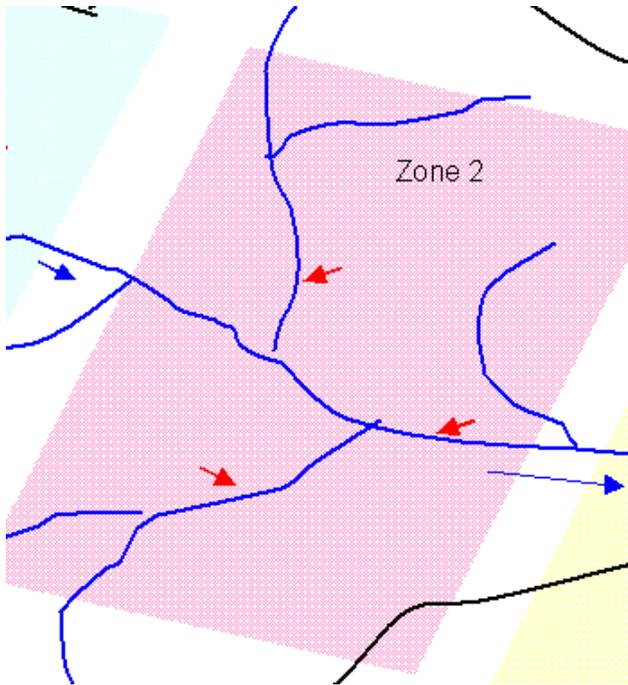
(can use DERM calculator)

Zone 1 approach for determining EC for medium flow



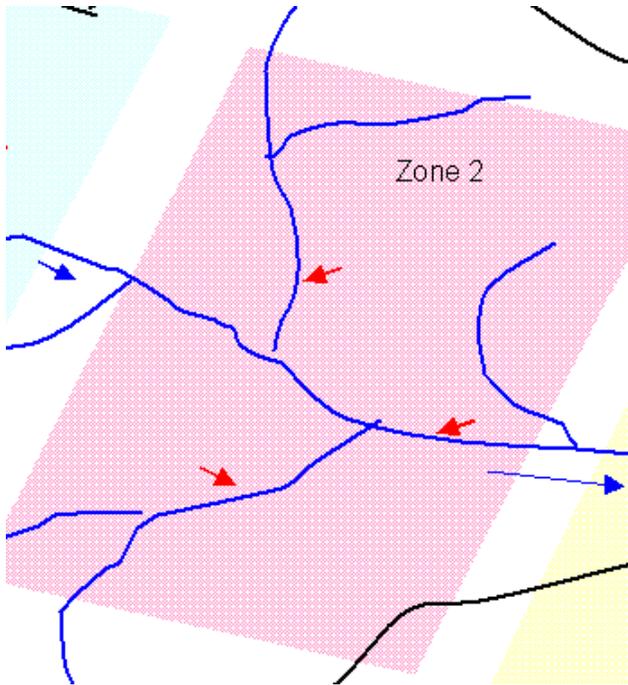
- Can choose higher flow trigger and repeat
- Repeat for other EC if desired, to determine max rate, e.g. $3500\mu\text{S}/\text{cm}$.
- Discharge flow will be lower for higher EC
- Can only release from one or other EC limit approach

Zone 2 approach for determining EC for medium flow



1. Select EC_{event} , e.g. $250\mu\text{S}/\text{cm}$ (or $210\mu\text{S}/\text{cm}$)
2. Design $EC_{\text{in stream}} = 700\mu\text{S}/\text{cm}$ (~drinking, <ecosystem tox.)
3. Allowable $\Delta EC = 450\mu\text{S}/\text{cm}$
4. Determine event flow trigger, e.g. $0.2\text{ m}^3/\text{s}$

Zone 2 approach for determining EC for medium flow



5. Choose EC_{limit} , e.g. $<1500\mu\text{S}/\text{cm}$

6. Calculate maximum discharge rate:

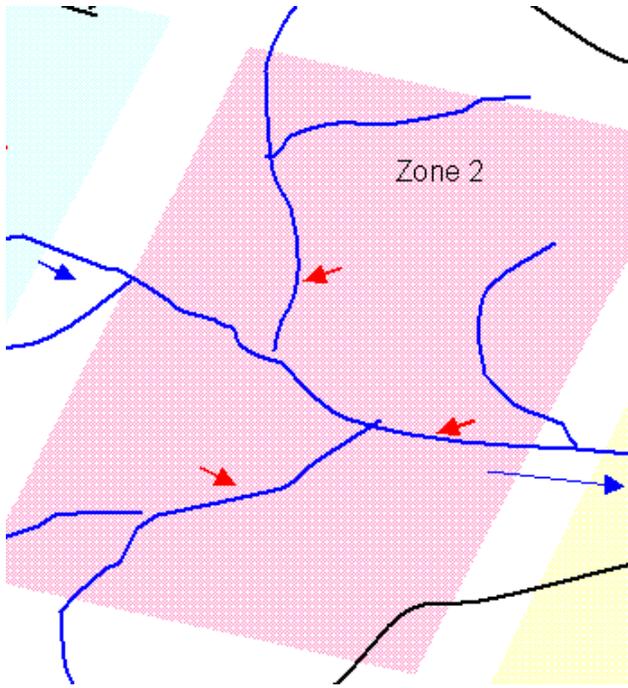
$$= \text{Flow Trigger} * \Delta\text{EC} / (EC_{limit} - (EC_{event} + \Delta\text{EC}))$$

$$= 0.2 \times 450 / (1500 - (250 + 450))$$

$$= 0.2 \times 450 / 800 = \underline{0.113 \text{ m}^3/\text{s}}$$

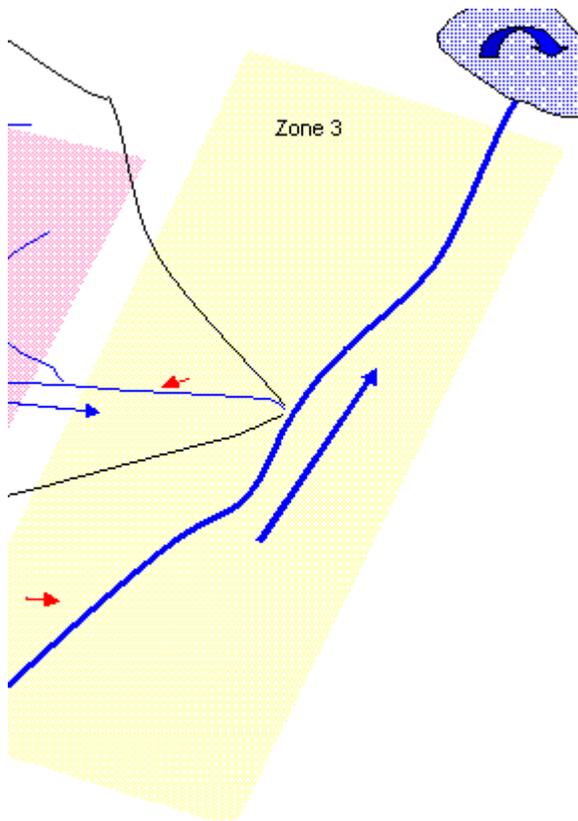
(can use DERM calculator)

Zone 2 approach for determining EC for medium flow



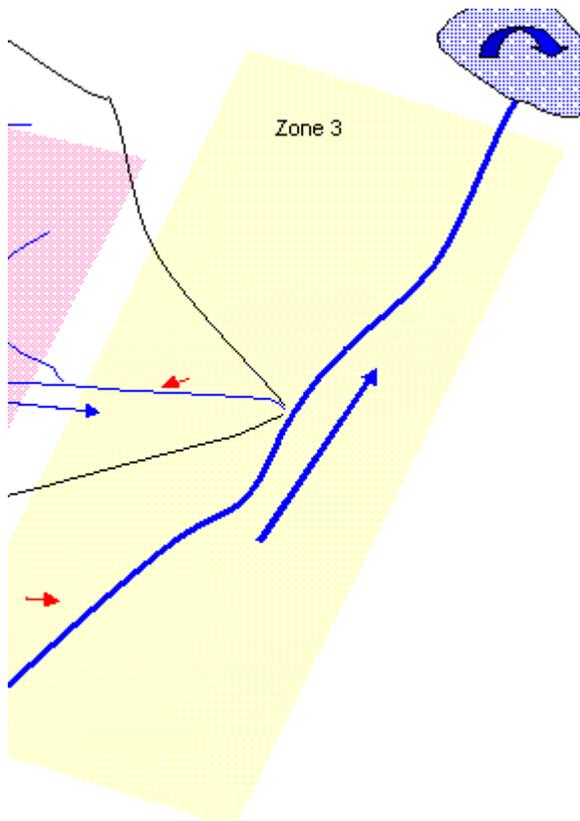
- Can choose higher flow trigger and repeat
- Repeat for other EC if desired, to determine max rate, e.g. $3500\mu\text{S}/\text{cm}$.
- Discharge flow will be lower for higher EC
- Only release from one or other approach
- Assess potential influence of any other mine releases (share assimilative capacity – adjust EC_{event} and/or ΔEC)

Zone 3 approach for determining EC for medium flow



1. Select EC_{event} , e.g. 250uS/cm (or 210)
2. Design $EC_{\text{in stream}} = WQO_{\text{baseflow}}$
3. Use multiplier of 0.2
4. Calculate $\Delta EC = 0.2 \times (EC_{WQO} - EC_{\text{event}})$
5. Determine event flow trigger, e.g. 10 m³/s

Zone 3 approach for determining EC for medium flow



5. Choose end-of-pipe EC, e.g. $<1500 \mu\text{S}/\text{cm}$
6. Calculate maximum discharge rate:

$$= \text{Flow Trigger} * \Delta\text{EC} / (\text{EC}_{\text{limit}} - (\text{EC}_{\text{event}} + \Delta\text{EC}))$$

Example, Lower Dawson Rv (10m³/s trigger)

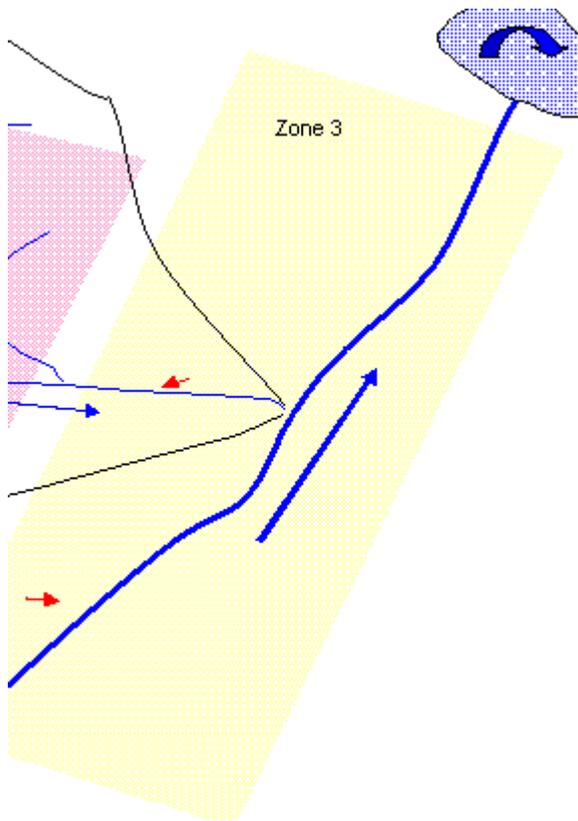
$$\Delta\text{EC} = 0.2 \times (340 - 210) = 26 \mu\text{S}/\text{cm}$$

Max Discharge

$$= 10 \times 26 / (1500 - (210 + 26)) = \underline{0.206 \text{ m}^3/\text{s}}$$

(can use DERM calculator)

Zone 3 approach for determining EC for medium flow

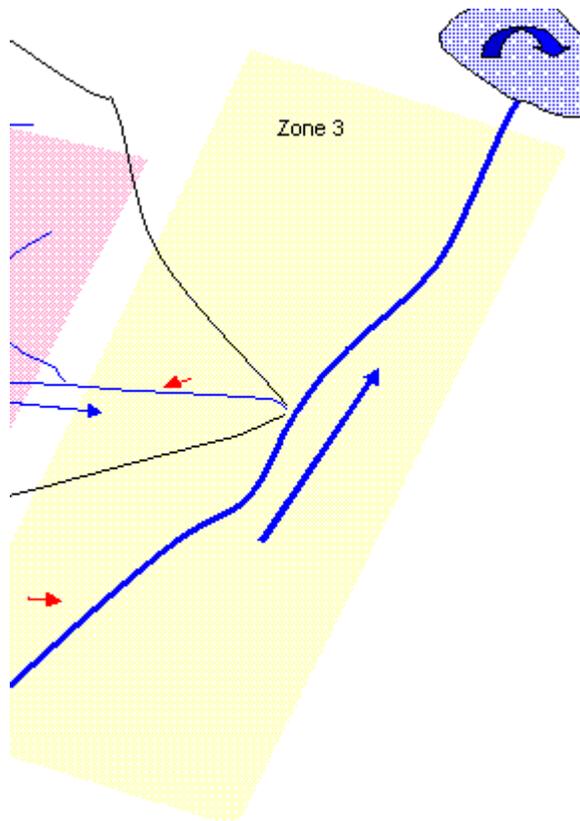


- Can choose higher flow trigger and repeat
- Repeat for other EC if desired, to determine max rate, e.g. 3500 $\mu\text{S}/\text{cm}$.
- Discharge flow will be lower for higher EC
- Only release from one or other approach
- No need to assess potential influence of any other mine releases – incorporated already

Zone approaches for determining EC for high flow

- Uses high flow trigger for release commencement
- End-of pipe EC can be $> 3500 \mu\text{S}/\text{cm}$ (but $< 10,000 \mu\text{S}/\text{cm}$). Better WQ, greater volume permitted.
- Design dilution/maximum discharge rate as per medium flow approaches and Zones.
- Must include site specific risk assessment. May include additional indicators/requirements.
- This option less feasible for Zone 1 and 2 mines.

Zone 3 approach for determining EC for high flow



Example, Lower Dawson Rv (100m³/s trigger, EC_{limit}=7500 μS/cm)

$$\Delta EC = 0.2 \times (340 - 210) = 26 \mu\text{S/cm}$$

Max Discharge

$$= (100-10) \times 26 / (7500 - (210 + 26))$$

$$= \underline{0.32 \text{ m}^3/\text{s}}$$

Where 10m³/s is medium flow discharge trigger to still discharge medium quality water

REMP & Supporting Information for Application

Overview

- Receiving environment triggers
- Changes to REMP instructions
- EA Application information
- Raw Monitoring Data

Receiving Environment Triggers

- Triggers only on high priority indicators, during release
- Slight changes to EC, sulphate & addition of sodium
- EC is high risk trigger, may reduce in some cases
- Sulphate for drinking water protection
- Addition of sodium, limit TBA

Table 7 (Receiving Waters Contaminant Trigger Levels) changes

Quality Characteristic	Trigger Level
Electrical Conductivity ($\mu\text{S}/\text{cm}$)	1000 Note: for protection against toxicity this may need to be reduced in some circumstances e.g. where in close proximity upstream of a drinking water dam or regional waterway
Sulphate (SO_4^{2-}) (mg/L)	250 (Protection of drinking water Environmental Value)
Sodium (mg/L)	TBA

Changes to REMP instructions

- Purpose of REMP to assess overall condition of local receiving waters
- Not specifically for compliance but to help longer term decisions, trigger reviews etc
- For ephemeral streams, downstream sensitive receiving waters/EVs outside specified REMP may need to be considered, e.g. nearest water holes.
- For further guidance, Draft DERM REMP Document for Fitzroy Coal Mines and Additional Information available.

Changes to REMP condition W23/W24

- W23 re-ordered and tried to make clearer
- Emphasise condition assessment/use of WQO, not EA limits
- Sites include upstream/background, downstream + additional
- Frequency and timing to assess ambient conditions and derive site specific background reference values
- Include monitoring DO, temp, and all water quality parameters listed in Table 2 and 3,
- Sediment & biological only where appropriate.
- Need stream flow for interpretations, monitor during flow.
- W24 for design document

Supporting Information for Application

Risk assessment considering:

- Waterways potentially affected – based flow WQOs, areas of high ecological values, human drinking water supply, stock watering, crop irrigation etc.
- WQOs tabulated/source of values.
- Clear maps including discharge locations, MPs, EVs including reservoirs/important habitats
- Clearly stipulate discharge proposal – flow triggers, EC, max discharge rate & potential affects (worse case increase)

Supporting Information for Application

- Provide clear justification for any changes to the EA. Ideally provide track-change EA if minor changes.
- Provide summary data/graphs to support changes – cover methodology presented here for flow, WQ etc.
- Number of data points, data stats and quality important for acceptance
- Provide all calculations and summary of data used (Excel sheets would suffice) to allow checking.
- Provide supporting raw time-series data – electronically via DERM Excel template or WQA database

2 Point Source Database data format

Point Source Database Template

Microsoft Excel - example monitoring data template.xls

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A15 fx 5

Mine Name: <i>Mandatory</i>					
Organisation Name: <i>Mandatory</i>		xxx Pty Ltd			
EA Number:		MINxxx			
TEP Number:					
Site Contact* <i>Mandatory</i>		Name: Position: Phone: Email:			
Monitoring Point Information (All relevant water points must be listed in the table below) <i>EA Release Points</i> <i>TEP Release Points</i> <i>Flow Gauging Stations from the EA and TEP (typically EA Table W4)</i> <i>Receiving Environment Sites (typically EA Table W3)</i> <i>All REMP sites from the 2 year program (EA Condition W20/W21)</i> Please note: Dam, Pit or other water storage monitoring points are not required					
Monitoring Point ID		Latitude (GDA 94)	Longitude (GDA 94)	Stream or River Name	Details
Identification number e.g. RP1 or TEP RP1 or UPSTREAM1 or Gauging Station number/name USE EA/TEP/REMP ID TERMINOLOGY WHERE POSSIBLE		Site location latitude (GDA 94) MUST BE CONVERTED TO DECIMAL DEGREES*	Site location longitude (GDA 94) MUST BE CONVERTED TO DECIMAL DEGREES*	e.g. Roper Creek or Isaac River	
Release Points				EA, TEP, Both ?	
e.g.		-23.303908°		143.625402°	
RP1				Creeky Creek	
1					
5					
6					
add additional if necessary					
Background				Gauge Station (Y/N)	
e.g.		-23.327016°		143.594386°	
CreekyMP1				Creeky Creek	
9				Y	

Instructions Spatial Info Discharge Flow Data Discharge WQ Data Rec Env Flow Data Rec Env WQ Data

AutoShapes

Working document for DM links... Sum=11

2 Point Source Database data format

Microsoft Excel - example monitoring data template.xls

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Reply with Changes. End Review...

	A	B	C	D	E	F	G	H	I
1									
2	DISCHARGE_POINT	DATE (dd/MM/yyyy)	TIME (hh:mm)	Flow (ML/day)	Cumecs (m3/s)				
3	RP1	1/10/2009							
4	RP1	2/10/2009							
5	RP1	3/10/2009							
6	RP1	4/10/2009							
7	RP1	5/10/2009							
8	RP1	6/10/2009							
9	RP1	7/10/2009							
10	RP1	8/10/2009							
11	RP1	9/10/2009							
12	RP1	10/10/2009							
13	RP1	11/10/2009							
14	RP1	12/10/2009							
15	RP1	13/10/2009							
16	RP1	14/10/2009							
17	RP1	15/10/2009							
18	RP1	16/10/2009							
19									
20									
21									
22									

Spatial Info Discharge Flow Data Discharge WQ Data Rec Env Flow Data Rec Env WQ Data

Draw AutoShapes



Projects

- Dawson Theodore
- Isaac Goonyella
- Nogoa Duck Ponds
- Oakey Creek
- Mine 4 - Rolleston MP1
- Moorvale
- Baralaba
- North Goonyella

Properties

Chart Layers

Water Quality Analyser

Recent Timeseries

- Rec Env Flow Data Upstream (Electrical Conductivity (uS/cm))
- All >0.5 [Flow (m³/s)]
- all >0.25 [Flow (m³/s)]
- All >0.5 [Flow (m³/s)]
- All - >0.02 [Flow (m³/s)]
- All [Flow (m³/s)]
- all [Flow (m³/s)]
- clean2 [Flow (m³/s)]

Actions

- Import Timeseries
- eGuides
- Help



File/Ref CTS 22344/10

Department of
**Environment and Resource
Management**

10 December 2010

Mr [REDACTED]
Manager Environment
BMA Coal Pty Ltd
Email: [REDACTED]@bmacoal.com

Dear Mr [REDACTED]

As per our discussions earlier this week, officers from the Department of Environment and Resource Management have been working closely with your officers from Peak Downs Mine to assess the impact of the recent heavy rains in central Queensland have had on the management of water at the mine.

I am advised that verbal advice provided by your officers to the department indicates that the Peak Downs Mine is considering applying for a Transitional Environmental Program (TEP).

As previously advised, the department expects mines to operate within the terms of their Environmental Authorities (EA). In exceptional circumstances, where EA conditions cannot be met, and where the mine can demonstrate that the impact on the receiving environment does not cause environmental harm, the department will assess applications for TEPs as quickly as possible. This will ensure that mines can take advantage of the large flows which are currently in the receiving waters.

The department has deployed considerable resources to ensure that assessments can be undertaken expeditiously, however a major factor in determining processing times is the adequacy of the information provided. Therefore, in order to assist you in supplying the information required to streamline the assessment process, I have attached a template that you may wish to use to support the TEP application. Please note the explanatory notes in the template which discuss matters that should be considered when submitting the information, in particular:

- Keeping the submission and the discharge plan to a scale, based on the company's immediate and urgent priorities, that will allow timely consideration;
- Specifying which conditions of the EA can't be complied with;

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ABN 46 640 294 485

- Providing a clear and specific plan covering at least discharge locations, volumes, timeframes, criteria, information about receiving waters and importantly, monitoring that the company will undertake;
- Using all relevant information from any previous similar events, any data relating to those releases, and any relevant information regarding environmental impacts;
- Clearly stating information gaps and why they exist (inability to sample etc), using any available information to make an inference on those gaps; and
- Stating any assumptions;

The department will advise an expected assessment time within 24 hours of receipt of the application.

As you will be aware, the department has an expectation that stakeholders with an interest in water quality in the Fitzroy, as well as the broader community, will be kept informed on these issues. The Fitzroy Water Quality Advisory Group (the Advisory Group), which was established at the direction of the Honourable Kate Jones MP, Minister for Climate Change and Sustainability, is meeting in Rockhampton on 16 December 2010. The department will be briefing and seeking the views of the Advisory Group on the current issues in the Fitzroy.

In an effort to also expeditiously provide feedback to relevant stakeholders on TEP applications, the department asks that if you are planning to submit a TEP, that it be submitted by 14 December 2010. Not only will this enable it to be assessed urgently but it will enable the department to consult with the Advisory Group about it on 16 December 2010. Note that this timeframe is not intended as a "deadline", simply an opportunity, given the urgency, to utilise a pre-planned meeting of the Advisory Group.

Feel free to contact me on [REDACTED] should you wish to discuss this further.

Yours sincerely

[REDACTED]
[REDACTED]
**Assistant Director-General
Regional Service Delivery**

Mines Water Discharges

Authorised since 1 December 2011

Transitional Environmental Program (TEP)

23 August 2011

The Department of Environment and Resource Management has approved 100 applications for Transitional Environmental Programs (TEPs) for mines since 1 December 2010. These comprise 61 new applications and 39 amendments to existing TEPs.

The department will continue to review and process TEPs as required.

A TEP allows a mine site to complete actions outside of its agreed environmental authority (EA) conditions. The program is in place for a specified timeframe and requires adherence to special conditions. Once a TEP has expired the mine site is again expected to comply with its EA conditions.

The objective of the TEP is to ensure the mine can safely recommence operations and that dewatering activities can be conducted in a manner that does not harm the environment.

Mine	Issue date	End date	Purpose
Rolleston	28 Oct 2010 (amended 1 Feb 2011)	29 Aug 2011	Water Management: TEP allows mine-affected water to be released to avoid the potential for uncontrolled release during the wet season. Authorised release is outside current EA conditions. TEP amended to extend timeframe to allow continuation of release.
	23 Feb 11	29 Aug 2011	Water Management: TEP allows for the release of mine-affected water from an additional discharge point into Meteor Creek, via Sandy Creek.
Ensham	10 Dec 2010 (amended 5 Jan 2011) (amended 11 Feb 2011)	30 Jun 2011	Water Management: TEP allows for the release of approximately 15,000 megalitres, at about 250 megalitres per day, to dewater open cut mine pits on site. TEP amendment allows an increase EC limits, revised receiving water flow rate, and modified discharge locations.
Poitrel	15 Dec 2010 (amended 19	30 Jun 2011	Water Management: TEP authorises release of water when the receiving water flow rate is lower than current EA requirements, provided there is significant

Mine	Issue date	End date	Purpose
	Jan 2011) (amended 11 Feb 2011) 8 Aug 2011	31 Jan 2012	flow in downstream waters of the Isaacs River. Water quality is within EA limits. The amendment authorises the release of water with elevated EC to no flow in New Chum Creek. The 11 February amendment allows for the release of water with elevated EC into New Chum Creek with downstream monitoring and flow triggers in the Isaac River. Water Management: TEP authorises release of water with higher EC levels to New Chum Creek with no minimum flow requirement but with minimum flow of 10m ³ /sec in the Isaac River.
Isaac Plains	18 Dec 2010 (amended 17 Jan 2011 (amended 3 March 2011 and 18 March 2011)	30 Jun 2011	Water Management: TEP allows the release of water from the operational mining pit. Good quality water being discharged and this will be monitored closely to ensure quality is maintained downstream. Authorises the release of water from an additional release point and allows for releases into no flow in the Isaac River. Amendment of 3 March allows slight increases in EC.
South Walker	18 Dec 2010 (amended 20 Jan 2011) (amended 9 Feb 2011) (amended 15 Feb 2011)	30 Jun 2011	Water Management: TEP allows the release of excess water, stored on site as a result of recent rain. The water to be released contains elevated electrical conductivity. The TEP will ensure water is only released during time of high flow in receiving waters to ensure adequate dilution is achieved. Amendment allows for discharge to Walker Creek during low flow. Amended TEP of 9 February allows for the release of water with elevated electrical conductivity to Walker Creek with an amended downstream EC trigger. The amendment of 15 Feb allows for the release of water with elevated EC levels from Bee Creek into Sandy Creek. These releases will be consistent with the amended TEP issued on 9 February for releases into Walker Creek.
	27 Jan 2011	30 Jun 2011	Water Management: TEP authorises the release of excess water stored on site with elevated EC levels to no flow in Sandy Creek.
	(amended 8 Jun 2011)	31 Jan 2012	Water Management: TEP authorises to extend the end date of TEP MAN1579.
	(amended 8 Jun 2011)	31 Jan 2012	Water Management: TEP authorises to extend the end date of TEP MAN11720.
Cook	24 Dec 2010	30 Jun 2011	Water Management: TEP authorises the release of water with Electrical Conductivity and Turbidity limits above those authorised in the current EA. Downstream monitoring is required with downstream water quality triggers.
Callide	24 Dec 2010	30 Jun 2011	Water Management: TEP authorises the release of water with Electrical Conductivity limits above those authorised by the current EA, provided there is adequate flow in the receiving waters to dilute levels to near background immediately downstream of the release. Downstream monitoring is required with downstream water quality triggers.

Mine	Issue date	End date	Purpose
	11 Feb 2011 (amended 25 Mar 2011)	29 Jul 2011	Water Management: TEP authorises the release of mine affected water from Lake Gasteen discharge location into Callide Creek at low or no flow conditions. Electrical conductivity limits vary depending on receiving water flow rates.
	25 Feb 2011 (amended 31 Mar 2011)	29 July 2011	Water Management: TEP authorises the release of mine affected water, with higher EC levels, into Oaky Creek from an authorised discharge location. Allows releases to no flow. Amended TEP allows for increased EC levels during no flow conditions into Oaky Creek.
Moranbah North	24 Dec 2010	30 Jun 2011	Water Management: Electrical conductivity authorises the release of water with Electrical Conductivity limits above those authorised by the current EA, provided there is adequate flow in the receiving water of the Isaac River. Downstream monitoring is required with downstream water quality triggers.
	24 Dec 2010 (amendment)	30 Jun 2011	
	22 Mar 2011 (amended)	24 Feb 2012	The TEP was approved to remove the use of evaporator fans.
Minerva	24 Dec 2010 (amended 10 Feb 2011)	30 Jun 2011	Water Management: TEP authorises the release of water when the receiving water flow rate is lower than current EA requirements. Water quality is higher than EA limits for conductivity. Downstream monitoring is required with downstream water quality triggers.
	(amended 24 Feb 11)		Amended TEP authorises the release of water with elevated EC levels into Sandhurst Creek with downstream monitoring and flow triggers. Amended TEP on 24 February allows for changes to the downstream flow monitoring control point from the department's Duck Ponds gauge to the Comet Weir gauge. Allows for water discharge to continue at a lower rate when the flow in the Comet River falls below 5 cumecs.
Kestral	24 Dec 2010	30 Jun 2011	Water Management: TEP authorises the release of water when the receiving water flow rate is lower than current EA requirements. Water quality is higher than EA limits for conductivity. Downstream monitoring is required with downstream water quality triggers.
Carborough Downs	24 Dec 2010	30 Jun 2011	Water Management: TEP authorises the release of water when the receiving water flow rate is lower than current EA requirements, with increased dilution of releases. Water quality is higher than EA limits for conductivity. Downstream monitoring is required with downstream water quality triggers.
Burton	13 Jan 2011	31 May 2011	Water Management: TEP authorises the discharge of mine affected water of higher electrical conductivity, though a maximum downstream conductivity will be achieved through only discharging at a minimum flow in the receiving waters.
	8 Feb 2011	01 Sep 2011	Water Management: TEP authorises the release of water with higher EC levels to receiving waters of Anna Creek. Downstream monitoring is required in

Mine	Issue date	End date	Purpose
			the Isaac River.
Peak Downs	13 Jan 2011 (amended 1 Mar 2011)	30 Jun 2011	Water Management: TEP authorises a discharge at a higher electrical conductivity and a lower minimum flow in receiving waters, though it also contains maximum limits for electrical conductivity in receiving waters that flows will have to be controlled to meet these limits. Amendment allows for releases Ripstone Creek and requires a flow trigger in the Isaac River during releases to the creek.
	(amended 10 Jun 2011)	30 Aug 2011	Water Management: TEP authorises mine to continue to discharge mine affected water until 20 June 2011 to take advantage of anticipated high flows.
	14 Jul 2011	30 Jan 2012	Water management: TEP authorises the extension of time that mine water can be released providing flow and water quality conditions are met until 30 November 2011. The TEP includes a works program for planned upgrades of the water management system.
Dawson South	13 Jan 2011	30 Jun 2011	Water Management: TEP authorises a discharge at a higher electrical conductivity (EC). Downstream monitoring is required.
	11 Jun 2011	08 Aug 2011	Water Management: TEP authorises extension of TEP until 8 August 2011 due to forecast of rainfall event.
Lake Lindsay	14 Jan 2011	30 Jun 2011	Water Management: TEP authorises the release of water with elevated EC and with reduced flow in receiving waters.
German Creek – Oak Park	14 Jan 2011	30 Jun 2011	Water Management: TEP authorises the release of water with elevated EC and a reduction in the receiving water flow rate. Downstream monitoring is required.
Goonyella Riverside	19 Jan 2011	30 Jun 2011	Water Management: TEP authorises the release of water with elevated EC and a reduction in the receiving water flow rate. Downstream monitoring required.
	14 Jul 2011	30 Jan 2012	Water management: TEP authorises the extension of time that mine water can be released providing flow and water quality conditions are met until 30 November 2011. The TEP includes a works program for planned upgrades of the water management system.
German Creek	20 Jan 2011	30 Jun 2011	Water Management: TEP authorises the release of water with elevated EC and a reduction in the receiving water flow rate. Downstream monitoring required.
Saraji	27 Jan 2011 (amended 18 Feb 2011)	30 Jun 2011	Water Management: TEP authorises the release of excess water with elevated EC to Phillips Ck and Hughes Ck with a reduction in the receiving water flow rate. Downstream monitoring is required. Amended TEP authorises releases with elevated EC levels that are dependent on downstream flow triggers. Downstream monitoring required.
	(amended 10 Jun 2011)	30 Aug 2011	Water Management: TEP authorises mine to continue to discharge mine affected water until 30 June 2011 to

Mine	Issue date	End date	Purpose
			take advantage of anticipated high flows.
	14 Jul 2011	30 Jan 2011	Water management: TEP authorises the extension of time that mine water can be released providing flow and water quality conditions are met until 30 November 2011. The TEP includes a works program for planned upgrades of the water management system.
Millenium	28 Jan 2011	30 Jun 2011	Water Management: TEP authorises the release of excess water with elevated EC to New Chum Ck with a reduction in the receiving water flow rate. Downstream monitoring is required.
Hail Creek	29 Jan 2011	30 Jun 2011	Water Management: TEP authorises the release of mine affected water through additional discharge points and reduced flow in receiving waters.
	(amended 10 Jun 2011)	30 Sep 11	Water Management: TEP authorises the discharge of mine affected water to Bee Creek (Connors River).
	(amended 11 Jul 2011)	30 Sep 11	Water Management: TEP authorises the discharge of water with elevated electrical conductivity to Bee Creek with no minimum flow requirement.
Lake Vermont	29 Jan 2011	30 Aug 2011	Water Management: TEP authorises the release of mine affected water to Carfax Gully with no natural flow and a reduction in flow in the Isaac River.
Newlands	23 Dec 2011 (amended 28 Jan 2011)	30 Jun 2011	Water Management: TEP authorises the release of excess water with elevated EC and a reduction in the receiving water flow rate. Downstream monitoring is required. Amendment authorised new discharge points and reduced flow in receiving waters. Also increased downstream monitoring requirements.
Sonoma	7 Jan 2011 (amended 24 Feb 11)	30 Jun 2011	Water Management: TEP authorises the release of excess water with elevated EC. Downstream monitoring is required. TEP amendment of 24 February authorises the release of water with elevated EC.
Kogan Creek	11 Jan 2011	29 Apr 2011	Water Management: TEP authorises the release of mine effected water (above existing TSS licence limits) to enable access to coal reserves to ensure coal supply to Kogan Creek Power Station.
Texas Silver	24 Jan 2011	30 Apr 2011	Water Management: TEP authorises the release from stormwater water pond to enable completion of construction and lining of dam.
New Oakleigh	1 Feb 2011	11 Feb 2011	Water Management TEP authorises discharge of captured flood water from extraction pit at a higher electrical conductivity. Monitoring required along discharge path and downstream.
Baralaba	8 Feb 2011	29 Jul 2011	Water Management: TEP authorises the release of mine affected water to the Dawson River from an inundated mine pit. Water quality is in accordance with Baralaba's Environmental Authority (EA).
	(amended 12 May 2011)	30 Sep 2011	Water Management: TEP authorises the release through the 2011 dry season at different release rates.
	(amended 10		Water Management: TEP authorises revision of

Mine	Issue date	End date	Purpose
	Jun 2011)		receiving water pH concentration due to elevated pH concentration in upstream environment.
	(amended 9 Jul 2011)		Water Management: TEP authorises to decrease discharge volume due to decreased flow in the receiving environment.
Yarrabee	10 Feb 2011	30 Jun 2011	Water Management: TEP authorises the release of water with elevated electrical conductivity to 12 Mile Creek. Monitoring of receiving waters is also required in the Mackenzie River.
	(amended 3 May 2011)	15 Sep 2011	Water Management: TEP amendment authorises change of downstream monitoring point in Mackenzie River and extend the timeframe by six weeks.
Red Mountain Joint Venture	11 Feb 2011	31 Jul 2011	Water Management: TEP authorises the release of water with elevated EC levels into New Chum Creek. Downstream flow triggers and dilution is required.
Jellinbah	11 Feb 2011	30 Jun 2011	Water Management: TEP authorises release of mine affected water with elevated EC (~2500 uS/cm) to Blackwater Creek. Amendment authorises further 20 days of pumping mine affected water.
	(amended 5 April 2011) (amended 19 April 2011) 3 June 2011	31 Oct 2011	Water Management: TEP authorises release of mine affected water to Blackwater and Twelve Mile Creek during no flow event.
Norwich Park	11 Feb 2011	30 Jul 2011	Water Management: TEP authorises the release of mine affected water with elevated electrical conductivity.
	8 Jun 2011	30 Aug 2011	Water Management: TEP authorises mine to continue to discharge mine affected water until 30 June 2011 to take advantage of anticipated high flows.
	14 Jul 2011	30 Jan 2012	Water management: TEP authorises the extension of time that mine water can be released providing flow and water quality conditions are met until 30 November 2011. The TEP includes a works program for planned upgrades of the water management system.
Boonal Joint Venture	14 Feb 2011	30 Jun 2011	Water Management: TEP authorises the release of water from the Boonal loadout facility to Bullock Creek.
Thalanga Copper Mine	18 Feb 2011	31 Oct 2013	Water Management: TEP authorises releases from east evaporation pond whilst the company undertakes studies and site changes.
Dawson	18 Feb 2011	30 Jun 2011	Water Management: TEP authorises the release of up to 75ML/day with elevated EC into Kianga Creek at low and no flow conditions.
	11 Jun 2011	08 Aug 2011	Water Management: TEP authorises extension until 8 August 2011 due to forecast of rainfall event.

Mine	Issue date	End date	Purpose
Blackwater	18 Feb 2011	1 July 2011	Water Management: TEP authorises the release of water with elevated EC to New Deep Creek with low flow in receiving water.
	14 Jul 2011	30 Jan 2012	Water management: TEP authorises the extension of time that mine water can be released providing flow and water quality conditions are met until 30 November 2011. The TEP includes a works program for planned upgrades of the water management system.
Mt Rawdon	18 Feb 2011	30 Nov 2011	Water Management: TEP authorises dams below the waste rock dump and the tailings dam to overflow rather than returning the water into the tailings storage facility
Gregory/Crinum	28 Feb 2011	30 Jun 2011	Water Management: Allows for releases to low flow in Crinum Creek with downstream monitoring in Crinum Creek.
	(amended 10 Jun 2011)	30 Aug 2011	Water Management: TEP authorises mine to continue to discharge mine affected water until 30 June 2011 to take advantage of anticipated high flows.
	14 Jul 2011	30 Aug 2012	Water management: TEP authorises the extension of time that mine water can be released providing flow and water quality conditions are met until 30 November 2011. The TEP includes a works program for planned upgrades of the water management system.
D'Aguilar Gold	11 Mar 2011	29 Apr 2011	Water Management. TEP authorises release of water that has overflowed the TSF into the Shamrock Pit by pumping, and deals with measures to increase storage capacity for contaminated water.
North Goonyella	15 Mar 2011	30 Sep 2011	Water Management: TEP authorises the release of mine affected water into reduced flow in the Isaac River and no flow in Goonyella Creek.
East End	28 Mar 2011 (amended 20 Apr 2011)	29 Jul 2011	Water Management: TEP authorises discharge based on a staged EC concentrations and receiving water flow rates, low and no flow conditions are also included. Amended TEP authorises increased EC limit downstream.
Foxleigh	1 Apr 2011	30 Jun 2011	Water Management: TEP authorises the release of mine affected water with elevated levels into Roper Creek.
Oak Creek	11 Apr 2011	1 Apr 2013	Water Management: TEP authorises the release of water from several additional release points.
	(amended 8 Jul 2011)		Water Management: TEP authorises extending the timeline for developing and submitting a second TEP detailing the capital works upgrade. No change to conditions.
Moorvale	20 Apr 2011	31 Aug 2011	Water Management: TEP authorises the release of water with elevated EC levels to North Creek under no flow conditions. Flow is required in the Isaac River.
	(amended 20 Apr 2011)	30 Sep 2011	Water Management: TEP authorises release of water to North Creek under no flow conditions.

Mine	Issue date	End date	Purpose
	(amended 10 Jun 2011)	30 Sep 2011	Water Management: TEP authorises amendment to existing TEP as a result of accumulation of mine affected water in the main environment dam.
Peabody Wilkie Creek	29 Apr 2011	31 May 2012	Water Management: TEP authorises discharge of water with elevated EC to Wilkie Creek.
Commodore Coal Mine	5 May 2011	30 Nov 2013	Water Management: TEP authorises discharge of mine affected water outside TSS limits. TEP is to upgrade current water management infrastructure
Curragh	13 May 2011	31 Nov 2011	Water Management: TEP authorises release of mine affected water with elevated EC.

CSG TEPs approved since 1 December 2010

The Department of Environment and Resource Management has approved 10 applications for Transitional Environmental Programs (TEPs) for CSG operations since 1 December 2010. These comprise 6 new applications and 4 amendments to existing TEPs.

The department will continue to review and process TEPs as required.

A TEP allows a CSG operation to complete actions outside of its agreed environmental authority (EA) conditions. The program is in place for a specified timeframe and requires adherence to special conditions. Once a TEP has expired the mine site is again expected to comply with its EA conditions.

The objective of the TEP is to ensure the CSG operation can safely recommence operations and that dewatering activities can be conducted in a manner that does not harm the environment.

Operation	Issue date	End date	Purpose
Spring Gully	28 Dec 2010 (amendments 28 Jan 2011; 25 Feb 2011; 4 Mar 2011)	30 Sep 2011	Water Management: NO discharges yet required. Discharge of RO brine if MRL reached or an engineering concern identified but only if 1:100 dilution, a base flow in creek equal to minor flood and mixing zone limits achieved.
Moranbah Gas Project (MGP)	4 Feb 2011	31 Mar 2011	Water Management: Discharge of CSG water to Isaac River only if dams 1, 2, 5 or 10 at MGP exceed target fill heights (
Daandine	18 Jan 2011	28 Feb 2011	Water Management: Discharge of RO permeate to flood flows – Wilkie Ck
	19 Aug 2011	28 Feb 2012	Water Management: Authorises discharge of RO

Operation	Issue date	End date	Purpose
			permeate to reduce risk of discharge from associated water ponds when required.
Mt Kingsley/Arcadia	22 Mar 2011	03 Feb 2011	Water Management: TEP requires Santos to undertake an assessment as to the reasons behind overtopping of mud and water dams at three sites in November 2010 in order to develop strategies to prevent recurrence.
Scotia	28 Apr 2011 (amendment 8 Jun 11)	25 Oct 2011	Water Management: TEP allows discharge from a site dam in order to avoid overtopping while awaiting commissioning of a RO plant on site

Last updated [23 August 2011](#)

**DRAFT TRANSITIONAL ENVIRONMENTAL PROGRAM UNDER SECTION 333
OF THE ENVIRONMENTAL PROTECTION ACT 1994**

Principal Holder: XXXXXXXX
XXXXXXXX
XXXXXXXX

EA Number: XXXXXXXX

Title: XXXXXXXXXXXXXXXXXXXX

Date: XXXXXXXX

Finish Date: *NOTE: The 'End Date' should be approximately 2 months after the lodgement date of the completion report.*

BACKGROUND

Explains why a TEP is required, as a result of an incident, breach, emergency. i.e. what went wrong

NOTE: Include relevant reporting requirements, monitoring locations and discharge limits from EA conditions, rainfall data, pits and water management structures affected, quantity of water proposed to be discharged, pumping/discharge rates and locations, creeks/ivers to be discharged to, whether creeks/ivers are still flowing naturally, water quality monitoring locations and downstream limits in creeks/ivers during discharge, results of previous sampling, ongoing reporting requirements to the administering authority, downstream water uses and affected properties. Also include contingency plans for possibility of having to cease discharge due to poor water quality or significant flow path erosion etc. Include whether there are other permits involved and status of the applications.

SUPPORTING INFORMATION

The *Environmental Protection Regulation 2008* commenced on 1 January 2009. The regulation consolidated considerations that must be made when making a range of decisions including TEPs into Chapter 4 of the regulation. This has resulted in making the range of matters to be considered clearer to decision makers. These include, but are not limited to:

- s51(1) (a) requires the consideration of the management hierarchy, environmental values, quality objectives and management intent specified in an EPP. The *Environmental Protection (Water) Policy 2009* lists a range of values that includes the biological integrity, the agricultural value, the drinking water value, the recreation value and the value for industrial purposes. If these values are correctly identified, the 'beneficial uses' of the waterway will be identified.
- s51(1) (d) requires consideration of the impact of the release of contaminants on the environment including the cumulative impact
- s51(1) (f) the order of occupancy between the person carrying out the activity and the affected person
- s51(1) (g) the remaining capacity of the receiving environment to accept contaminants while protecting the environmental values.
- s52(1) (a) requires consideration of imposing a condition requiring the implementation of a system for managing risks to the environment
- S52(1) (g) requires consideration of imposing a condition on the way in which contaminants are released for example a condition restricting the release of a contaminant at a particular temperature, velocity or rate or during particular meteorological conditions or water flows.
- s53(1) requires consideration of whether to impose monitoring conditions about the release
- s56 (2) requires consideration of any available toxicity data relevant to the release and the receiving environment.

Note: Section 330 of the EP Act defines a TEP as:

A transitional environmental program is a specific program that, when approved, achieves compliance with this Act for the matters dealt with by the program by:

- (a) reducing environmental harm; or
- (b) detailing the transition to an environmental standard.

OBJECTIVES

NOTE: As required under section 331 the transitional environmental program must state the objectives to be achieved and maintained under the program.

The objectives of the TEP must relate to the time frames for mines returning to operation in accordance with / compliance with the EA conditions, and must also include the prevention or re-occurrence in the short, medium and long term of the situation that gave rise to the approval of an TEP

HOW OBJECTIVES ARE TO BE ACHIEVED

NOTE: As required under section 331 the TEP must state how the objectives are to be achieved, and provide a timetable to achieve the objectives, taking into account the application of best practice environmental management and the risks of environmental harm being caused by the activity. The timetable must state appropriate performance indicators that can be measured at various intervals.

As an approved TEP can protect the holder from enforcement action for non-compliances with the Act, the commitments or terms of the TEP made by *the client* need to be clearly drafted, unambiguous and easily auditable. Please note that a failure to comply with the terms of a TEP is an offence so the terms outlined within the document act in a similar way to conditions contained within an EA.

Table 1 – achieving TEP objectives

OBJECTIVE	ACTION	RESPONSIBILITY	TIME FRAME	PERFORMANCE INDICATOR
XXXXX		Nominate officer/person responsible for fulfilling objective.		
XXXXX				
XXXXX				
XXXXX				

If the table above is not sufficient in size please use in the landscape format. If the table is insufficient due to the quantity of detail required utilise subheadings e.g. objective, action, responsibility, timeframe and performance indicator with detailed information included below each heading. This information can then be modified in the reporting for successes, issues, incidents and failures.

MONITORING

NOTE: As required under section 331 – Also include specific upstream and downstream monitoring locations and detailed supporting aerial photographs and maps defining discharge points and monitoring locations.

The following tables are provided as an example on providing the required data and how to apply varying limits to different monitoring points. If you are proposing to meet a specific water quality downstream (i.e. as a compliance point, approximately 500m is acceptable – receiving water monitoring locations should not be utilised), compliance will need to be monitored at both the ‘end of pipe’ location and the ‘compliance point’. Justification of the discharge actions proposed need to be provided in the documentation, considering Chapter 4 of the Environmental Protection Regulation 2008.

Table 2 - Contaminant release points, sources and receiving waters

Release point (TEP RP)	Easting (GDA94)	Northing (GDA94)	Contaminant source and location	Monitoring point	Receiving waters
TEP RP 1	xxxx	xxxx	xxxx	TEP MP 1	xxxx
TEP RP 2	xxxx	xxxx	xxxx	TEP MP 2	xxxx
				TEP MP 3	

Table 3 - Contaminant release monitoring points

Monitoring point (TEP MP)	Easting (GDA94)	Northing (GDA94)	Contaminant source and location	Monitoring point location	Receiving waters
TEP MP 1	xxxx	xxxx	xxxx	xxx dam spillway	xxxx
TEP MP 2	xxxx	xxxx	xxxx	xxx dam spillway	xxxx
TEP MP 3	xxxx	xxxx	xxxx	500m downstream of junction of xxx dam spillway on the xxx receiving waters	xxxx

Table 4 - Contaminant release limits

Quality characteristic	Release Limit	Monitoring Frequency	Sample Type	Monitoring Point
Electrical conductivity (uS/cm)	xxxx (e.g. 1500)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	<i>In situ</i> ¹	TEP MP 1
				TEP MP 3
			Samples require laboratory analysis ²	TEP MP 1
				TEP MP 3
	xxxx (e.g. 3000)	Daily during release (the first sample must be taken within 2 hours of commencement of release)	<i>In situ</i> ¹	TEP MP 2
				Samples require laboratory analysis ²
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)	Daily during release (the first sample must be taken within 2	<i>In situ</i> ¹	TEP MP 1
				TEP MP 2

		hours of commencement of release)		TEP MP 3
			Samples require laboratory analysis ²	TEP MP 1
				TEP MP 2
				TEP MP 3
Turbidity (NTU)	xxxxx	Daily during release (the first sample must be taken within 2 hours of commencement of release)	<i>In situ</i> ¹	TEP MP 1
				TEP MP 2
				TEP MP 3
		Samples require laboratory analysis ²	TEP MP 1	
			TEP MP 2	
			TEP MP 3	
Sulphate (SO ₄ ²⁻) (mg/L)	xxxxxx	Daily during release (the first sample must be taken within 2 hours of commencement of release)	<i>In situ</i> ¹	TEP MP 1
				TEP MP 2
				TEP MP 3
		Samples require laboratory analysis ²	TEP MP 1	
			TEP MP 2	
			TEP MP 3	

¹ In situ samples can be taken using electronic sampling equipment.

² Samples are required to be analysed at a NATA accredited facility in accordance with this Transitional Environmental Program.

Table 5 - Release contaminant trigger investigation levels

Quality characteristic	Trigger levels (µg/L)	Monitoring frequency	Monitoring Point
Aluminium	55	Commencement of release and thereafter weekly during release	TEP MP 1 TEP MP 2
Arsenic	13		
Cadmium	0.2		
Chromium	1.0		
Copper	2.0		

Iron	300		
Lead	10		
Mercury	0.2		
Nickel	11		
Zinc	8.0		
Boron	370		
Cobalt	90		
Manganese	1900		
Molybdenum	34		
Selenium	10		
Silver	1.0		
Uranium	1.0		
Vanadium	10		
Ammonia	900		
Nitrate	1100		
Petroleum hydrocarbons (C6-C9)	20		
Petroleum hydrocarbons (C10-C36)	100		
Fluoride (total)	2000		

Table 6 - Contaminant release during flow events

Receiving waters	Release point (TEP RP)	Gauging station description	Easting (GDA94)	Northing (GDA94)	Minimum flow in receiving water required for a release event	Flow recording frequency
XXXX Creek	TEP RP1	WX	XXXXX	XXXXX	= > XXm ³ /sec	Continuous (minimum daily)
XXXX Creek	TEP RP2	WX	XXXXX	XXXXX	= > XXm ³ /sec	Continuous (minimum daily)

Table 7 - Receiving water downstream monitoring points

Monitoring points (TEP MP)	Receiving waters location description	Easting (GDA94)	Northing (GDA94)
TEP MP X	CX – XXXX Creek XXX metres downstream of RP X	XXXX	XXXX
TEP MP X	CX - XXXX Gully XXXX metres downstream of RP X	XXXX	XXXX

REPORTING

NOTE: The department will require daily reporting of insitu water quality parameters.

Progress reports will be required to be submitted to the department (i.e. monthly) describing activities and issues from previous month and proposed activities for next month and a final report defining how the objectives of the TEP have been achieved.

A final report is required to be submitted to the report upon completion of all actions, and at least 2 months prior to the end date of the TEP.

CONDITIONS

In carrying out this Transitional Environmental Program, 'Client Name (i.e. principal EA holder)' will undertake all activities in accordance with the following conditions.

Undertaking the release of mine effected water

- 1 Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under this Transitional Environmental Approval.
- 2 The release of contaminants to waters must only occur from the release points specified in Table 2 and depicted in Figure 1 attached to this Transitional Environmental Program.
- 3 The release of contaminants to waters must not exceed the release limits stated in Table 4 at the monitoring points specified in Table 2 and Table 3 of this Transitional Environmental Program.
- 4 The release of contaminants to waters from the release points must be monitored at the locations specified in Table 2 and Table 3 for each quality characteristic and at the frequency specified in Table 4 and Table 5 of this Transitional Environmental Program.
- 5 If quality characteristics of the release exceed any of the trigger levels specified in Table 5 during a release event, the Transitional Environmental Program holder must compare the downstream results in the receiving waters identified in Table 7 to the trigger values specified in Table 5 and:
 - a) where the trigger values are not exceeded then no action is to be taken
 - b) where the downstream results exceed the trigger values specified Table 5 for any quality characteristic, compare the results of the downstream site to the data from background monitoring sites and
 - i) if the result is less than the background monitoring site data, then no action is to be taken or
 - ii) if the result is greater than the background monitoring site data, complete an investigation in accordance with the ANZECC & ARM CANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining

- 1) details of the investigations carried out
 - 2) actions taken to prevent environmental harm.
- 6 If an exceedance in accordance with condition 5(a)(ii)(2) is identified, the holder of the Transitional Environmental Program must notify the administering authority within 24 hours of receiving the result. The notification must include written verification of the exceedance forwarded to the administering authority either via facsimile (INSERT LOCAL OFFICE NUMBER) or email to Manager.MiningCWR@derm.qld.gov.au.

Contaminant Release Events

- 7 The Transitional Environmental Program holder must install, operate and maintain a stream flow gauging station to determine and record stream flows at the locations upstream of each release point specified in Table 2 for any receiving waters into which a release occurs.
- 8 Notwithstanding any other condition of this Transitional Environmental Program, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in Table 6 for the contaminant release point(s) specified in Table 2.
- 9 Contaminant release flow rate must not exceed **XXX**% of receiving water flow rate.
- 10 The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in Table 2.
- 11 Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

Notification of Release Events

- 12 The Transitional Environmental Program holder must notify the administering authority within **XXX** hours of having commenced releasing mine affected water to the receiving environment. Notification must include the submission of written verification to the administering authority (either via facsimile (INSERT LOCAL OFFICE NUMBER) or email to Manager.MiningCWR@derm.qld.gov.au) of the following information:
 - a) release commencement date/time
 - b) expected release cessation date/time
 - c) release point/s
 - d) release volume (estimated)
 - e) receiving water/s including the natural flow rate
 - f) any details (including available data) regarding likely impacts on the receiving water(s).

- 13 The Transitional Environmental Program holder must provide the administering authority daily during the release of mine affected water, in writing (either via facsimile (INSERT LOCAL OFFICE NUMBER) or email to Manager.MiningCWR@derm.qld.gov.au) of the following information:
- all in situ monitoring data for that day
 - the receiving water flow rate
 - the release flow rate.
- 14 The Transitional Environmental Program holder must notify the administering authority as soon as practicable, (no later than within 24 hours after cessation of a release) of the cessation of a release notified under condition 12 and within 28 days provide the following information in writing:
- release cessation date/time
 - natural flow volume in receiving water
 - volume of water released
 - details regarding the compliance of the release with the conditions of this Transitional Environmental Program (i.e. contamination limits, natural flow, discharge volume)
 - all in-situ water quality monitoring results
 - any other matters pertinent to the water release event.

Notification of release event exceedence

- 15 If the release limits defined in Table 3 are exceeded, the holder of the Transitional Environmental Program must notify the administering authority within 24 hours of receiving the results.
- 16 The Transitional Environmental Program holder must, within 28 days of a release that exceeds the conditions of this Transitional Environmental Program, provide a report to the administering authority detailing:
- the reason for the release
 - the location of the release
 - all water quality monitoring results
 - any general observations
 - all calculations
 - any other matters pertinent to the water release event.

Requirements to cease the release of mine affected water

- The mine water discharge must cease immediately if any water quality limit as specified in Table 2 is exceeded.

2. The Department of Environment and Resource Management may require the mine to cease discharge if the department's water monitoring stations detect any water quality limit exceedance.
3. The release of mine effected waters must cease immediately if identified that the release of mine affected waters is causing erosion of the bed and banks of the receiving waters, or is causing a material build up of sediment in such waters.
4. The release of mine effected waters must cease immediately if holder of this Transitional Environmental Program is directed to do so by the administering authority.

Monitoring Requirements

Where monitoring is a requirement of this Transitional Environmental Program, ensure that a competent person(s) conducts all monitoring.

All monitoring undertaken as a requirement of this Transitional Environmental Program must be undertaken in accordance with the administering authority's Water Sampling Manual.

Notification of emergencies, incidents and exceptions

As soon as practicable after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this Transitional Environmental Program, the administering authority must be notified of the release by telephone, facsimile or email.

The notification of emergencies or incidents must include but not be limited to the following:

- a) the holder of the Transitional Environmental Program
- b) the location of the emergency or incident
- c) the number of the Transitional Environmental Program
- d) the name and telephone number of the designated contact person
- e) the time of the release
- f) the time the holder of the Transitional Environmental Program became aware of the release
- g) the suspected cause of the release
- h) the environmental harm caused, threatened, or suspected to be caused by the release, and
- i) actions taken to prevent any further release and mitigate any environmental harm caused by the release.

Not more than fourteen days following the initial notification of an emergency or incident, written advice must be provided of the information supplied to the administering authority in relation to:

- a) proposed actions to prevent a recurrence of the emergency or incident, and

- b) outcomes of actions taken at the time to prevent or minimise environmental harm.

Any other conditions that require a response, contingency for matters under this TEP, i.e. if constructing a new regulated structure, design plans will be required to be submitted to the administering authority for approval prior to construction.

NOTES FOR THE CLIENT

These regulatory requirements of Chapter 4 of the *Environmental Protection Regulation 2008*, the Standard Criteria and the requirements of EP Act.

In deciding to accept or refuse a TEP the administering authority is required to consider section 338 of the EP Act, which states:

338 Criteria for deciding draft program

(1) In deciding whether to approve or refuse to approve the draft program or the conditions (if any) of the approval, the administering authority—

(a) must comply with any relevant regulatory requirement; and

(b) subject to paragraph (a), must also consider the following—

(i) the standard criteria;

- *The principles of ecological sustainable development as set out in the 'National Strategy for Ecologically Sustainable Development'.*
- *Any applicable environmental protection policy.*
- *Any applicable Commonwealth, State or local government plans, standards, agreements or requirements.*
- *Any applicable environmental impact study, assessment or report.*
- *The character, resilience and values of the receiving environment.*
- *All submissions made by the applicant and submitters.*
- *The best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows – a transitional environmental program.*
- *The financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) (above) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument.*
- *The public interest.*
- *Any applicable site management plan.*
- *Any relevant integrated environmental management system or proposed integrated environmental management system.*
- *Any other matter prescribed under a regulation.*

(ii) additional information given in relation to the draft program;

(iii) the views expressed at a conference held in relation to the draft program.

As has been demonstrated a significant consideration for the draft TEP is for the standard criteria. Recommendations in relation to a submission of a draft TEP in line with section 338 and the standard criteria are:

- Provide all relevant stakeholders, which may included Local Government and potentially affected landholders, with a copy of the draft TEP, and allow sufficient time for relevant stakeholders to provide comment for consideration.
- The applicant is required to consider Environmental Protection Policies, the character, resilience and values of the receiving environment, any applicable plans and standards, such as ANECC (aquatic ecosystem guidelines), the Queensland Water Quality Guidelines and 'A study of the cumulative impacts on water quality of mining activities in the Fitzroy River Basin'.

In accordance with the legislation, the submitted TEP must adequately address methods to reduce environmental harm (Section 330) and must meet the content requirements detailed in section 331.

4. Science & Capacity Building

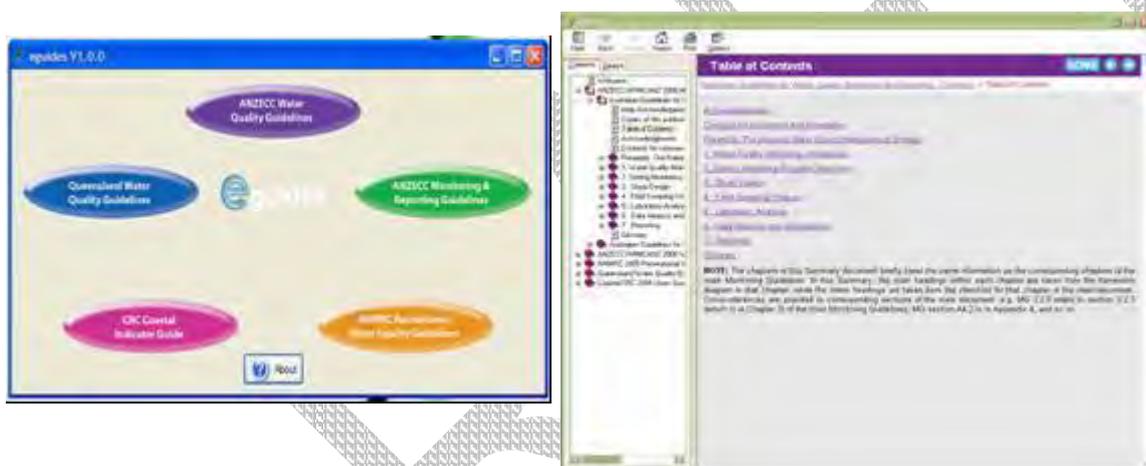
4.1 Decision Support Software

eGuides

eGuide is an electronic document which consists of a number of commonly referred to water quality guideline documents. The current version of eGuides contains the following documents.

- ANZECC/ARMCANZ 2000 Monitoring & Reporting Guidelines
- ANZECC/ARMCANZ 2000 Water Quality Guidelines
- NHMRC 2005 Recreational Guidelines
- Queensland Water Quality Guidelines
- Coastal CRC Users' Guide to Indicators for Monitoring

These documents have been compiled into a standard “HTML” version of Windows help systems (shown below) and can be installed in any personal computer for easy and quick access to information. Users can select the document that they would like to manually browse, or select the 'search' tab to search all the guides for some key words. The searched items can be viewed, copied to another document or printed out for later references. The beta version of this tool has been released and available on request from water.tools@epa.qld.gov.au.



Modelling and Monitoring Assessment Decision Support System (MAMA DSS)

The Modelling and Monitoring Assessment Decision Support System (MAMA DSS) is a decision support tool to help choose and review modelling and monitoring undertaken as part of Environmental Impact Assessments (EIAs). Decision-making about activities in the coastal zone is generally underpinned by information from monitoring and modelling. The DSS is designed to provide a process for choosing and reviewing assessment techniques considering the management objective, the potential pollutants from point or diffuse sources, the features of the environment and the relevant indicators, stressors, and processes.

The DSS is supported by a help system containing information about water quality modelling approaches such as: biogeochemical modelling (also called process modelling), statistical modelling (also called non-process modelling), and monitoring and experimentation methods such as in-field monitoring, autosampling, remote sensing, and experimentation.

The MAMA DSS can be requested from water.tools@epa.qld.gov. Further information on the tool can be obtained from <http://www.coastal.crc.org.au/3m/>.

Procedural information for the Operational Policy *Waste water discharge to Queensland waters*



Queensland Waterways Database

The Queensland Waterways Database is a repository for all current and historical water quality monitoring data for Queensland waterways collected by the EPA. Approximately 350 sites across Queensland are monitored every month for a range of water quality indicators. Government agencies, research organisations and community groups use this information to assess the health of Queensland's waterways. Within the agency, water quality data is used in the production of reports, maps and models and to assist in compliance investigations, decision-making and planning.

Further information can be obtained by emailing water.data@epa.qld.gov.au or from http://www.epa.qld.gov.au/environmental_management/water/water_quality_monitoring

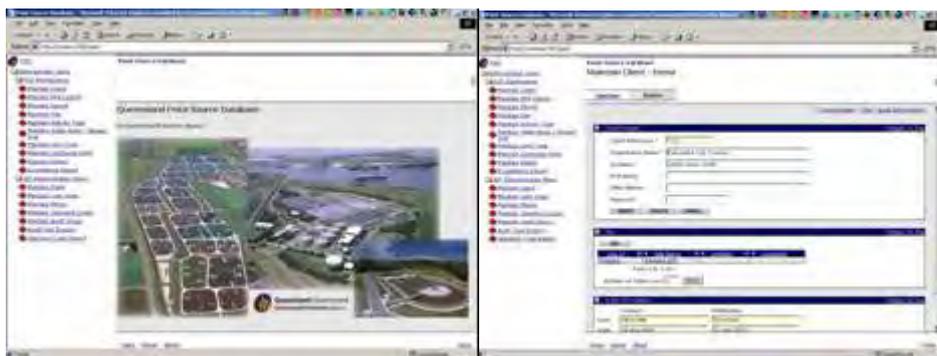


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Procedural information for the Operational Policy *Waste water discharge to Queensland waters*

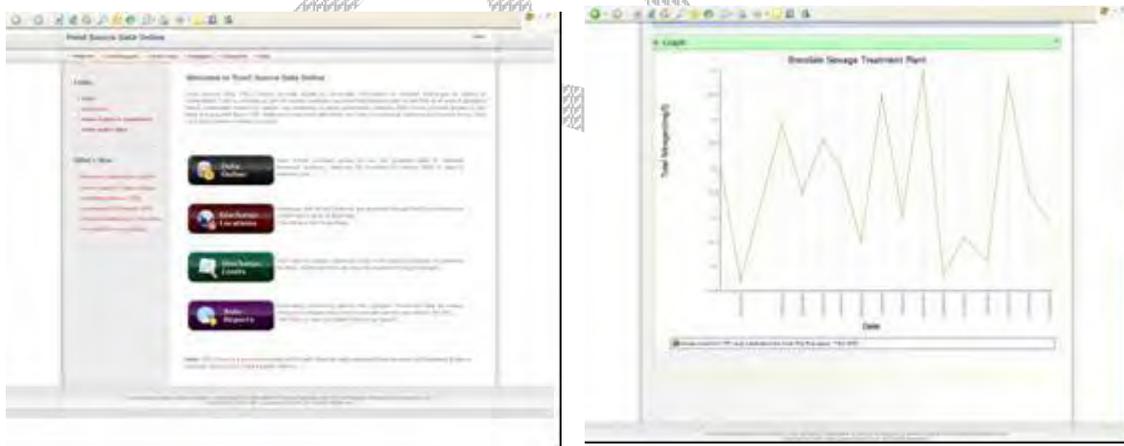
Point Source Database

Information on licensed discharges to water is monitored as part of licensees' permits issued by the EPA. The EPA's Point Source Database has been developed since 2003 and allows electronic submission, automated checking and storage of data. It is aimed to assist compliance and allow improved access to discharge information for a range of other uses. The database currently contains information on major sewage treatment plants in Queensland but will be extended in the future to all industries with licensed discharges. Further information on the database is provided in Appendix 1.



In addition to monitoring data, licence limits and discharge locations have been collated and are available to EPA staff via Ecomaps (<http://mudlark.env.qld.gov.au/website/index.htm>). Further information on how to access this layer of Ecomaps is provided in Attachment 2.

A further initiative is Point Source Data (PSD) Online which will provide access to up-to-date information on licensed discharges to waters in Queensland. The current application is a prototype and a beta version should be available EPA in mid 2008. PSD Online will provide access to raw data and graphed data contained in the EPA database. Other features include load estimation and links to discharge locations and licence limits in Ecomap. Instructions on how to use PSD Online will be provided.



Point source data is available to EPA staff, other organisations and the community on request from water.data@epa.qld.gov.au. Information on the database is available to the public from http://www.epa.qld.gov.au/environmental_management/water/water_quality_monitoring/reporting_of_licensed_discharges_to_waterways/.

For further information, email psd.help@epa.qld.gov.au or contact the Freshwater & Marine Sciences Group of the EPA.

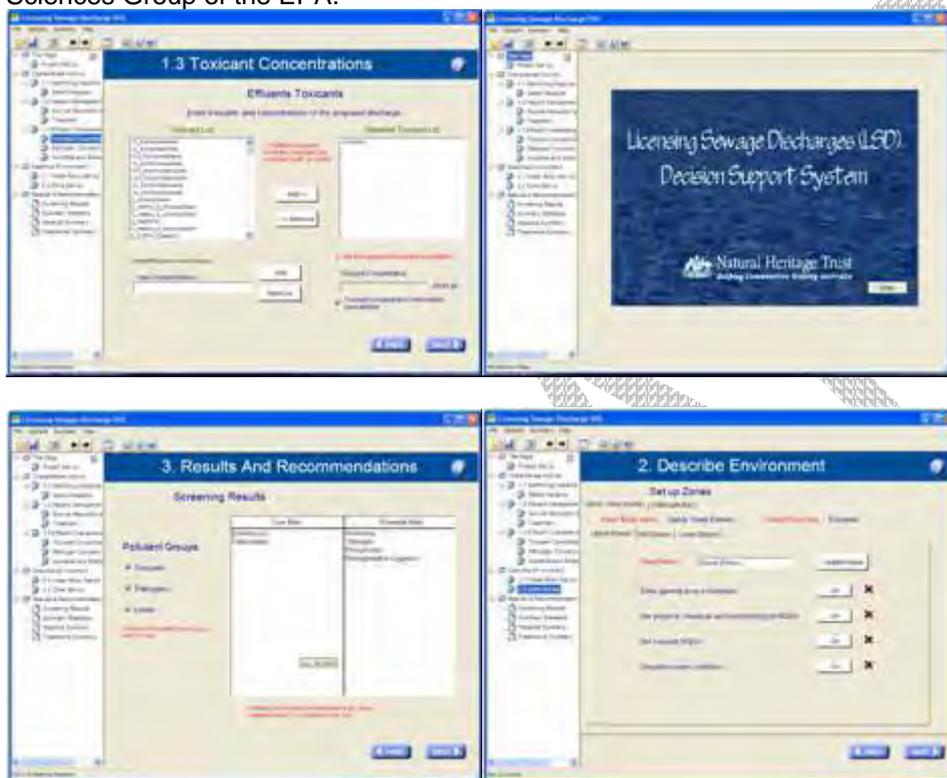
Licensing Sewage Discharges Decision Support System (LSD DSS)

Procedural information for the Operational Policy *Waste water discharge to Queensland waters*

The Licensing Sewage Discharges Decision Support System (LSD DSS) is a support tool for the assessment of the aquatic aspects of proposed discharges from sewage treatment plants. It has been designed to be used by licensing officers in the early stages of screening a licensed application. There is an associated help system that is fully searchable. It includes screen explanations and the knowledge bases on typical sewer pollutants, waste water treatment, risk assessment protocols and relevant water quality guidelines.

The DSS was originally developed by the Queensland Environmental Protection Agency in collaboration with the Environment Protection Authority Victoria and the NSW Department of Environment and Conservation. The latest beta version was produced in collaboration with the e-Water Cooperative Research Centre.

For further information about the DSS please contact water.tools@epa.qld.gov.au or the Freshwater & Marine Sciences Group of the EPA.



Procedural information for the Operational Policy *Waste water discharge to Queensland waters*

Water Quality Online Website

Water Quality Online is a website that contains information on water quality information and products developed as part of the National Action Plan for Salinity and Water Quality for regional managers in Queensland. It includes some of the tools discussed above in addition to a range of other tools that could assist water quality assessment. Water quality online is located at <http://www.wqonline.info>



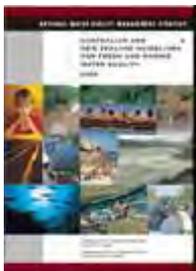
OzCoasts/OzEstuaries Website

The OzCoast and OzEstuaries provides comprehensive information about Australia's coast, including its estuaries and coastal waterways. This information helps to generate a better understanding of coastal environments, the complex processes that occur in them, the potential environmental health issues and how to recognise and deal with these issues. It includes a database on estuaries, information on coastal indicators, geomorphology and geology, conceptual models, the simple estuary response model (SERM) plus more. It can be accessed at <http://www.ozcoasts.org.au/>.



Procedural information for the Operational Policy *Waste water discharge to Queensland waters*

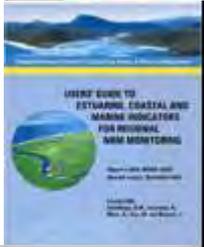
4.2 Relevant Water Quality Guidelines



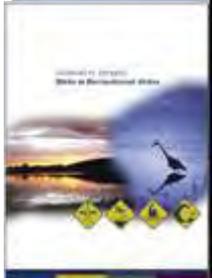
ANZECC & ARMCANZ - Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000. These guidelines provide substantial information on the nationally agreed approaches and trigger values for the protection of fresh and marine water. The guidelines are available with eGuides described above or can be downloaded from <http://www.environment.gov.au/water/publications/quality/index.html#nwqmsguidelines>



ANZECC & ARMCANZ - Australian Guidelines for Water Quality Monitoring and Reporting 2000. These national guidelines present useful information on water quality monitoring covering planning, designing, fieldsampling, laboratory analysis and reporting. The guidelines are available with eGuides described above or can be downloaded from <http://www.environment.gov.au/water/publications/quality/index.html#nwqmsguidelines>



The Coastal CRC's User's Guide to Estuarine, Coastal and Marine Indicators for Regional NRM Monitoring, Coastal Zone CRC. These guidelines were designed to assist regional natural resource managers choose indicators when dealing with estuarine and marine environment. It provides substantial information on the stressors and indicators that could be applicable to these environments. The guidelines are available with eGuides described above or can be downloaded from <http://www.coastal.crc.org.au/Publications/indicators.html>

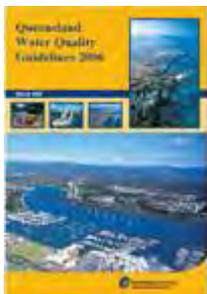


NHMRC Guidelines for Managing Risks in Recreational Waters, endorsed June 2005. These guidelines are the most recently published in Australia for the management of recreational waters. It covers a range of hazards including microbial contamination. It includes a new risk assessment approach including sanitary surveys and new indicators/classifications to assess risks from pathogens. The guidelines are available with eGuides described above or can be downloaded from <http://www.nhmrc.gov.au/publications/synopses/eh38.htm>.



NHMRC Australian Drinking Water Guidelines 2006. The Australian Drinking Water Guidelines (the ADWG) are intended to provide a framework for good management of drinking water supplies. They are concerned with safety from a health point of view and with aesthetic quality. The guidelines are available from <http://www.nhmrc.gov.au/publications/synopses/eh19syn.htm>.

Procedural information for the Operational Policy *Waste water discharge to Queensland waters*



Queensland Water Quality Guidelines, Queensland EPA, March 2006. These guidelines were developed to complement the ANZECC/ARMCANZ Freshwater and Marine Guidelines. It includes site specific trigger values for regions of Queensland based on monitoring data from relevant reference sites. The guidelines are available with eGuides described above or can be downloaded from http://www.epa.qld.gov.au/environmental_management/water/queensland_water_quality_guidelines/#gen0



A guide to the application of the ANZECC/ARMCANZ Guidelines in the minerals industry, Australian Centre for Environmental Research (ACMER), September 2003. These guidelines provide advice on the application of the national guidelines to mining industry and includes relevant case studies. More information on obtaining this document is available at <http://www.acmer.uq.edu.au/publications/handbooks.html>



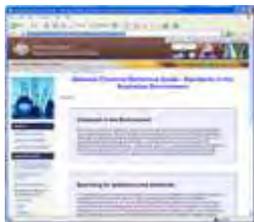
Review of Methods for Water Quality Assessment for Temporary Stream and Lakes Systems, Australian Centre for Environmental Research (ACMER), September 2004. This document provides information on methods used to assess ephemeral streams. The document is available from <http://www.acmer.uq.edu.au/research/attachments/FinalReportTempWatersSep20042.pdf>



Licensing Discharges from Sewage Treatment Plants, Case Study No.2, EPA. This document provides an example of how EPA licensing officers may apply the agency's Procedural Guide for Licensing Discharges to Aquatic Environments. It involves a large sewage treatment plant which discharges to an estuary. It is available from the EPA's Ecostep system.



Water Quality Sampling Manual, EPA, 1999. This document is the third edition of the Queensland EPA's Water Quality Sampling Manual. It is for used in deciding 'protocols' under section 10 of the Queensland Environmental Protection (Water) Policy 1997 (subordinate legislation 1997 No. 136). It can be obtained from http://www.epa.qld.gov.au/environmental_management/water/water_quality_monitoring/publications/



National Chemical Reference Guide - Standards in the Australian Environment. This is an Australian Government website that provides you with standards for chemicals such as in foods. It is found at [http:// hermes.erin.gov.au/pls/crg_public!/CRG_OWNER.CRGPPUBLIC.pStart](http://hermes.erin.gov.au/pls/crg_public!/CRG_OWNER.CRGPPUBLIC.pStart)

4.3 Water Quality Advice & Technical Services

The Freshwater & Marine Sciences Group of the EPA provides services to internal EPA clients on request (see electronic form on requesting services). These services include general advice, review of documents, modelling, field investigations and monitoring services and will typically cover only water quality aspects of a project. In requesting services, you need to clearly state the objective of the project or the problem to be solved staff. Additional documents should be sent via email or post.

The general turn-around time for reviews of EIS/IAS or similar major documents is 10 working days. However, the time required to complete any particular project will depend on the scope of the work and the available staff resources within the group at the time of the request. In general, the Freshwater & Marine Sciences Group will provide staff time on an in-kind basis, subject to director's approval. The requestor should cover any additional project costs, such as analysis costs and airfares.

Contacts for the Freshwater & Marine Sciences Group

Email: water.workrequests@epa.qld.gov.au

Phone: (3896 9250) or fax (38969277)

Postal: Indooroopilly Sciences Centre
EPA (Botany Building)
80 Meiers Road, Indooroopilly
Brisbane, QLD, 4068

Attachment1 to Section 4

The Point Source Database Information Guide for EPA Staff
October 2007
Version 3.0

Overview

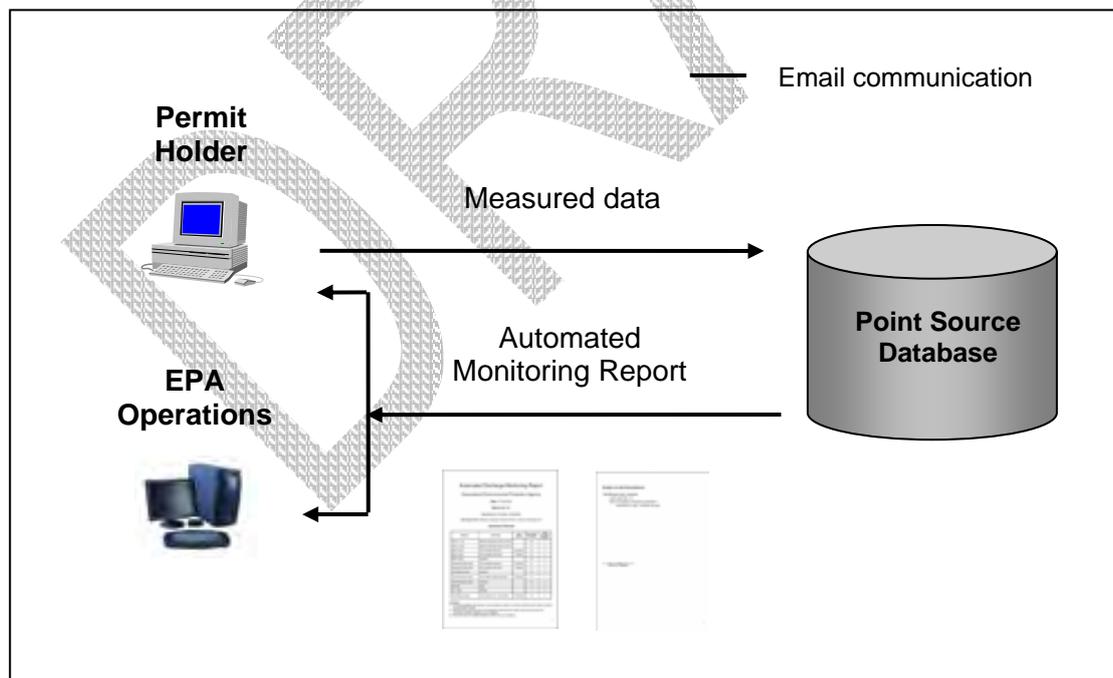
The Point Source Database (PSD) was designed and developed by the EPA to hold monitoring data for discharges to water required under EPA development permits for environmentally relevant activities (ERA's). It allows electronic submission of data and undertakes automated checks of the data against compliance limits. The submitted data can be viewed graphically by EPA staff while discharge locations and limits can be viewed using Ecomaps.

Benefits

The purpose of the PSD is to support compliance although it is not designed to replace notification requirements for non-compliance and incidents as prescribed in development permits. The database will also reduce the time taken by both EPA staff and registered operators in dealing with data requests and improve EPA decisions and projects through providing more complete and up-to-date information. Reporting of point source releases through mechanisms such as State of Environment Reporting, National Pollution Inventory and the Southeast Queensland's Ecosystem Health Report Card will be improved.

For registered operators submitting electronic data to the EPA, the requirement for this data and the related analysis to be submitted with the permit holder's annual return will be waived.

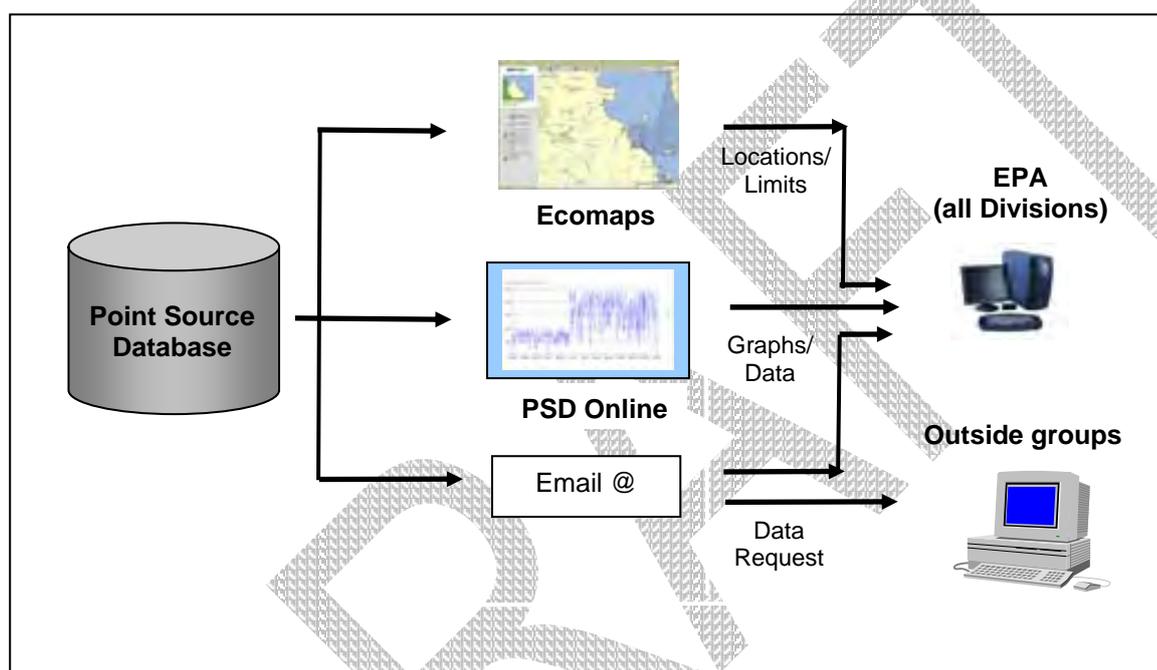
Electronic Submission and Reporting



Procedural information for the Operational Policy *Waste water discharge to Queensland waters*

The PSD requires registered operators to prepare a text file of measured data using a specific Excel template and attached this file to an email which is sent to the database. For registered operators of sewage treatment plants, this is currently at least every three months. The email is then received by the database and the file is firstly checked, and if in a correct format, imported into the database. The database then compares the submitted measured data to permits limits that are stored in the database and an automated monitoring report is produced. This provides a summary of results for each permit limit of the release as well as more detailed information on any exceedences – see Automated Monitoring Report for more information. The automated monitoring report is then sent, along with a copy of the submitted data, via email to the specified permit holder's email address and the relevant EPA district office email address.

Getting Point Source Data and Information



Information will be available to EPA staff via Ecomaps, an internal website called Point Source Data Online or on request. The Ecomaps layers contain information on each the facilities, discharge locations and discharge limits. Point Source Data Online will provide direct access to most recent and historical data received by the database either as raw data or through viewing measured data via graphs. The data can be compared directly to permit limits and saved as an Excel file. Point Source Data Online also provides a facility to estimate pollutant loads for each facility based on submitted data. Guidance on accessing the ecomaps layer is provided in Appendix 2 (coming soon for Point Source Data Online). Requests for data or limits/locations can also be made to the Environmental Sciences Division – see contact details below.

External organisations do not have direct access to measured data, graphs, permit limits or discharge locations. However, the Environmental Sciences Division will respond to all reasonable data requests received in writing by an organisation or individual from government, universities, private industry or the general public. Data will generally be provided to partner organisations (those contributing to EPA monitoring programs) free of charge. The EPA will reserve the right to charge a nominal fee for services for any other data request.

Requests for data can also be made from Freshwater & Marine Sciences Group via email (water.data@epa.qld.gov.au). The GIS layer of locations and limits can be requested from the Environmental information Systems Unit via email (data.coordinator@epa.qld.gov.au).

Procedural information for the Operational Policy *Waste water discharge to Queensland waters*

Implementation Overview

The PSD has currently been implemented for all sewage treatment plants greater than 10,000 equivalent persons (ERA 15 (e), (f) and (g) under Schedule 1 of the *Environmental Protection Regulation 1998*) that involve a direct discharge to waters. Historical data for these discharges has been collected, in most cases back to the year 2000. Electronic submission of quarterly data commenced for these discharges in 2007.

The PSD has been initially set up to collect information on direct releases to water. However, flow measurements of “recycled water” leaving the registered operators premises are also being collected for sewage treatment plants. At this stage, flows or quality of waters release to land covered under the permits are not collected or checked against permit limits, although this may be implemented in the future.

The next phase of the implementation will target major industry and the remaining sewage treatment plants, firstly in South East Queensland (SEQ) and then the remainder of Queensland. Some historical data for major industry in SEQ has already been collected.

Guidance to Registered operators

Registered operators participating in electronic submission of data will generally have received a Point Source Database Implementation Manual and attended an information session run by the EPA. The following information is generally provided to the registered operator prior to submission.

The EPA will request participation from a registered operator in writing to submit their data electronically. The registered operator should notify the EPA in writing if they wish to participate. The EPA should also be notified in writing if the registered operator no longer wishes to submit electronic data to the EPA. In this case, reporting and data analysis is required as part of the licensees' annual return and data will need to be provided to the EPA on request. All correspondence with registered operators should be available on the relevant EPA files.

In preparing for electronic submission, the EPA will request the permit holder to provide historical data (preferably back to the year 2000) in an electronic format to the EPA. The data does not need to be in any specific format and existing Excel spreadsheets will suffice as long as they can be easily interpreted. The EPA will then import this data manually into the database. Automated checking of this data against permit limits is not usually undertaken. The data can then be used for data requests and to provide a previous history for assessment of long term limits that are usually up to 12 months when the first automatic submission is received.

Submission of electronic data to the EPA should be done using the templates provided by the EPA for the permit holder's specific plant or based on the EPA's electronic submission guide (available from psd.help@epa.qld.gov.au). The completed templates should be attached to an email as a .CSV file (comma delimited text file) and sent to psd.data@epa.qld.gov.au. For large point source emitters, data should be submitted to the EPA on no less than a quarterly basis and coincide with the end of the financial and calendar years. Data should be submitted for whole calendar months. Data submission will become due one calendar month after the end of the yearly quarter. The EPA will provide an email reminder to each licensee at this time. Data is to be submitted within thirty days of becoming due.

The provision of correct and accurate data is the sole responsibility of the permit holder and should be undertaken as set out in the development permit/s. The EPA will not be held responsible for submission of incorrect data. If incorrect data has been submitted, please contact the database manager on psd.help@epa.qld.gov.au.

The licensee should provide the EPA with a single generic email address so that all electronic correspondence in relation to the Point Source Database can be emailed to this address. It is the responsibility of the licensee to manage this email address and notify the EPA of any changes.

Procedural information for the Operational Policy *Waste water discharge to Queensland waters*

Registered operators who submit monitoring data required under their development permit/s for the release to water are not required to submit this data or any related analysis with their annual return. However, submission of data to the Point Source Database does not remove an organization's obligation to report non-compliances and incidents as prescribed by their development permit/s.

New Permits or Change to Permit Limits

The PSD contains permit limits for every licensed discharge to water contained in the database. It is essential that these permit limits are kept up-to-date as they are used for automated checking against submitted data. The permit limits are also displayed in Ecomaps, which is currently updated periodically.

Project Managers in the Environmental Operations Division are responsible for notifying the PSD administrators of any new development permits involving a discharge to waters and of any amendments to existing discharge quality limits on a development permit. This is required to be completed prior to submission to the Delegate and the process is included in the standard template "Assessment Report – Environmentally Relevant Activities". If a new permit involving a discharge to waters has been approved and is not currently in the PSD, please contact the Freshwater & Marine Science (email psd.help@epa.qld.gov.au). If you become aware that the permit limits in the database, either from automated monitoring reports or from the layer in Ecomaps, also please contact Freshwater & Marine Sciences.

The PSD current holds information for all permits or amended permits but does not include details of Environmental Management Programs (EMPs). Please notify Freshwater & Marine Sciences if an EMP exists for a permit involved in electronic submission.

Automated Monitoring Report

The EPA will produce an automated monitoring report (see attached sample) when new monitoring data is received from registered operators. A copy of the automated monitoring report and the data submitted will be sent to the relevant EPA Environmental Operations office and to the registered operator. Limit exceeded events are highlighted in the report and correspond to when the monitoring data provided exceeds permit limits. These are provided as a guide but should not be used as the primary basis for non-compliance.

The automated monitoring report is produced for each discharge plant/monitoring point. The report shows the date of submission, a unique return ID allocated by the database, the date period for which the new data have been submitted and the plant/discharge point name. A summary of results is provided in a tabular form with each line corresponding to a different indicator and limit type set out in the relevant permit. The indicators column shows the indicator name and units. The limit type column shows a range of limit types including maximum, range (maximum and minimum), loads, medians and a combination of short-term and long-term percentiles. For medians and percentiles, the limit period over which the limit is applied is shown in the next column and can include numbers of days, weeks or months. The frequency of sampling is not specifically tested by the database. However, the number of data points submitted to the database are counted and presented in the summary report. This allows the reader to scan the column and for those indicators taken at the sample frequency, the number of data points should be the same. Note there are typically more flow data points (typically measured daily) than water quality concentrations.

More detailed information on limit exceedences is provided in the automated monitoring report after the summary table. For each indicator/limit type combination, information is presented on the limit values and the date and values of any exceedences. The time period and samples required for the limit are also shown for medians and percentile limit types.

If the automated monitoring report contains exceedences, it is important to note that this may not be because of non-compliance. The limits in the monitoring report should be checked against current known limits. The limits may not be up-to-date or there may be an Environmental Management Program (EMP) in place allowing higher discharge levels. The data should also be checked. The raw data is provided with the automated monitoring report. Alternatively, data can be obtained or visualised using Point Source Data Online which allows direct

Procedural information for the Operational Policy *Waste water discharge to Queensland waters*

comparison against limits. It should be noted incorrect data can be submitted to the database and that the database and online tool may not correctly represent the limit calculations as set out in development permits. Therefore, even if the limits and exceedence appear correct, it is strongly recommended that the registered operator are contacted and provided an opportunity to confirm that the data and the limit exceeded events are correct. The limit exceeded events can also be checked against the non-compliances already notified to the EPA. If the limit exceeded events have not been reported, the registered operators should again be contacted. Based on the response from the registered operators, further actions may be required by the EPA.

Further Information

The Point Source Database is a joint initiative Environmental Sciences and Environmental Operations Divisions. For further information, please contact Freshwater & Marine Sciences on (07) 3896 9250 or psd.help@epa.qld.gov.au.

Sample Automated Monitoring Report

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Automated Discharge Monitoring Report

Queensland Environmental Protection Agency

Date: 06/08/2007

Return Id: 845

Data Period: 01/04/2007 - 29/06/2007

Discharge Point: Coombabah / GCCCRP2

Summary Results

Indicator	Limit Type	Limit Period	Data Points in Period	Limit Exceeded Events
BOD 5 (mg/l)	80th percentile (short-term)	5 Weeks	13	0
BOD 5 (mg/l)	90th percentile (long-term)	12 Months	13	0
BOD 5 (mg/l)	maximum		13	0
D.O. (mg/l)	minimum		13	0
Suspended Solids (mg/l)	maximum		13	0
Suspended Solids (mg/l)	80th percentile (short-term)	5 Weeks	13	0
Suspended Solids (mg/l)	90th percentile (long-term)	12 Months	13	0
Faecal Coliforms (CFU/100ml)	80th percentile (1 day)	1 Days	13	0
Faecal Coliforms (CFU/100ml)	median (1 day)	1 Days	13	0
Free Residual Chlorine (mg/L)	maximum		13	0
pH (Unit)	range		13	0
Total Phosphorus (mg/l)	maximum		13	2
Total Nitrogen (mg/l)	maximum		13	0
Total Nitrogen (mg/l)	50th percentile (long-term)	12 Months	13	0
N-NH3 (mg/l)	no limit		N/A	N/A
Total Nitrogen (mg/l)	Annual Load		13	0

Disclaimer

- It is the responsibility of the licensee to ensure samples are taken in accordance with their permit. Refer to permit for more information on limits.
- Although all care has been taken in the development of this report, the results may be incorrect and do not necessarily constitute compliance or non-compliance.
- This report does not constitute notification to EPA of any non-compliance.

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Indicator	Limit Type	Limit Period	Data Points in Period	Limit Exceeded Events
Total Phosphorus (mg/l)	Annual Load		13	0
Flow (L)	maximum (dry day)		51	0
Flow (L)	maximum (wet day)		39	0

Details of Limit Exceedence

BOD 5 (mg/l), 80th percentile (short-term)

Lower/upper limit: < 15
 Time period for limit application: 5 Weeks
 Samples required in time period: 5
 Date of exceedence (result):
 Nil.

BOD 5 (mg/l), 90th percentile (long-term)

Lower/upper limit: < 10
 Time period for limit application: 12 Months
 Samples required in time period: 52
 Date of exceedence (result):
 Nil.

BOD 5 (mg/l), maximum

Lower/upper limit: < 30
 Date of exceedence (result):
 Nil.

D.O. (mg/l), minimum

Lower/upper limit: > 4
 Date of exceedence (result):
 Nil.

Suspended Solids (mg/l), maximum

Lower/upper limit: < 45
 Date of exceedence (result):
 Nil.

Attachment 2 to Section 4

Point Source Database – New Ecomaps Layers Version 1.0

Introduction

Two new layers relating to point source discharges have been added to Ecomaps. The two layers are (i) Point source discharge plants and (ii) Point source discharges. They currently contain similar metadata information but have been included as the locations of the plants and the discharges are usually different. The layers shows the location of point source discharges/plants and a description of each including the plant name, ecotrack number, permit reference, Environmentally Relevant Activity (ERA) type, licensee, location details. There is also a link to permit limit details that are the indicators and numerical limits placed on each of those limits in the relevant permit.

This document provides instruction on how to access these layers on Ecomaps that is located at:

<http://mudlark.env.qld.gov.au/website/index.htm>

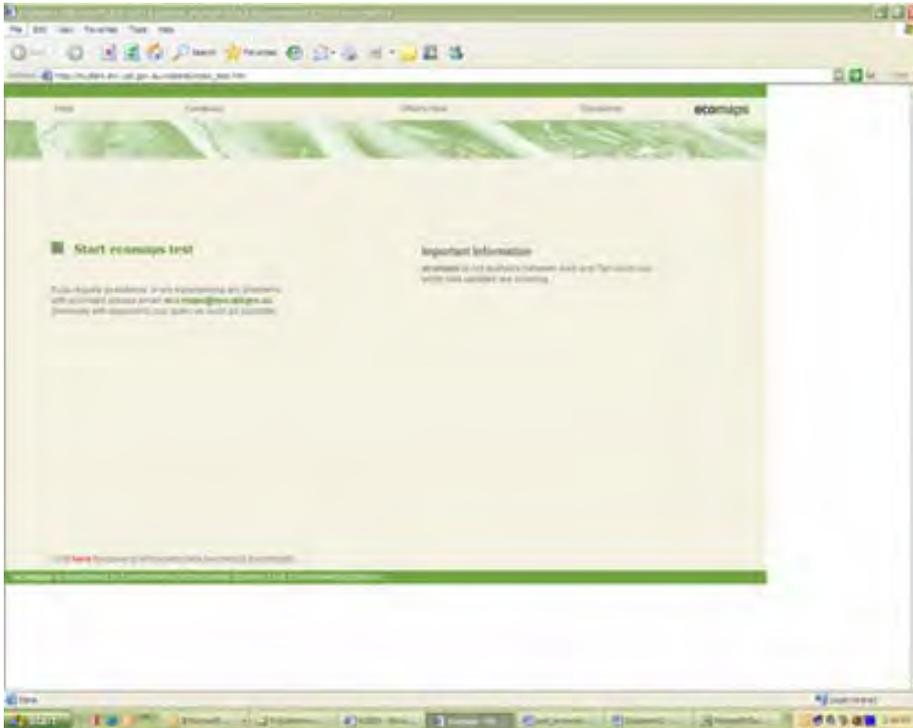
Although all care has been taken with the compilation of the data, please note that the information presented in this layer may contain errors or not be up-to-date. In terms of permit limits, Environmental Management Plans or other statutory mechanisms may be in place that are not recorded on these layers. Please contact the relevant Environmental Operations Office for the most recent information.

The Point Source Database is a joint initiative Environmental Sciences and Environmental Operations Divisions. For further information or feedback, please contact Freshwater & Marine Sciences on (07) 3896 9250 or psd.help@epa.qld.gov.au.

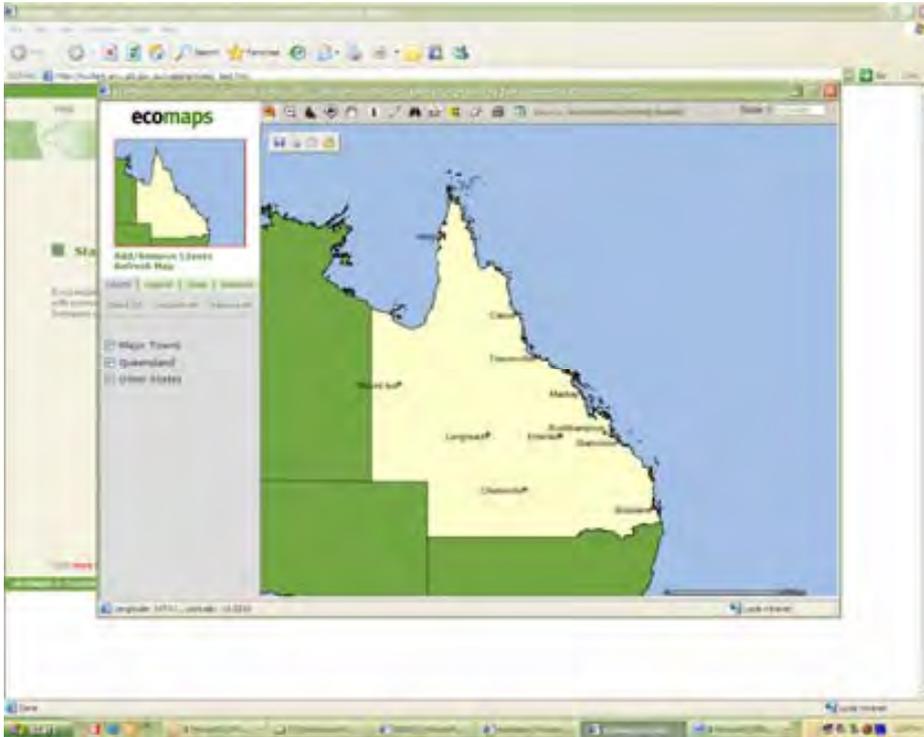
Instructions

Step 1 – Start Ecomaps using the link and click on Start “ecomaps test”

<http://mudlark.env.qld.gov.au/website/index.htm>



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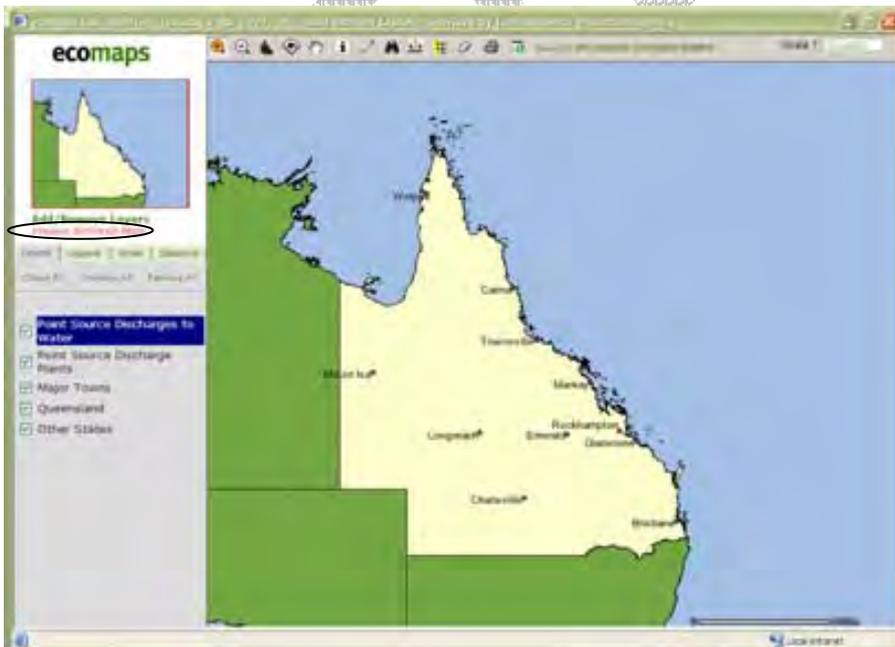
Step 2 – Click on Add/Remove Layers and choose Environment and Conservation. You can click the two boxes related to Point Sources and then Close

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Step 3 – Check both boxes on the main screen and then Refresh Map

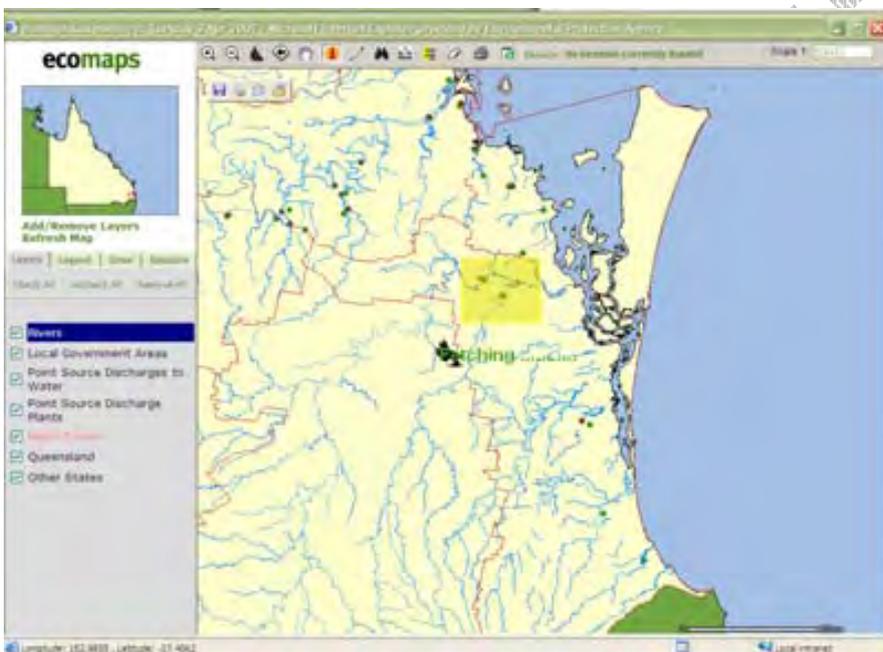


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Step 4 – Add any other layers you want such as local government boundaries, rivers etc. and then Refresh Map

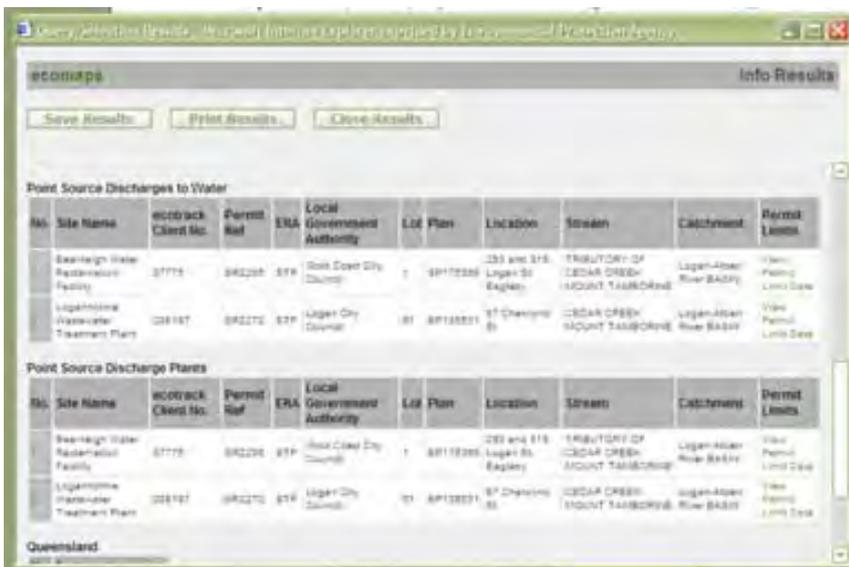
Step 5 – Zoom into some area of choice using the magnifying glass symbol

Step 6 – Click on i symbol and then choose Rectangle Select and select an area

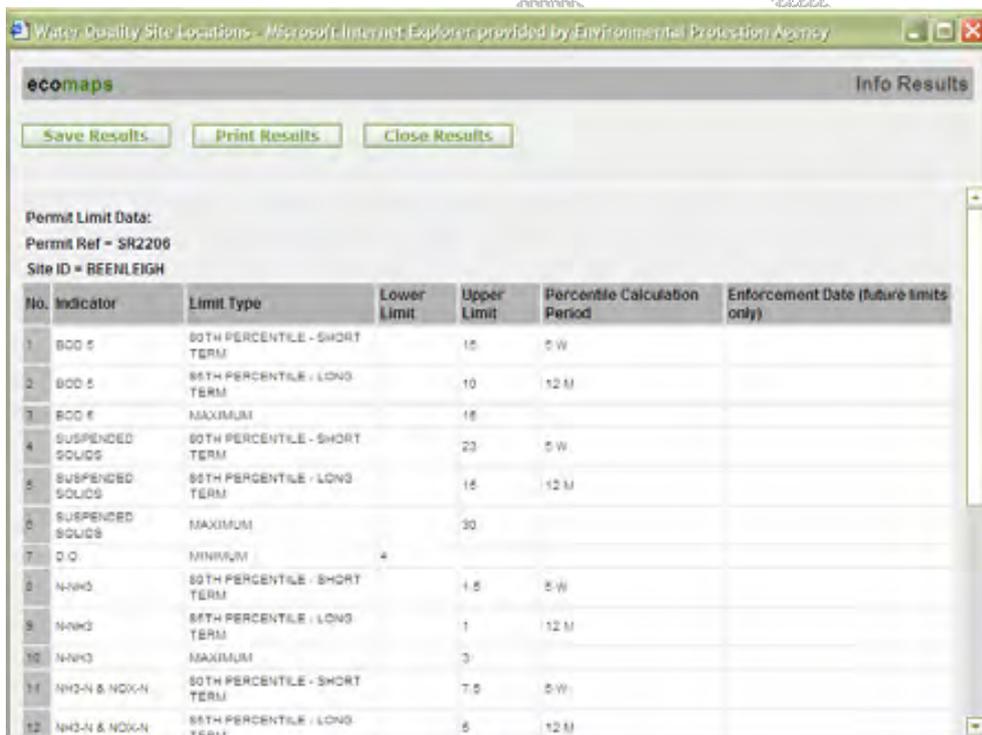


Scroll down till you see the point source information:

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Step 7 – Click on View Permit Limit Data for your Plant/Discharge of choice:



5. Direct Toxicity Assessment

This Section provides 'stand alone' information in considering a requirement for direct toxicity assessment. It also informs Section 2.3 of the Operational Policy.

5.1 Introduction

This section of the *Procedural Guide* has been prepared by the Freshwater & Marine Sciences Unit (Environmental Sciences Division) for staff of the Environmental Protection Agency involved with regulating wastewater discharges to aquatic receiving environments.

The following subsections outline what assistance this document can provide for EPA staff contemplating the need to request or impose Direct Toxicity Assessment of an existing or proposed effluent discharge and what information would be required to make an informed decision. The following sections in the *Procedural Guide* will detail the specific effluent quality data required to determine whether or not there is a significant risk of toxic effects and therefore whether one-off, event-based or routine assessment for the toxic potential of the effluent is required. This assessment is referred to as a Direct Toxicity Assessment.

It should be noted that a Direct Toxicity Assessment (DTA) is also widely known as Whole Effluent Toxicity (WET) tests and both refer to an experimental procedure aimed at quantifying the potential toxicity of a sample of effluent through exposing a range of test specimens to that effluent. To remain consistent with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ 2000), only the term DTA will be used hereafter.

This Document (the Procedural Guide/Policy)

This *Procedural Guide* will assist EPA officers who have reason to believe (or suspect) that:

- an effluent may have the potential of exhibiting toxic effects in aquatic biota, and consequently
- need to decide whether or not a DTA of the effluent is warranted.

A new Development Application (DA) or Amendment to an existing DA should contain detailed information that characterises the effluent and the receiving aquatic environment.

Information Submitted by the Proponent

The information provided in an Environmental Impact Assessment (EIA), Environmental Impact Statement (EIS), or other equivalent document, will form the basis of the assessment to determine whether or not there is a significant risk of toxic effects being caused by the effluent. If the required effluent quality data has not been presented in EIA/EIS then the priority would be to obtain it via a Request for Further Information (RFI).

In most cases however, the EIA/EIS should already contain detailed information that:

- identifies and quantifies the actual (or expected) effluent water quality characteristics;
- discusses whether or not the contaminants in the effluent comply with local Water Quality Objectives (WQOs) and preserve the Environmental Values (EVs) attributed to the specific receiving waters, and
- describes the effluent quality criteria in comparison to *Toxicity Trigger Values* (TTVs) presented in (ANZECC & ARMCANZ 2000) or alternate equivalent guideline.

5.2 Warranting Direct Toxicity Assessment

Performing a DTA usually involves initiating a series of laboratory-based toxicological bioassays that are designed to determine whether or not the effluent is toxic to any of a range of aquatic biota. The DTA of an effluent is both a time-consuming undertaking (at least several weeks) and expensive; hence for a DTA to be warranted there needs to be one or more issues of concern regarding some aspect of the:

- toxicant concentrations;
- discharge characteristics, and

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- aquatic receiving environment.

Each of these aspects of an effluent is addressed below individually, however it must be pointed out that these are by no means separate issues; they are interrelated. An obvious example would be that a salinity concentration of 20 parts per thousand (ppt) would not be considered a toxicant in an estuarine or marine environment, but would be in a freshwater environment.

Toxicant Concentrations

The primary reason for warranting a DTA of an effluent relates directly to the expected or observed concentrations of potential toxicants. There is a need for a DTA of the effluent to be performed when:

- one or more toxicant concentrations in the effluent are shown to exceed the TTVs at the appropriate *Percentage Level of Species Protection* (refer to Section 3.4).

Additionally, a requirement to have a DTA conducted should also be considered when there is a notable lack of measured effluent quality data, such as when the effluent quality data are:

- incomplete;
- based only on:
 - medians, means or 50th percentiles;
 - non-validated modelling outputs, or
 - best available estimations;
- relevant only for a short monitoring period and the quality of the effluent is:
 - likely to experience significant process-based fluctuations, or is
 - seasonally variable and the toxicant data is not representative of seasonality.

Characterising the effluent

In order to determine whether the effluent poses a significant toxicological risk in the receiving environment, the first step is to review the quality characteristics of the effluent. Toxicity or environmental harm could be caused by one or more of the following characteristics:

- physicochemical variables;
- known toxicants, and
- unknown toxicants.

Each of these aspects of an effluent is addressed individually below.

Physicochemical Variables

Although physicochemical variables are not toxicants per se, they may still cause harm to aquatic biota when they occur outside of a certain range or beyond certain limits. The main physicochemical variables that need to be considered when determining if a DTA is warranted are:

- pH (note that ammonia toxicity varies with pH; refer to ANZECC & ARM CANZ 2000);
- temperature;
- dissolved oxygen (DO) concentration/saturation, and
- conductivity/salinity/total dissolved salts
- hardness/total dissolved solids (TDS).

The acceptable ranges or limits for these water quality characteristics can be available for specific water bodies, climatic regions, aquatic environment types, or catchments, and can be available in either State or National publications, or by the private sector (i.e. generated by environmental consultants). Physicochemical variables are generally part of the WQOs and for Queensland, those can be found in the *Queensland Water Quality Guidelines* (QLD EPA 2006).

Known Toxicants

Known toxicants are toxicants that are known to have the potential to harm the health of aquatic receiving environments and are therefore frequently analysed via chemical analysis. The following categories contain the

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names of known toxicants that should be considered when characterising an effluent and where appropriate, example ANZECC & ARM CANZ (2000) TTVs are presented.

Metals & Metalloids

A more complete list of metals and metalloids with the potential to cause toxic effects in aquatic biota is presented in Table 3.4.1 of the ANZECC & ARM CANZ (2000). The most commonly encountered metals and metalloids of concern have been reproduced below (Table 1) for the reader's convenience.

Table 1. Excerpt from Table 3.4.1 in ANZECC 2000 – Toxicity Trigger Values for most Metals & Metalloids at alternative levels of protection.

Values in grey shading are the trigger values applying to typical *slightly-to-moderately* disturbed systems.

Chemical	Toxicity Trigger Values for Freshwater (µg/L)				Toxicity Trigger Values for Marine Water (µg/L)				
	Level of Protection (% species)				Level of Protection (% species)				
	99%	95%	90%	80%	99%	95%	90%	80%	
Metals & Metalloids									
Aluminium pH >6.5	27	55	80	150	ID	ID	ID	ID	
Aluminium pH <6.5	ID	ID	ID	ID	ID	ID	ID	ID	
Arsenic (As III)	1	24	94 ^C	360 ^C	ID	ID	ID	ID	
Arsenic (As V)	0.8	13	42	140 ^C	ID	ID	ID	ID	
Boron	90	370 ^C	680 ^C	1300 ^C	ID	ID	ID	ID	
Cadmium	0.06	0.2	0.4	0.8 ^C	0.7 ^B	5.5 ^{B,C}	14 ^{B,C}	36 ^{B,A}	
Chromium (Cr III)	ID	ID	ID	ID	8*	27*	50*	90*	
Chromium (Cr VI)	0.01	1.0 ^C	6 ^A	40 ^A	0.14	4.4	20 ^C	85 ^C	
Cobalt	ID	ID	ID	ID	0.005	1	14	150 ^C	
Copper	1.0	1.4	1.8 ^C	2.5 ^C	0.3	1.3	3 ^C	8 ^A	
Lead	1.0	3.4	5.6	9.4 ^C	2.2	4.4	6.6 ^C	12 ^C	
Mercury (inorganic)	0.06	0.6	1.9 ^C	5.4 ^A	0.1	0.4 ^C	0.7 ^C	1.4 ^C	
Mercury (methyl)	ID	ID	ID	ID	ID	ID	ID	ID	
Nickel	8	11	13	17 ^C	7	70 ^C	200 ^A	560 ^A	
Selenium (Total)	5	11	18	34	ID	ID	ID	ID	
Silver	0.02	0.05	0.1	0.2 ^C	0.8	1.4	1.8	2.6 ^C	
Zinc	2.4	8.0 ^C	15 ^C	31 ^C	7	15 ^C	23 ^C	43 ^C	

* These figures are provided in the errata for the ANZECC & ARM CANZ (2000) Guidelines (http://www.mincos.gov.au/pdf/anz_water_quality/gfmwq-guidelines-vol1-errata.pdf)

- A Figure may not protect key test species from acute (and chronic) toxicity – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.
- B Chemicals for which possible bioaccumulation and secondary poisoning effects should be considered – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.
- C Figure may not protect key test species from chronic toxicity – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.
- H The figure has been calculated for a Hardness of 30 mg/L CaCO₃ and should be adjusted for site specific hardness – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.
- ID Insufficient data to derive a trigger value – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.

Non-metallic Inorganics

Table 2 is a complete listing of non-metallic inorganic toxicants as per Table 3.4.1 of the ANZECC & ARM CANZ (2000).

Table 2. Excerpt from Table 3.4.1 in ANZECC 2000 – Toxicity Trigger Values for Non-metallic Inorganics at alternative levels of protection.

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Values in grey shading are the trigger values applying to typical *slightly-to-moderately* disturbed systems.

Chemical	Toxicity Trigger Values for Freshwater (µg/L)				Toxicity Trigger Values for Marine Water (µg/L)			
	Level of Protection (% species)				Level of Protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
Non-metallic Inorganics								
Ammonia	320	900 ^C	1430 ^C	2300 ^A	500	910	1200	1700
Chlorine	0.4	3	6 ^A	13 ^A	ID	ID	ID	ID
Cyanide	4	7	11	18	2	4	7	14
Nitrate*	4900	7200	8700 ^C	12000 ^A	ID	ID	ID	ID
Hydrogen Sulfide	0.5	1.0	1.5	2.6	ID	ID	ID	ID

* The TTVs for nitrate are officially under review (refer to ANZECC & ARM CANZ (2000) errata), however the values provided here have been recalculated by prominent Australian toxicologists involved in the writing of the Guideline and are therefore likely to be adopted.

A, B, C, H, ID – Refer to the footnotes to Table 1.

D Ammonia as total ammonia [NH₃-H] at pH 8 – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.

E Chlorine as total chlorine, as [Cl] – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.

F Cyanide as un-ionised HCN, measured as [CN] – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.

G Sulfide as un-ionised H₂S, measured as [S] – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.

J Figures protect against toxicity and do not relate to eutrophication issues – see Table 3.4.1 in ANZECC & ARM CANZ (2000) for more information.

* Note that these figures differ from those in ANZECC & ARM CANZ (2000) due to a subsequent review of the values {{{XXXXXXXXXX}}}

Aromatic Hydrocarbons, Phenols & Xylenols, Organic Sulfur Compounds

If an effluent is shown to contain significant concentrations (i.e. as low as 1-10 µg/L or greater) of aromatic hydrocarbons, phenols, xylenols, organic sulphurous compounds or phthalates, then it may cause harm to an aquatic receiving environment. Table 3 provides some examples.

Table 3. Excerpt from Table 3.4.1 in ANZECC 2000 – Toxicity Trigger Values for some Aromatic Hydrocarbons, Phenols & Xylenols, Organic Sulfurous Compounds and Phthalates.

Values in grey shading are the trigger values applying to typical *slightly-to-moderately* disturbed systems.

Chemical	Toxicity Trigger Values for Freshwater (µg/L)				Toxicity Trigger Values for Marine Water (µg/L)			
	Level of Protection (% species)				Level of Protection (% species)			
	99%	95%	90%	80%	99%	95%	90%	80%
AROMATIC HYDROCARBONS								
Benzene	600	950	1300	2000	500	700	900	1300
<i>o</i> -xylene	200	350	470	640	ID	ID	ID	ID
<i>p</i> -xylene	140	200	250	340	ID	ID	ID	ID
Naphthalene	2.5	16	37	85	50 ^C	70 ^C	90 ^C	120 ^C
Nitrobenzene	230	550	820	1300	ID	ID	ID	ID
Polychlorinated Biphenyls (PCBs) & Dioxins								
Aroclor 1242	B	0.3	0.6	1.0	1.7	ID	ID	ID
Aroclor 1254	B	0.01	0.03	0.07	0.2	ID	ID	ID
PHENOLS & XYLENOLS								
Phenol		85	320	600	1200 ^C	270	400	520
2,4,6-tetrachlorophenol	T,B	3	20	40	95	ID	ID	ID
2,3,4,6-tetrachlorophenol	T,B	10	20	25	30	ID	ID	ID
Pentachlorophenol	T,B	3.6	10	17	27 ^A	11	22	33
ORGANIC SULFUROUS COMPOUNDS								
Carbon Disulfide		ID	ID	ID	ID	ID	ID	ID

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PHTHALATES									
Dimethylphthalate		3000	3700	4300	5100	ID	ID	ID	ID
Dibutylphthalate	B	9.9	26	40.2	64.6	ID	ID	ID	ID

A,B,C,ID – Refer to the footnotes to Table 1.

T Tainting or flavour impairment of fish flesh may occur at lower concentrations – see Table 3.4.1 in (ANZECC & ARMCANZ 2000) for more information.

Pesticides (Insecticides, herbicides, fungicides) and other synthetic organic compounds

If an effluent is shown to contain significant concentrations (i.e. as low as 1-10 µg/L or greater) of aromatic hydrocarbons, phenols, xylenols or sulphurous compounds, then it may cause harm to an aquatic receiving environment. Table 4 provides some examples.

Table 4. Excerpt from Table 3.4.1 in ANZECC 2000 – Toxicity Trigger Values for some Pesticides, Herbicides and Fungicides.

Values in grey shading are the trigger values applying to typical *slightly-to-moderately* disturbed systems.

Chemical	Toxicity Trigger Values for Freshwater (µg/L)				Toxicity Trigger Values for Marine Water (µg/L)				
	Level of Protection (% species)				Level of Protection (% species)				
	99%	95%	90%	80%	99%	95%	90%	80%	
ORGANOCHLORINE PESTICIDES									
Chlordane	0.03	0.08	0.14	0.27 ^C	ID	ID	ID	ID	
Heptachlor	0.01	0.09	0.25	0.7 ^A	ID	ID	ID	ID	
Lindane	0.07	0.2	0.4	1.0 ^A	ID	ID	ID	ID	
ORGANOPHOSPHATE PESTICIDES									
Chlorpyrifos	B	0.00004	0.01	0.11 ^A	1.2 ^A	0.0005	0.009	0.04 ^A	0.3 ^A
Diazinon		0.00003	0.01	0.2 ^A	2 ^A	ID	ID	ID	ID
Dimethoate		0.1	0.15	0.2	0.3	ID	ID	ID	ID
Parathion		0.0007	0.004 ^C	0.01 ^C	0.04 ^A	ID	ID	ID	ID
HERBICIDES & FUNGICIDES									
Atrazine		0.7	13	45 ^C	150 ^C	ID	ID	ID	ID
Diquat		0.01	1.4	10	80 ^A	ID	ID	ID	ID
2,4-D		140	280	450	830	ID	ID	ID	ID
2,4,5-T		3	36	100	290	ID	ID	ID	ID
Glyphosate		370	1200	2000	3600 ^A	ID	ID	ID	ID
Simazine		0.2	3.2	11	35	ID	ID	ID	ID

A,B,C,ID – Refer to the footnotes to Table 1.

Endocrine Disrupting Chemicals

Endocrine Disrupting Chemicals (EDCs) are comprised of many elements and different groups of compounds from a variety of sources, including industrial reagents, and domestic, health and personal care products. Although many are also be toxicants capable of causing lethal effects when they occur at sufficient concentration, at much lower concentrations they are referred to as *micropollutants*. EDCs are believed to cause detrimental effects in biota through disrupting the proper function of glands of the endocrine system. The glands and the hormones they release influence almost every cell, organ, and function in an organism. The endocrine system is instrumental in regulating mood (in humans), growth and development, tissue function, and metabolism, as well as sexual function and reproductive processes. For more information refer to CRC-WQT (2007).

A list of common known EDCs is provided in 0

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Pharmaceuticals

Pharmaceuticals, including veterinary chemicals should be screened for in effluents derived from wastes where hospitals and large-scale livestock operations occur. Some of these compounds have been shown to pass through secondary treatment trains more readily than others. Some of these substances act as EDCs. Please refer to CRC-WQT (2007).

A list of common known pharmaceutical EDCs is provided in 0.

Unknown Toxicants

Unknown toxicants can be of two types; *Known-Unknowns* and *Unknown-Unknowns*. These are explained below.

Known-Unknown Toxicants

Known-Unknown Toxicants are chemicals that are known to be in use and form a component of the effluent, but are unstable and degrade quickly to levels outside the detection capabilities of today's instruments, or there are no chemical analysis procedures or instruments capable of reliably detecting or quantifying them to-date.

Examples of Known-Unknown Toxicants would include undescribed disinfection by-products (making them undetectable in chemical analyses aimed at detecting specific compounds) and anti-scaling agents. Anti-scaling agents (such as orthonophosphates) are routinely used in Reverse Osmosis (RO) treatment of treated sewage effluent and sea water. At the present time there is no reliable method of detecting this group of compounds and their potential for toxicological effect have not yet been fully described; therefore, they are a potential Known-Unknown toxicant.

When Known-Unknown Toxicants are used in treatment processes and suspected to persist at significant concentrations in an effluent, and no readily available scientific literature exists that could be used to estimate the potential risk they pose to the aquatic receiving environment in question, then a DTA would be warranted.

Unknown-Unknown Toxicants

Unknown-Unknown Toxicants are chemicals suspected of being present in some effluent streams but cannot be quantified or detected. Unknown-Unknown Toxicants could be present due to:

- illegal or undeclared substances that either directly or indirectly enter the effluent stream;
- complex mixtures of organic compounds reacting with strong oxidising agents (e.g. chlorine) forming undescribed toxicants, and
- undescribed degradation products of pesticides and other complex substances.

When the effluent is likely to incorporate industrial and/or trade wastes that include chemicals of concern, and when the characteristics of the discharge are likely to match the scenarios presented under Section 0, it may be prudent to recommend that a DTA be performed.

Discharge Characteristics

There may be good reason to order that a DTA of the effluent be performed whenever the proposed effluent is:

- being discharged to an aquatic environment attributed with High Ecological Value (HEV);
- voluminous, and being discharged into a relatively small receiving environment; or
- being discharged without a diffuser into:
 - a moderately to poorly-mixed (medium to low kinetic energy) environment, or
 - a receiving environment with a significantly different density.

Some general information on mixing zones is presented below that will be helpful in determining whether or not adequate mixing is taking place to manage acutely toxic concentrations of contaminants.

Mixing Zone characteristics

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The mixing zone of an effluent discharge is typically defined as the area or zone at which the concentrations of contaminants may be above water quality objectives. This means that the mixing zone could be a different size for different contaminants, depending on the:

- Concentration of the contaminant in the effluent;
- Ambient or baseline concentration of the contaminant; and the
- Water quality objectives for the contaminant.

For instance, if Contaminant A

- is typically present in the effluent at 10 mg/L and
- the water quality objective for that contaminant is 1 mg/L, and background concentrations will be very low, then;
- 10 times dilution would be required for Contaminant A to meet water quality objectives, and that level of dilution would be achieved within;
- Distance X of the discharge point, based on dilution modelling.

For Contaminant B, it:

- is typically present in the effluent at 30 mg/L and;
- the water quality objective for that contaminant is 1 mg/L, and background concentrations will be very low, then;
- 60 times dilution would be required for Contaminant B to meet water quality objectives, and that level of dilution would be achieved within;
- Distance Y of the discharge point, based on dilution modelling.

Note that Distances X and Y should typically be determined using the average dilution scenario (e.g. mean current velocity and tide). A worst-case dilution scenario with low velocity (e.g. 0.05m/s) at low tide should also be determined to check no overlap with other mixing zones or contact with the shore line.

Therefore, Contaminant A and B will mostly likely possess mixing zones of differing dimension. This applies to all contaminants. There are a multitude of factors that will influence the size and extent of a mixing zone and the dilution rate of an effluent, and these should be presented as the input variables and assumptions used in the modelling for the discharge. The validity and applicability of those input variables should be assessed.

(i) Near-field Mixing Zone and Far-field Diffusion

Near-field Mixing Zone occurs in the area within the mixing zone where the most rapid dilution takes place. This area is situated from the point of discharge to a certain distance away from that point, and the mixing is generally driven by the exit velocity of the effluent. Thereafter, where the effluent has lost its exit inertia and has become assimilated with the hydrodynamics of the aquatic receiving environment, a slower dilution-rate (a diffusion-based dilution rate) presides. The **Far-field Diffusion Zone** occurs from the extent of the near-field mixing to a distance where an elevation in the concentration of *any* contaminant from the effluent is no longer detectable from that in the ambient environment.

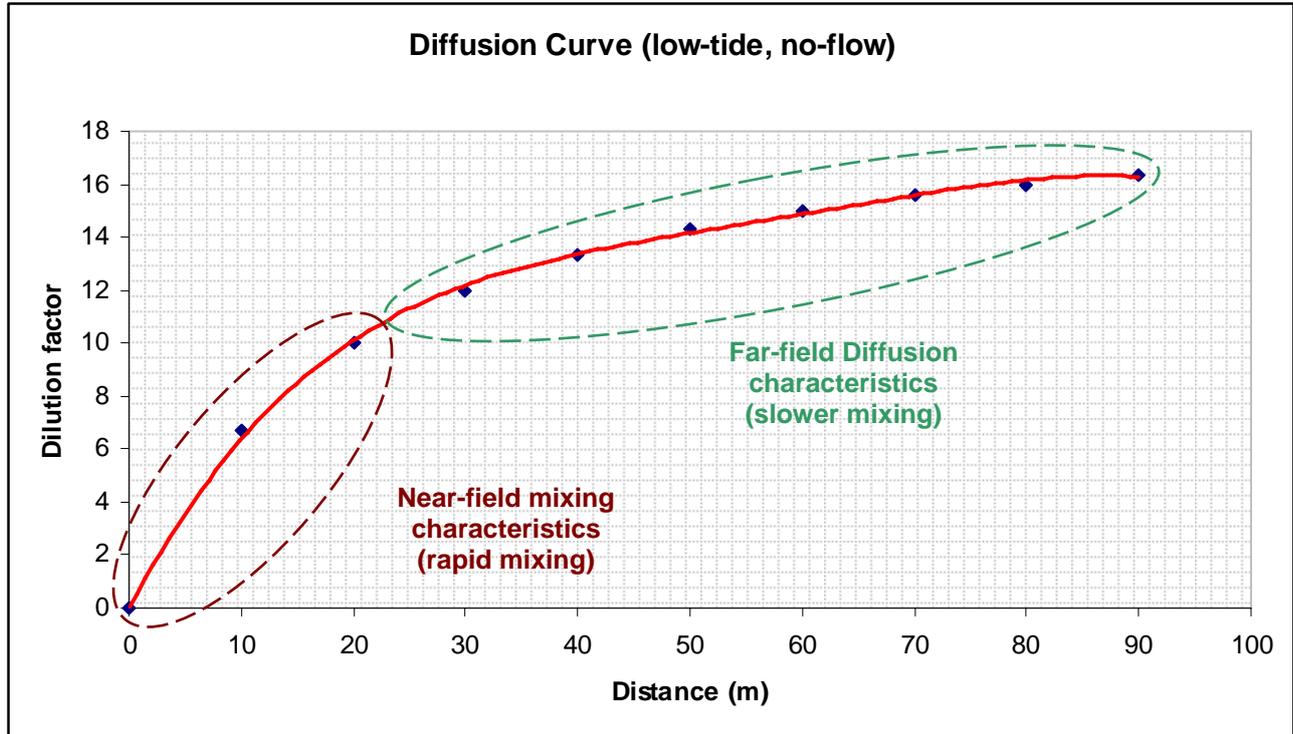


Figure 1. Example Diffusion Curve and related mixing characteristics

Hydrodynamic mixing models can provide estimates of the extent of these areas under differing conditions in the receiving environment, such as no-flow (worst-case), low-flow, and high-flow (best-case) conditions, and dilution curves (see Figure 1) can be produced for each scenario.

The dilution curves coupled with computer modelling of lateral diffusion dynamics are capable of producing a visual representation of the area likely to be affected by the discharge. This area is often described as the *plume* (see Figure 2). Both the near-field mixing zone and far-field diffusion occur within the boundary of the plume.

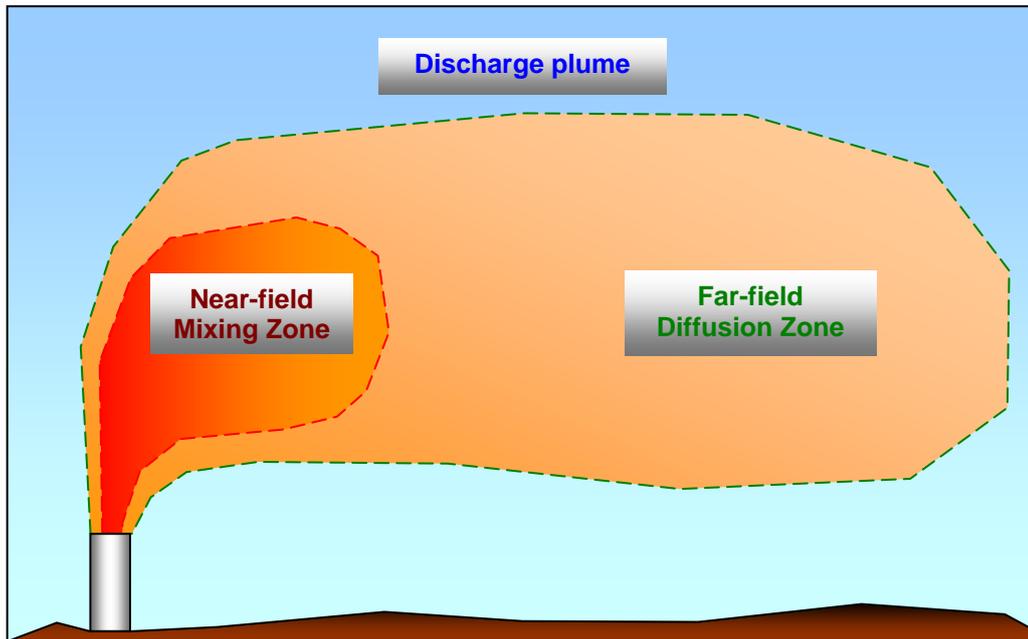


Figure 2. Representative diagram of a Near-field Mixing Zone and Far-field Diffusion.

Toxicity zone mapping can be performed by correlating the diffusion curve with the measured or estimated toxicant concentrations in the discharged effluent, or alternatively, DTA results. This approach can be taken in regards to identifying acute and chronic toxicity zones within the plume; see below (Section 00).

Acute Toxicity and Chronic Toxicity Mixing Zone

In regards to toxicity assessment, the typical mixing zone of an effluent discharge may possess up to two distinct areas relating to toxicity; the:

- acute toxicity zone, and
- chronic toxicity zone.

The ideal situation is where there is neither an acute nor a chronic toxicity zone however this is rarely the case. More typically, there will either be a Chronic Toxicity Zone within the plume (Figure 3 A), or both an Acute and a Chronic Toxicity Zone within the plume (Figure 3 B).

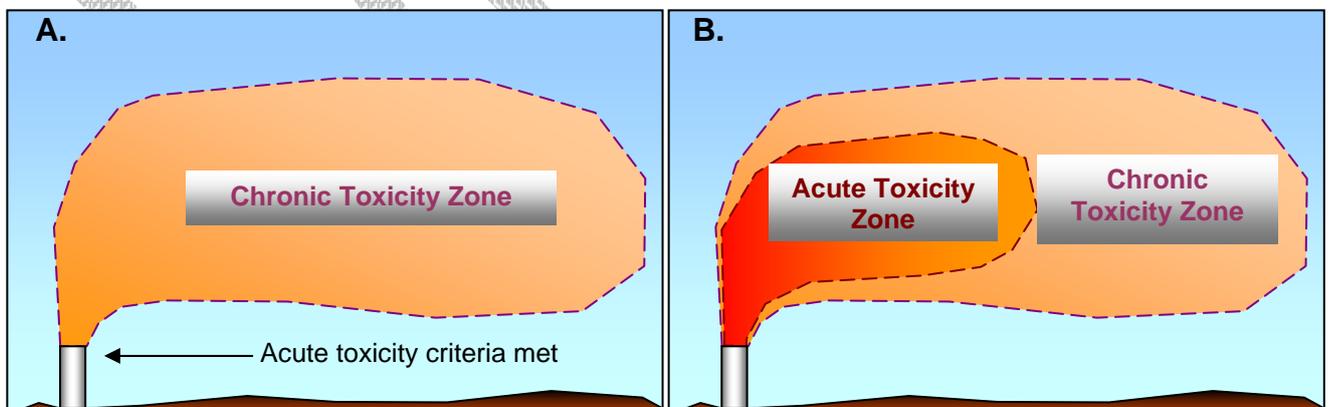


Figure 3. Acute and Chronic Toxicity Zones in a Mixing Zone

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The EPA should always ensure, or negotiate toward, a no Acute Toxicity Zone scenario (see Figure 3 A.). It can be assumed that an acute toxicity zone is absent when all toxicant concentrations are below the acute toxicity criteria (i.e. ANZECC & ARM CANZ (2000) TTVs) at the end-of-pipe. In such a case, only a chronic toxicity zone may be present, and only long-term continuous exposure to these levels of toxicants would be likely to result in any observable adverse effects to the exposed biota.

Unfortunately however, having the effluent meet the (ANZECC & ARM CANZ 2000) TTVs at the end-of-pipe is not always achievable by the proponent. In such cases, the EPA needs to assess the risk posed to the receiving environment by the toxicants in the effluent.

Aquatic Receiving Environment

Effluents are generally discharged to surface waters that can be classified into four categories:

- Freshwaters;
- Brackish waters;
- Estuarine waters, and
- Marine waters.

Considerations that relate to a discharge to each of these environments are discussed below.

Discharges to Freshwaters

Freshwaters are by definition very soft (i.e. water hardness is very low; salinity 0.05-1.0 ppt (ANZECC & ARM CANZ 2000)) and this condition promotes the solubility and consequently the bioavailability of toxicants, especially heavy metals and metalloids. Therefore the same 'total' metal concentrations in freshwater will tend toward being more toxic in freshwater than the same concentration in marine waters (refer to Table 1).

Discharges to Brackish or Estuarine waters

Brackish waters are slightly-to-moderately saline waters (salinity between 0.5 and 30 ppt (ANZECC & ARM CANZ 2000)), often resulting from saline ocean waters mixing with, and being diluted by, freshwater sources, as in estuaries. This variability in salinity normally excludes freshwater species being used as the test specimens in toxicity bioassays, although some freshwater biota can tolerate a certain degree of brackishness.

It is common however that marine species are selected for assessing effluent being discharged into brackish or estuarine waters. This is possible by simply elevating the effluents' salinity to a concentration preferred by the test specimen through the addition of pure salt. Naturally, this approach is not appropriate if it is the toxicity of the salinity itself what is being assessed.

Discharges to Marine waters

Marine waters are saline waters (salinity between 30-40 ppt ANZECC & ARM CANZ (2000)) and the presence of salt generally suppresses the bioavailability of metal and metalloid toxicants. This does not always translate to less toxic effects being observed in marine environments because some marine species can be more susceptible to toxic reactions to specific toxicants than freshwater species (e.g. copper; refer to Table 1).

Only marine species should be selected for DTA of discharges to marine environments.

5.3 Essential Components of the DTA Design

Test-effluent Management

As mentioned in Section 0, the effluent needs to be characterised so that an appropriate DTA can be designed with applicable test specimens that can be used to determine the existence and magnitude of toxicological effects. Other important considerations that may affect the results of a DTA, such as the way the effluent is collected, stored and transported as well as the natural water used for dilutions are discussed in the following subsections.

Effluent Dilution Series

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In order to determine the level of dilution required for an effluent to no longer exhibit observable toxic effect in the test biota, the DTA incorporates a dilution series into the design. The dilution series typically takes the form of serial 1:1 dilutions that result in the following concentrations of effluent:

Table 5. Effluent dilution series

Dilution ratio (parts effluent: parts dilution water)	Resultant Percentage of the original effluent concentration
(undiluted)	100%
1:1	50%
1:3	25%
1:7	12.5%
1:15	6.25%
1:31	3.125%

The most appropriate water that can be utilised for the dilutions would be collected from the actual receiving environment for the proposed discharge (refer to Section 0), otherwise tap water, deionised or demineralised water, artificially manufactured sea water, or some other uncontaminated dilution water would be required.

Normalising for Salinity

When the salinity of the effluent varies significant from the salinity of the receiving waters then there is the potential for an adverse impact on the environment to occur. This can be true for effluents more saline and for effluents less saline than receiving waters; however, the former is by far the more common case and of greater concern due to the potential of the denser brine solution sinking to engulf benthic biota.

In cases such as this, marine or estuarine test specimens should be selected (even for effluents proposed for a freshwater discharge) and the salinity of the effluent artificially increased to match that preferred by the test specimen (refer to {{58 Krassoi, R. 1995}}). In this way, any observable effects due to salinity are negated and the only effects from toxicants remain observable. Even though the test specimen is not representative of the receiving environment, the effects of elevated salinity are taken out of the toxicity equation.

Collection and Use of Effluent and Bulk Natural Water

Certain complications can arise with the bulk collection of natural water for purpose of diluting effluent for DTA. These complications arise due to fluctuations in water quality variables that may occur between the times of collection to the commencement of the bioassays. Critical water quality parameters should be measured in the field (at the time of collection) wherever possible using portable probes and spectrometers; then again prior to the commencement of the bioassay so that any deviation from the field values is documented:

- pH
- Temperature
- Dissolved Oxygen (DO) concentration
- Conductivity (Salinity)
- Ammonia
- Suspended Solids

Where suspended solids (SS) are in high concentration in the receiving environment, it can interfere with observing the test specimens and can be a cause for toxic effects in some test specimens and therefore the bulk water should be allowed to settle or should be filtered. Bulk natural water should also be refrigerated to slow the activity of microbes consuming carbonaceous compounds and dissolved oxygen, and transport times should be kept to a minimum (i.e. use of local laboratories are preferable to interstate arrangements). In all other aspects, bulk natural water should be collected as per the *Water Quality Sampling Manual* (QLD EPA 2008) or the latest issue.

Appropriate End Points

Ideally, a well designed DTA program that is in accordance with the guidelines stipulated in ANZECC & ARMCANZ (2000) must firstly incorporate five test specimens selected from four major taxonomical groups, but

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should also aim to examine multiple toxicological end point types (i.e. acute, sub-lethal and chronic effects) over the varying selected periods of exposure. These concepts are discussed in more detail below.

Acute Effects

Acute effects are observed when the substance(s) being tested causes death or severely incapacitates the organisms to the point where they are unable to maintain normal functions that will lead to certain death in the very near future (e.g. organisms become moribund through their inability to feed themselves, their nervous system has been irreparably damaged, etc.).

These are the most unlikely effects observable in the receiving environment, predominantly because the EPA will regulate the toxicant concentration levels in the discharge as to avoid acute toxicological effects from occurring, but also because biota are unlikely to remain in an inhospitable environment long enough for acute effect to manifest. On the contrary however, some biota are incapable of avoiding or vacating such inhospitable environments before permanent and lethal damage has occurred (e.g. slow-moving or sessile organisms).

Sub-lethal Effects

Sub-lethal effects are observed when a substance being tested causes detrimental effects that will certainly compromise the individual organisms' ability to survive (e.g. through retarding growth and/or development) or the species' ability to persist (i.e. affecting fecundity, gestation or other reproductive success rates).

These effects can be exhibited in an organism later on in life after a larval or early development life stage was exposed to a short-term or pulse exposure to a toxicant, or can be the effect of long-term chronic exposure. This type of effect is more likely to occur in the receiving environment than are acute effects however they are rarely observed due to lack of in-depth monitoring.

Chronic Effects

Chronic effects are observed when the substance causes the organism to be unable to maintain normal biological functions that will lead to certain death in the long-term (e.g. it compromises the organisms' ability to resist disease, causes biochemical changes that affect absorption rate of nutrient through the gut wall, etc.).

These effects are most likely to occur in the receiving environment but due to the lack of routine monitoring associated with effluent discharges, they are rarely observed. Even when the effects of chronic toxicity are observed, it is difficult to identify the specific effluent(s) or source(s) responsible for the observed effect because long-term chronic exposures are difficult to link back to specific point-source discharge(s).

Exposure Times

Toxicological effects are dependant on the concentration of the toxicant versus the time of exposure. To examine the potential short-term and long-term effects that a substance may exhibit on test specimens, short-term exposures (1 hour) and medium-term exposures (96 hours) should be incorporated into the DTA design. Although longer-term exposures (e.g. weeks, months or even years) may exhibit adverse effects on biota in the receiving environment, it is unfeasible to explore these effects within the scope of most DTAs. It may be necessary that a long-term monitoring program be implemented if the circumstances of the discharge warrant continued vigilance (refer to Section 0).

Appropriate Test Specimens

The best DTAs utilise test specimens that are directly relevant to the receiving environment for the discharge, however this may not always be possible for several reasons, including:

- Unavailability of the organism in sufficient numbers to perform the bioassays
- Inability to maintain the organism in the laboratory in a healthy state
- The organisms' relative sensitivity to a toxicant is unknown making its selection dubious
- State laws prohibited its use upon grounds of animal ethics (e.g. vertebrates)

In all other cases the best compromise should be sought. The most important considerations are:

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- the test specimens should:
 - be sensitive to the main toxicant(s) of concern; this may be the case according to:
 - taxa versus toxicant type (e.g. use insect or crustacean macroinvertebrates for organophosphate pesticides),
 - life stage of the test organism (e.g. juveniles may be more sensitive than adults);
 - reasonably or closely relevant to the receiving environment, or
 - a standard test organism (see Section 0)

Acclimatised Species

It may be appropriate to capture and rear local specimens that have acclimatised to local background toxicant concentrations. This may be particularly applicable where background toxicants exceed the ANZECC 2000 TTVs but locally captured organisms don't seem adversely affected.

This approach is more in the realms of scientific research and therefore normally out of the scope of a general DA however if the proponent is willing to wait for the research to be performed and invest the money required then this should be considered by EPA officers.

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Some Standard Test Specimens used in Australia

Table 6. Some generic Direct Toxicity Assessment toxicity bioassays

Organism	Test Type	Test Duration & Effect	Test Endpoint	Substance Tested	Receiving Environment	Sources
Plant						
<i>Selenastrum capricornutum</i> Freshwater micro alga	Laboratory	96 hours chronic	Growth inhibition	WE, chemicals, sediment, leachates, groundwater	Freshwater	USEPA Method 1003.0 OECD Method 201 Stauber 1994b Bailey et al 2000
<i>Lemna gibba</i> <i>Lemna minor</i> Duckweed	Laboratory	4-7 days chronic	Plant growth	WE, chemicals, sediment, leachates, groundwater	Freshwater (incl. turbid waters)	USEPA OPPTS 850.4300 ASTM (1998) OECD Guideline 221
<i>Isocochrysis aff. galbana</i> Marine microalga	Laboratory	72-96 hours chronic	Growth inhibition	WE, chemicals, sediment, leachates, groundwater	Marine	USEPA Method 1003.0 APHA Method 8111 Stauber et al. (1996)
<i>Chlorella protothecoides</i>	Laboratory	72 hours chronic	Cell division rate			
Fish (vertebrate)						
Insect (invertebrate)						
Mollusc (invertebrate)						
<i>Saccostrea commercialis</i> Rock oyster	Laboratory	48 hours chronic	Larval abnormality	WE	Estuarine, marine	Krassoi et al. (1996)
<i>Mimachlamys asperima</i> Doughboy scallop						
Crustacean (invertebrate)						
<i>Ceriodaphnia dubia</i> <i>Ceriodaphnia cf. dubia</i> <i>Daphnia carinata</i> Freshwater water fleas	Laboratory	24-96 hours acute	Juvenile survival	WE, chemicals, sediment, leachates, groundwater	Freshwater	USEPA Method 1003.0 Stauber et al. (1996)
		~7 days chronic	3 rd brood of neonates			

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<i>Daphnia magna</i> Freshwater water flea	Laboratory				Freshwater	
Amphipod (invertebrate)						
<i>Corophium cf. volutator</i> Aquatic amphipod	Laboratory	10 days acute	Juvenile survival, emergence and reburial	Sediment	Freshwater, estuarine, marine	USEPA OPPTS 850.1020
Echinoderm (invertebrate)						
<i>Heliocidaris tuberculata</i> Sea urchin	Laboratory	1 hour acute	Fertilisation success	WE, chemicals, sediment, leachates, groundwater	Estuarine, marine	APHA Method 8810C Simon and Laginestra (1997)
		72 hours chronic	Larval development			APHA Method 8810D Simon and Laginestra (1997)

Region- and Habitat-specific Test Specimens

(ii) Queensland Freshwaters

Table 7. Some Direct Toxicity Assessment toxicity bioassays appropriate for Queensland Freshwaters

Organism	Test Type	Test Duration & Effect	Test Endpoint	Substance Tested	Receiving Environment	Sources
Plant						
<i>Chlorella sp.</i> Green alga	Laboratory	72 hours chronic	Population growth	Cu, herbicides, WE	Lowland streams, floodplains	{{56 Riethmuller, N. 2003;}}
<i>Chlorella sp.</i> (2 tropical species)	Laboratory	48 or 72 hrs chronic	Cell division rate	WE		Franklin et al 1998 Franklin et al (in press)
<i>Ceratophyllum demersum</i> Hornwort	Laboratory	96 hours chronic	Growth inhibition	Cu, herbicides, WE	Lowland streams, floodplains	{{56 Riethmuller, N. 2003;}}
<i>Lemna aequinoctialis sp.</i> Duckweed	Laboratory	4-7 days chronic	Plant growth	Cu, herbicides	Lowland streams, floodplains	{{56 Riethmuller, N. 2003;}}
<i>Monoraphidium arcuatum</i> Tropical green alga	Laboratory	72 hours chronic	Cell division rate	Cu		{{69 Levy, J.L. 2007;}}
Fish (vertebrate)						
<i>Melanotaenia nigrans</i> Black-banded rainbowfish	<i>In-situ</i> / Laboratory	96 hours acute	Larval survival	U, Cu, WE	Escarpment streams, floodplains	eriss notes
<i>Magurnda magurnda</i> Purple-spotted gudgeon	Laboratory	96 hours acute	Larval survival	U, Cu, WE	Upland streams, floodplains	{{56 Riethmuller, N. 2003;}}
Insect (invertebrate)						

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<i>Chironomus crassiforceps</i> Chironomid	Laboratory	5 days chronic	Larval growth	U, Cu	Permanent billabongs, floodplains	eriss notes
Mollusc (invertebrate)						
<i>Amerianna cumingii</i> Freshwater gastropod	<i>In-situ</i>	96 hours chronic	Reproduction, juvenile survival	U, Cu, WE	Permanent billabongs, floodplains	eriss notes
Crustacean (invertebrate)						
<i>Moinodaphnia macleayi</i> Freshwater cladoceran	Laboratory	6 day sub-lethal	Reproduction (3 brood)	U, Cu, HCN, Mn, NO ₃ , Cd, WE	Permanent billabongs	{{56 Riethmuller, N. 2003;}}
		24 hours chronic	Feeding inhibition			
		6 day acute	Survival			
Cnidarian (invertebrate)						
<i>Hydra viridissima</i> Green hydra	Laboratory	96 hours chronic	Population growth	U, Cu, Mg, Na, WE	Permanent billabongs, floodplains	{{56 Riethmuller, N. 2003;}}

Cd – Cadmium
Na – Sodium

Cu – Copper
NO₃ – Nitrite

HCN – Cyanide
U – Uranium

Mg – Magnesium
WE – whole-effluent

Mn – Manganese
WS – whole-sediment

Queensland Brackish Waters

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Queensland Marine Waters

Table 8. Some Direct Toxicity Assessment toxicity bioassays appropriate for Queensland Marine Waters

Organism	Test Type	Test Duration & Effect	Test Endpoint	Substance Tested	Receiving Environment	Sources
Plant						
<i>Nitzschia closterium</i> Marine microalga (diatom)	Laboratory	72-96 hours chronic	Growth inhibition	WE, chemicals, sediment, leachates, groundwater	Marine	USEPA Method 1003.0, APHA Method 8111, Stauber et al. (1996)
<i>Nitzschia closterium</i> (tropical) Marine microalga (diatom)	Laboratory	72 hours chronic	Cell division rate	WE	Marine	{{62 Johnson, H.L. 2007;}}
<i>Phaeodactylum tricoratum</i> Marine microalga (diatom)	Laboratory	72 hours chronic	Cell division rate	WE	Marine	{{63 Franklin, N.M. 2001;}}
<i>Entomoneis cf punctulata</i> microalga (diatom)	Laboratory	72 hours chronic	Cell division rate	WS	Marine	{{64 Adams, M.S. 2004;}}
		24 hour acute	Esterase inhibition			
<i>Dunaliella tertiolecta</i> Green alga	Laboratory	1 hour acute	Enzyme inhibition	WE	Marine	Peterson & Stauber
		72 hour chronic	Cell division rate			{{59 Stauber, J.L. 1994;}}
Fish (vertebrate)						
Insect (invertebrate)						
Mollusc (invertebrate)						
<i>Tellina deltoidalis</i> bivalve	Laboratory	10 days acute	Survival	WS	Estuarine, marine	{{68 Simpson, S.L. 2005;}} Strom/simpson
	Laboratory	4 week chronic	Growth			
<i>Spiculla trigonella</i> Bivalve	Laboratory	10 days acute	Survival	WS	Estuarine, marine	Strom spadaro simpson
Crustacean (invertebrate)						

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<i>Penaeus monodon</i> Tiger prawn	Laboratory	96 hours acute	Juvenile survival	WE	Estuarine, marine	USEPA OPPTS 850.1045
Amphipod (invertebrate)						
<i>Allorchestes compressa</i> Marine amphipod	Laboratory	96 hours acute	Juvenile survival	WE, chemicals, sediment, leachates, groundwater*	Marine	USEPA OPPTS 850.1020
<i>Hyale crassicornis</i>						
<i>Melita spp.</i>						
<i>Melita plumulosa</i> Epibenthic deposit feeder	Laboratory	10 days acute	Survival, growth	WS	Estuarine, marine	{{66 King, C.K. 2006;}}
		6 week chronic	Reproduction			{{67 Gale, S.A. 2006;}}
		13 day chronic	Reproductive index			Hyne et al
Copepod (invertebrate)						
<i>Acartia sinijiensis</i> (tropical) Copepod	Laboratory	48 hours acute	Immobilisation	WE	Marine	{{65 Rose, A. 2006;}}
<i>Nitocra sp.</i> Copepod	Laboratory	7 day chronic	Life cycle (split) 7 day reproduction 7 day development	WE	Marine	?
Cnidarian (invertebrate)						

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Toxicity Identification Evaluation

Once the toxicological bioassays of a DTA are complete and toxic effects have been observed, there may be a need to determine which constituents in the effluent were responsible for those observed effects. The process for this determination is described by a series of procedures published by the USEPA but basically takes the following approach; the following Phase I TIE manipulations of the effluent are performed and then a repeat of the initial DTA is initiated, with subsequent Phase II and Phase III manipulations if required:

- Phase I TIE manipulations:
 - EDTA chelation – removes divalent metal ions (e.g. Cu, Zn, Ag, Hg) to reduce toxicity of the effluent;
 - pH adjustment – ammonia and aluminium toxicity can be reduced significantly by adjusting the effluent of pH;
 - Aeration – oxidisable or volatile toxicants are stripped or converted in the effluent to reduce overall effluent toxicity
 - Sodium thiosulphate – binds oxidative chemicals (such as Cl and Br) and some metals (e.g. Cu) making them unavailable as toxicants;
 - Solid Phase Extraction (SPE) – columns with C18 or C8 resin absorb non- or moderately polar organic chemicals from the effluent;
 - Filtration and centrifugation – removes particulate-bound toxicants;
 - Sublimation and Foam fractionation – removes sublimatable compounds such as surfactants;
 - Piperonyl Butoxide (PBO) addition – affects the action of some metabolically activated pesticides for that their toxicity is reduced or eliminated but may enhance the toxicity of pyrethroids.
- Phase II TIE manipulations:
 - SPE elution pattern – an enhanced version of Phase I SPE extraction;
 - HPLC elution pattern – similar to SPE elution pattern but with higher resolution;
- Phase III TIE manipulations:
 - Confirmation (spiking) study – suspect toxicants are spiked into the sample at double the concentration they exist at in the sample to observe enhanced toxic effect.

Identification of the compound(s) responsible for the observed toxicological effects on DTA test specimens may assist in developing strategies to reduce or remove the toxicants in question from the effluent (through the addition or modification of a treatment step), or be used to support or negate other management options.

5.4 Related Matters

This section deals with when, why and how DTAs should be conditioned into Discharge Licences and what needs to be considered in Receiving Environment Monitoring Programs (REMPs) so that the repercussions of the observations made in DTAs are adequately covered in the monitoring.

Routine DTAs

Where it is considered that there is continuing potential risk for an effluent to cause environmental harm then routine DTAs of the effluent may be required. Routine DTAs can be required:

- On an annual or bi-annual basis, or required at some other regular interval;
- whenever a treatment process change is implemented that is likely to significantly alter the effluent quality;
- whenever the influent quality into a sewage Treatment Plant (STP) for example, or Advanced Water Treatment Plant (AWTP), changes significantly, or
- when new information becomes available that puts into doubt the quality of the effluent so that the EPA can no longer confidently consider the effluent as being non-acutely toxic at the point of release.

An example of such a situation is where a ROC from a STP effluent that is being collected from a sewer catchment with a significant proportion of industrial effluents contributing to the bulk influent. Because of the

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many parties involved with contributing to the STP influent and the high potential for unreported process changes and/or reagent changes to occur, it would be appropriate that there be a requirement that DTA be conducted on the effluent on a regular (routine) basis.

Requirement for Regular DTA

NEGATIONS REGARDING THIS ISSUE ARE IN PROGRESS

Requirement for Irregular or Event-based DTA

NEGATIONS REGARDING THIS ISSUE ARE IN PROGRESS

No Requirement for DTA

NEGATIONS REGARDING THIS ISSUE ARE IN PROGRESS

Receiving Environment Monitoring Programs

Where an existing or proposed discharge is considered to present unknown risk of acute, sub-lethal or chronic toxicological effects for reasons beyond the results of the DTA, then it may be appropriate to condition a biota monitoring component into a Receiving Environment Monitoring Program (REMP). Such reasons would include:

- Effluent diffusion is poor (poor mixing) during certain tidal or other variables (see Section 0);
- Receiving environment is of special significance (e.g. Ramsar wetlands, Wetlands of State Significance, HEV areas, etc.; see Section 0);
- The DTA test specimens:
 - were not directly relevant to the receiving environment (see Section 0), or
 - did not include the taxa that are most sensitive to the toxicant(s) in the effluent, or
- The effluent tested was not truly representative of the long-term discharge.

Biota monitoring can be for an interim period, or indefinite. Generally, an interim period would be a minimum of 2-3 years in duration so that seasonal changes and patterns of subsequent years can be analysed.

5.5 References

- ANZECC & ARMCANZ (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. National Water Quality Management Strategy; Paper No. 4, .
- CRC-WQT. (2007). *Chemicals of Concern in Wastewater Treatment Plant Effluent: State of the Science in Australia*. The Cooperative Research Centre for Water Quality and Treatment, Occasional Paper No. 8.
- QLD EPA (2006). *Queensland Water Quality Guidelines*, Environmental Sciences Division, Queensland Environmental Protection Agency.
- QLD EPA (1999). *Water Quality Sampling Manual*. 3rd Edition.

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5.6 Acronyms and Abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AWTP	Advanced Water Treatment Plant
CRC-WQT	Co-operative Research Centre for Water Quality and Treatment
DA	Development Application
DO	Dissolved Oxygen
DTA	Direct Toxicity Assessment
EC ₅₀	median Effective Concentration for 50% of exposed specimens
EDC	Endocrine Disrupting Chemical
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
eriss	Environmental Research Institute of the Supervising Scientist
EV	Environmental Value
HEV	High Ecological Value
LC ₅₀	median Lethal Concentration for 50% of exposed specimens
mg/L	milligrams per litre
NATA	National Association of Testing Authorities of Australia
OPPTS	Office of Prevention, Pesticides and Toxic Substances
PCB	Poly-Chlorinated Biphenyl
pH	potential (of) Hydrogen
ppt	parts per thousand
QLD EPA	Queensland Environmental Protection Agency
RFI	Request for Further Information
RO	reverse osmosis
ROC	reverse osmosis concentrate
SPE	Solid-phase extraction
SS	Suspended Solids
STP	Sewage Treatment Plant
TDS	Total Dissolved Salts or Total Dissolved Solids
TIE	Toxicity Identification and Evaluation
TTV	Toxicity Trigger Value
µg/L	micrograms per litre
USEPA	United States Environment Protection Agency
WE	Whole effluent
WET(T)	Whole Effluent Toxicity (Testing)
WEMW	Whole effluent mine wastewater
WQO	Water Quality Objective

5.7 Glossary

Acute Toxicity	Acute toxicity is the ability of a substance or mixture of substances to cause lethal effects over a relatively short period of time, usually upon single or pulse exposures.
Aquatic Ecosystem	Any watery environment from small to large, from pond to ocean, in which plants and animals interact with the chemical and physical features of the environment.
Biota	The sum total of the living organisms in any designated area.
Chronic	Lingering or continuing for a long time; often for periods from several weeks to years. Can be used to define either the exposure of an aquatic species or its response to an exposure (effect). Chronic exposure typically includes a biological response of relatively slow progress and long continuance, often affecting a life stage.
Chronic Toxicity	Chronic toxicity is the ability of a substance or mixture of substances to cause harmful effects over an extended period, usually upon repeated or continuous exposure sometimes lasting for a significant proportion of the life of the exposed organism.
Cladoceran	Water flea; zooplankton belonging to the fourth Order of the Branchiopoda, the Cladocera.

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Contaminant	Biological (e.g. bacterial and viral pathogens) and chemical (see Toxicants) introductions capable of producing an adverse response (effect) in a biological system, seriously injuring structure or function or producing death.
Direct Toxicity Assessment	The use of toxicity tests to determine the acute and/or chronic toxicity of waste water discharges or total pollutant loads in receiving waters. (Assesses the toxicity of mixtures of chemicals rather than individual chemicals).
EC₅₀	The concentration of material in water that is estimated to be effective in producing some response in 50% of the test organisms. The EC ₅₀ is usually expressed as a time dependant value (e.g. 24 hour or 96 hour EC ₅₀).
Near-field mixing zone	The Near-field Mixing Zone (or the Initial Mixing Zone) is the area within the mixing zone where the most rapid dilution takes place. This area is situated from the point of discharge to a certain distance away from that point, and the mixing is generally driven by the exit velocity of the effluent.
Far-field Mixing Zone	The Far-field Mixing Zone (or the Absolute Mixing Zone) extends from the end of the Near-field mixing zone to a distance where an elevation in the concentration of <i>any</i> contaminant from the effluent is no longer detectable from that in the ambient environment. It may also be described as where the effluent has lost its exit inertia and has become assimilated with the hydrodynamics of the aquatic receiving environment; therefore a slower dilution-rate (i.e. a diffusion-based dilution rate) prevails.
LC₅₀	The concentration of material in water that is estimated to be effective in producing some lethal response in 50% of the test organisms. The LC ₅₀ is usually expressed as a time dependant value (e.g. 24 hour or 96 hour LC ₅₀).
TIE	Toxicity characterisation procedures involving use of selective chemical manipulations or separations and analyses coupled with toxicity testing to identify specific classes of chemicals and ultimately individual chemicals that are responsible for the toxicity observed in a particular sample.
Total Dissolved Salts	A measure of the inorganic salts dissolved in water. The organic component of the water has been removed via some laboratory technique.
Total Dissolved Solids	A measure of the inorganic salts (and organic compounds) dissolved in water.
Total Metal	The concentration of a metal in an unfiltered sample that is digested in strong nitric acid.
Toxicant	A chemical capable of producing an adverse response (effect) in a biological system at concentrations that might be encountered in the environment, seriously injuring structure and function or producing death. Examples include pesticides, heavy metals and biotoxins (i.e. domoic acid, ciguatoxin and saxitoxins).
Toxicity	The inherent potential or capacity of a material to cause adverse effects in a living organism.
Trigger Values	These are the concentrations (or loads) of the key performance indicators measured for the ecosystem, below which there exists a low risk that adverse biological (ecological) effects will occur. They indicate the risk of impact if exceeded and should 'trigger' some action, either further ecosystem specific investigations or implementation of management/remedial actions.
Water Quality Criteria	Scientific data evaluated to derive the recommended quality of water for various uses.
Whole Effluent Toxicity Testing	The use of toxicity tests to determine the acute and/or chronic toxicity of effluents.

Source: ANZECC & ARMCANZ (2000)

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5.8 Appendices

Endocrine Disrupting Chemicals (Pesticides)

Table 9 lists some commonly used pesticides and industrial chemicals that are known or believed to possess endocrine disrupting qualities. Use this list as a guide to help ascertain which compounds should be included in chemical analyses of wastewater effluents from systems with these activities taking place within the sewage catchment.

Table 9. Examples of known and suspected Agricultural and Industrial Endocrine Disrupting Chemicals

Chemical	Common Uses
Amitrol	Defoliant, a herbicide, photography, plant growth regulation, non-selective weed control
Atrazine	herbicide for weed control in agriculture
Arsenite	Sodium arsenite: Dyes, soap, treating scale diseases; insecticide (termites); antiseptic, topical acaricide, hide preservative, herbicide. Copper Acetoarsenite: Insecticide, wood preservative, larvicide, pigment (particularly for ships and submarines), fungicide, bactericide and molluscicide.
Benzophenone	Fixative for heavy perfumes, manufacture of antihistamines, hypnotics; insecticides.
Benzo(a)pyrene	Petrochemicals combustion by-product.
Bisphenol A	Basic building block of polycarbonate plastic, an intermediate in the manufacture of polymers, epoxy resins, , fungicides, antioxidants, dyes, phenoxy, polysulfone and certain polyester resins, flame retardants and rubber chemicals.
Butylated hydroxyanisole (BHA)	Preservative and antioxidant in fat-containing foods, in edible fats and oils; and in cosmetic formulations.
Cadmium	Heavy metal with widespread use: electroplating, photoelectric cells, soft solder and solder for aluminium; deoxidizer in Ni plating, Ni-Cd storage batteries; process engraving, electrodes for cadmium vapour lamps, photometry of ultraviolet sun-rays. The powder is also used as an amalgam (1 Cd: 4 Hg) in dentistry. Cadmium chloride: photography, paints, pigments, glass, glazes, electronic components, nemotocide, pesticide and a fungicide, dyeing and calico printing, in the manufacture of cadmium yellow, galvanoplasty, manufacture of special mirrors, ice-nucleating agent, lubricant, in analysis of sulfides to absorb hydrogen sulfide, polymerization catalyst. Cadmium oxide: electroplating, storage battery electrodes, catalyst, semi-conductors, silver alloys, ceramic glazes, nematocide, anthelminic, phosphors, glass, cadmium electroplating, and an aracaricide in pigs.
Dithiocarbamate	Sodium Diethyldithiocarbamate: pesticide, fungicide, chelating agent. It is used in the evaluation of T-cell deficient diseases, in the inhibition of superoxide dismutase in mice and of cisplatin nephrotoxicity in rats, in AIDS-related complex, in immunopharmacology and in cancer immunotherapy. It has clinical use in acute nickel carbonyl, cadmium and thallium poisoning. It is used in colorimetric determination of small quantities of copper and for its separation from other metals. It is also used as a latex accelerator in rubber processing and as a chemical intermediate in the production of other diethyldithiocarbamate metal salts, such as zinc selenium and tellurium salts. Sodium Dimethyldothiocarbamate: fungicide; corrosion inhibitor; rubber accelerator; intermediate; polymerization shortstop; nematocide and herbicide with a fumigant action. Lead Dimethyldothiocarbamate: vulcanization accelerator.

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DDT	One of the 12 POPs listed by the Stockholm Convention on Persistent Organic Pollutants, DDT's allowed use is now restricted to disease vector control, specifically to kill mosquitoes spreading malaria in the developing world.
p, p'-DDE	One of the principal metabolites (breakdown products) of DDT
Dieldrin	Usage banned by the Stockholm Convention on Persistent Organic Pollutants. A non-systemic, persistent organic insecticide with contact and stomach action.
Endosulfan	Insecticide; pesticide. Very widespread modern use.
Ethylene thiourea	Polymer vulcanizing and curing agent, accelerator in curing polychloroprene (neoprene) and other elastomers. It is also used in electroplating baths, as an intermediate for anti-oxidants, in insecticides, dyes, pharmaceuticals and synthetic resins.
Furans	Usage banned by the Stockholm Convention on Persistent Organic Pollutants. Combustion by-products of combustion of organochlorine chemicals, furans have also been used as intermediates in the preparation of pharmaceuticals, insecticides, resins and in the formation of lacquers.
Heptachlor	Usage banned by the Stockholm Convention on Persistent Organic Pollutants. Heptachlor was used for control of the cotton boll weevil, termites, ants, grasshoppers, cutworms, maggots, thrips, wireworms, flies, mosquitoes, soil insects, household insects and field insects. It has some fumigant action, and was applied as a soil treatment, a seed treatment or directly to foliage.
Kepone	Used as an insecticide, fungicide, pesticide for control of the banana root borer and tobacco wireworm and bait for control of ants and cockroaches.
Lindane	Banned in many (but not all) countries; a pesticide to control lice and other ectoparasites, a foliar spray and soil application for insecticidal control of a broad spectrum of phytophagous and soil dwelling insects, animal ectoparasites and public health pests. It is used on ornamentals, fruit trees, nut trees, vegetables, tobacco and timber. This chemical is found in baits and seed treatments for rodent control. In pet shampoo it kill ticks, lice and sarcoptic mange mites.
Malathion	Insecticide on fruits, vegetables, ornamentals, household and livestock use, an acaricide, control of flies and other insect pests in animal and poultry houses, adult mosquitoes in public health programs, human body and head lice and in flea and tick dips. It is used in veterinary medicine as an ectoparasiticide.
Methoxychlor	Insecticide for a wide range of insect pests (particularly chewing insects) in field crops, forage crops, fruit, vines, flowers, vegetables, and in forestry, in animal houses and dairies, in household and industrial premises and in veterinary medicine as an ectoparasiticide.
Mirex	Usage banned by the Stockholm Convention on Persistent Organic Pollutants. Insecticide, pesticide, flame retardant for plastics, rubber, paint, paper and electrical goods; in antifouling paints, rodenticides and additives for antioxidant and flame retardant mixtures for stabilized polymer compositions, ablative compositions, anthelmintic compositions and lubricant compositions. Applied in paper, paint, rubber, electrical, adhesive and textile applications; also used in thermoplastic, thermosetting and elastomeric resin systems.
Nitrofen	Herbicide used on many vegetables, broad-leafed and grass weeds, cereals, rice, sugar beet, some ornamentals, broccoli, cauliflower, cabbage, brussel sprouts, onions, garlic, celery, roses and chrysanthemums.
Pentachlorophenol	Insecticide for termite control, pre-harvest defoliant, general herbicide, wood preservative, synthesis of pentachlorophenyl esters, molluscicide, fungicide, bactericide, anti-mildew agent, slimicide and algacide. The technical material finds extensive use in cooling towers of electric plants, as additives to adhesives based on starch and vegetable and animal protein, in shingles, roof tiles, brick walls, concrete blocks, insulation, pipe sealant compounds, photographic solutions, and textiles and in drilling mud in the petroleum industry.
Pentachloronitrobenzene	Fungicide for seed and soil treatment, herbicide, in slime prevention in industrial waters and to control damping off and other fungal infections.
Phenol, 4-tert-Butyl	Intermediate in the manufacture of varnish and lacquer resins, soap antioxidant;

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	ingredient in de-emulsifiers for oil field use and motor oil.
Phthalates	<p>Butyl benzyl phthalate (BBP) resins: solvent and a fixative in perfume.</p> <p>Di-n-butyl phthalate (DBP): plasticisers, cosmetics, safety glass, insecticides, printing inks, paper coatings, adhesives, elastomers and explosives; as a solvent in polysulfide dental impression materials, solvent for perfume oils, perfume fixative, textile lubricating agent and solid rocket propellant.</p> <p>Di-ethylhexylphthalate (DEHP): vacuum pumps; as a plasticizer for polyvinyl chloride (PVC) for medical devices, resins and elastomers. Solvent in erasable ink and dielectric fluid. Acaricide in orchards, an inert ingredient in pesticides, a detector for leaks in respirators, testing of air filtration systems and component in cosmetic products.</p> <p>Di-n-pentyl phthalate (DPP): plasticizer for nitrocellulose and resin lacquers; anti-foaming agent in the manufacture of glue; in rubber cements.</p>
Thiram	Fungicide, bacteriostat, pesticide, rubber vulcanization accelerator, scarabicide, seed disinfectant, animal repellent, insecticide, lube oil additive, and wood preservative. Anti-septic sprays, lubricant oils. It is used against Botrytis, rusts and downy mildews and as a seed dressing against "damping off" and verticillium wilt. It is also used as an ethanol antagonist and deterrent in mixtures of the methyl, ethyl, propyl and butyl derivatives. Antioxidant in polyolefin plastics and a peptizing agent in polysulphide elastomers. Soaps and rodent repellents and as a nut, fruit and mushroom disinfectant.
Toxaphene	Usage banned by the Stockholm Convention on Persistent Organic Pollutants. Insecticide and pesticide. It was used on cotton crops, cattle, swine, soybeans, corn, wheat, peanuts, lettuce, tomatoes, grains, vegetables, fruit and other food crops; for control of animal ectoparasites, grasshoppers, army-worms, cutworms and all major cotton pests. It controls livestock pests such as flies, lice, ticks, scab mites and mange. It also controls mosquito larvae, leaf miners, bagworms, church bugs, yellow jackets and caterpillars.
Trifluralin	Pre-emergence herbicide, especially for cotton plants.
Zineb	Agricultural fungicide; insecticide.
Ziram	Fungicide and repellent to birds and rodents. Rubber vulcanization accelerator. Adhesives including those used in food packaging, paper coats for non-food contact, industrial cooling water, latex-coated articles, neoprene, paper and paperboard, plastics (polyethylene and polystyrene) and textiles.

Source: <http://www.ourstolenfuture.org/Basics/chemuses.htm>

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Endocrine Disrupting Chemicals (Pharmaceuticals)

Table 10. Example known and suspected Pharmaceutical Endocrine Disrupting Chemicals

Aspirin	Analgesic
Bacitracin	Antibiotic
Carbamazepine	Antiepileptic
Chloramphenicol	Antibiotic
Ciprofloxacin ¹	Antibiotic
Clofibrate	Lipid regulator
Clofibric Acid	Lipid regulator
Enrofloxacin ²	Antibiotic
Erythromycin	Antibiotic
Fluoxetine HCl	Antidepressant
Fluvoxamine	Antidepressant
Ibuprofen	Analgesic/Anti-inflammatory
Lincomycin ^{1,2}	Antibiotic
Naladixic acid ²	Antibiotic
Naproxen sodium	Analgesic/Anti-inflammatory
Norfloxacin ²	Antibiotic
Oleandomycin ²	Antibiotic
Oxytetracycline	Antibiotic
Paracetamol	Analgesic
Paroxetine HCl	Antidepressant
Roxithromycin ²	Antibiotic
Salicylic Acid	Topical keratolytic
Sulfamethoxazole ¹	Antibiotic
Sulfamethazine	Antibiotic
Tetracycline	Antibiotic
Triclosan	Antibacterial
Trimethoprim ^{1,2}	Antibiotic
Tylosin ²	Antibiotic

Source: CRC-WQT (2007)

1 Detected in STP and AWTP effluent {{57 Watkinson, A.J. 2007;}}

2 Detected in AWTP product water {{57 Watkinson, A.J. 2007;}}

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This procedural guide informs the EPA Operational Policy Waste water discharge to Queensland water. It provides specific technical information that may assist EPA officers undertaking water quality assessment for strategic planning purposes or when considering development applications or environmental authority applications under the Environmental Protection Act 1994, Environmental Protection (Water) Policy 1997, Integrated Planning Act 1997 and State Development and Public Works Organisation Act 1971.

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**Note this is a draft document for internal EPA purposes only.
 It is not Government policy.**

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Preamble

The purpose of the *Environmental Protection (Water) Policy 1997* (the EPP Water) is to achieve the protection of Queensland's water environment (surface tidal and non-tidal waters, groundwaters, lakes and wetlands) whilst allowing for development that is ecologically sustainable. The purpose is achieved by:

- a) identifying environmental values (EVs) for Queensland waters;
- b) deciding and stating water quality guidelines and objectives to enhance or protect the EVs – (ensuring healthy aquatic ecosystems and their ability to support human uses);
- c) making consistent and equitable decisions about Queensland waters that promote efficient use of resources and best practice environmental management; and
- d) involving the community through consultation and education, and promoting community responsibility.

The EVs for a water are protected if the measures for all indicators do not exceed the water quality objectives for the indicators.

1. Initial assessment of proposed activity

This Section informs Sections 2.1 and 2.4 of the Operational Policy

The initial assessment of the proposed activity should consider the industry type, materials used in processing, content and fate of waste streams and disposal options, reuse, recycling and re-treatment proposals, mass balance and water budget information, likely contaminants discharged in waste water to land or waters (including contaminated stormwater) and likely receiving water ecological and human health indicators potentially impacted by the waste water discharge. The waste management hierarchy for prioritising waste management practices under the EPP Water is at the Attachment to Section 1. Information that characterises the proposed waste water release should be included in applications seeking to discharge waste water to waters or land. Summary information is also at the Attachment to Section 1.

Particular industries and Environmentally Relevant Activities (ERAs) are associated with classes of aquatic ecosystem contaminants, e.g. waste water treatment plants and nutrients. The [National Pollutant Inventory emission estimation technique manuals](#) list 90 priority substances on the basis of health and environmental risk, by industry sector, and the [USA EPA Toxic Release Inventory](#) lists 313 priority substances. These inventories may assist in determining the likely waste water contaminants that may be associated with specific industry sectors or ERAs, and any potential issues with release to the environment (land or water).

The Modelling and Monitoring Assessment Decision Support System, refer Section 4.1, may also assist in identifying potential contaminants resulting from point or diffuse source emissions from specific industry sectors. The decision support tool includes relevant indicators and stressors and can be requested from water.tools@epa.qld.gov. Further information is at <http://www.coastal.crc.org.au/3m/>.

The e-Guides, refer Section 4.1, search facility includes links to all ANZECC Guidelines and may also assist in characterizing waste water toxicants that may be associated with specific industry sectors or ERAs. E-Guides are also available on request through water.tools@epa.qld.gov.

Attachment to Section 1

A. Waste management evaluation procedure

Figure 1 depicts the decision preference hierarchy in order to maximise the resource usage and minimise the impact on the EVs of the receiving waters under the EPP Water waste management evaluation procedure,

Decreasing order of preference

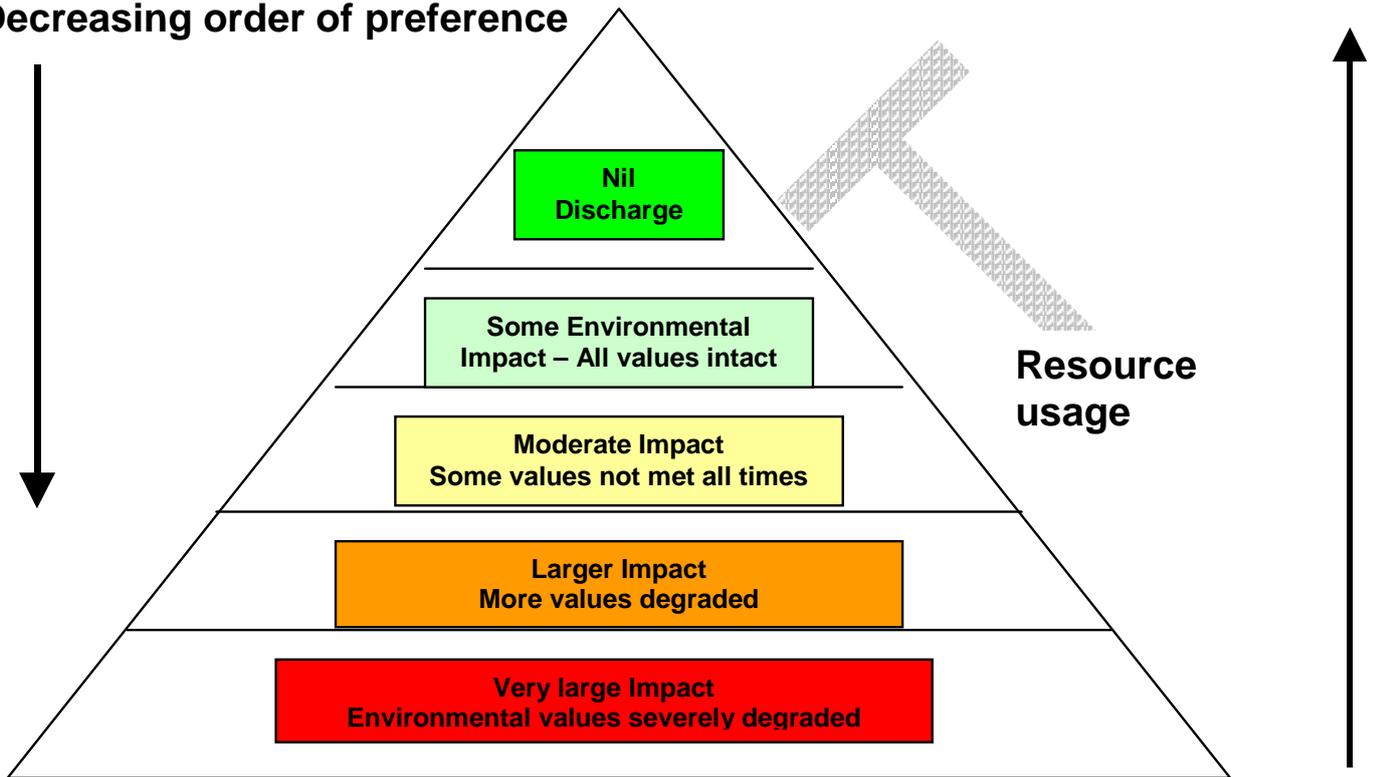


Figure 1. Decision preference hierarchy

Steps under the waste management evaluation procedure include:

Waste avoidance - Preventing the generation of waste water or reducing the amount of waste water generated.

Examples of practices for achieving avoidance include:

- input substitution;
- increased efficiency in the use of raw materials, energy, water or land;
- process redesign;
- product redesign;
- improved maintenance and operation of equipment; and
- closed-loop recycling.

Waste water re-use

Examples include:

- applying waste water to land in a way that gives agricultural and ecological benefits; and
- substituting waste water for potable water as input to a production process.

Waste recycling - Treating waste water that is no longer useable in its present form and using it to produce new products.

Energy recovery from waste - Recovering and using energy generated from waste.

Waste disposal - Disposing of waste water, or treating and disposing of waste water in a way that causes the least harm to the environment.

Examples of treatment before disposal include:

- employing a bio-treatment;
- employing a physico-chemical treatment (e.g., evaporation, drying, calcination, catalytic processing, neutralisation or precipitation); and
- blending or mixing waste to obtain a compound or mixture;

Examples of disposal include:

- disposal to storage dams.

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B. Waste water assessment - contaminants, re-use, recycling, treatment and release, monitoring information

The following information should be included in applications involving waste water release to waters or land:

- source(s) of waste water;
- the key waste water contaminants released under steady state conditions, by concentration and load for key indicators. Identification of any toxicity concerns from the initial assessment and the inclusion of any screening results from direct toxicity assessment;
- the waste water avoidance measures incorporated in the process design and the waste water re-use, recycling and treatment proposals. The waste water disposal options considered prior to the final design should be included -- please attach diagram(s) of the treatment plant or process;
- quantitative comparisons of the above waste management measures with best practice environmental management for the activity;
- the proposed average, maximum and minimum daily and weekly volumes to be discharged, and maximum hourly discharge rate;
- the proposed times of discharge (and whether continuous or intermittent), wet weather and dry weather flow variation;
- the proposed diffuser details and the stated tidal or flow conditions of the waste water release;
- the facilities for measuring the volume or rate of discharge and for waste water discharge monitoring. List the proposed monitoring frequency and the indicators to be monitored;
- the name of the waters proposed to receive the waste water discharge and a plan or map showing the spatial location and latitude and longitude of the discharge outfall;
- the proposed impact monitoring program on the effect on the receiving environment (water or land) of the waste water release, specifying the proposed location of monitoring points (relative to the coordinates of the discharge outfall), the frequency of monitoring and the indicators to be monitored;
- the results of any investigations into the effects of waste waters discharged to land or receiving waters (please attach reports); and
- investigations assessing pre-development groundwater contamination should be in accordance with http://www.ephc.gov.au/pdf/cs/cs_01_inv_levels.pdf and http://www.ephc.gov.au/pdf/cs/cs_06_groundwater.pdf.

2. Receiving waters assessment – character, resilience and values of the receiving environment

This Section informs Sections 2.2, 2.3 and Section 3 of the Operational Policy

2.1 What EVs and WQOs and levels of aquatic ecosystems protection apply?

Environmental values (EVs) for waters

The EVs of waters to be enhanced or protected are listed in the documents in Schedule 1 of the EPP Water. For waters not listed in Schedule 1, the EVs are in the *Queensland Water Quality Guidelines 2006* (the QWQGs).

Water quality objectives (WQOs) - to protect or enhance the EVs for waters

The WQOs for a water are contained in the documents listed in Schedule 1. For waters not listed in Schedule 1, the WQOs are the set of water quality guidelines from the QWQGs and the Australian *Water Quality Guidelines for Fresh and Marine Waters 2001* for all indicators that will protect all EVs for the water.

Where do I find the information?

- For waters that are listed in Schedule 1 of the EPP Water the EVs and WQOs are available from the [EPA website](#). The Schedule 1 documents for the water include the EVs and WQOs for different water types (upland and lowland freshwaters, upper, mid and lower estuarine waters, enclosed and open coastal waters, wetlands, lakes and reservoirs), the levels of aquatic ecosystems protection (HEV, SMD or HD) and river basin/sub-basin plans in jpeg format. Alternatively CD copies are available on request by emailing EPA.EV@epa.qld.gov.au, calling the free-call 1800 177 291 or contacting the local EPA office.
- For waters **that are not listed** in Schedule 1 of the EPP Water the [Queensland Water Quality Guidelines](#) provide EVs and WQOs for all other water types (see above) for Queensland regions/sub-regions. The default level of aquatic ecosystems protection is slightly to moderately disturbed. Both CD and printed copies are available on request as advised above. Note that the [ANZECC Water quality guidelines for fresh and marine water quality](#) provide concentration levels for indicators not included in the Queensland Water Quality Guidelines (for example, toxicants.). Other guidelines may also be relevant (for example food standards and recreation), see below and Section 4.1.
- **Water quality guidelines are also available on-line through e-Guides**, refer Section 4.1. The current version contains:
 - ANZECC 2000 Water Quality Guidelines;
 - ANZECC 2000 Monitoring & Reporting Guidelines;
 - NHMRC 2005 Recreational Guidelines;
 - Queensland Water Quality Guidelines; and
 - Coastal CRC Users' Guide to Indicators for Monitoring.

Users can select the document that they would like to manually browse, or select the 'search' tab to search all the guides for key words. The searched items can be viewed, copied to another document or printed out for later reference. E-Guides are available on request from water.tools@epa.qld.gov.au.

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Spatial datasets and metadata are available for:

- EPA staff through *Ecomaps* - Environment and Conservation category. Schedule 1 documents are available through the EPA Intranet system ROBIN (Fast find/EVs) or the QWQGs (link above);
- EPA GIS staff through Enterprise GIS ('O' drive). Schedule 1 documents as above;
- Other State Government Departments and Local Governments may access spatial data through the Queensland Government *Infolink*, accessible through the *GovNet* homepage at <http://wwwhost.env.qld.gov.au/HomePage/GovNet.htm>. Schedule 1 documents for the specific waters are available through the EPA website or the QWQGs (link above); and
- Consultants, stakeholders and members of the public, CD copies containing the spatial datasets, metadata and the EPP Water Schedule 1 documents are available on request through the EPA Environmental Information Systems Unit, by email from data.coordinator@epa.qld.gov.au or by telephone (07) 3227 6447.

Notes

1. The EPA has developed Queensland water quality guidelines (QWQGs) based on the ANZECC scientific principles and management protocols. The QWQGs are:

- based on data collected from un-impacted Queensland reference sites, that are listed in Appendix F (by region, site name and location (latitude and longitude.)) The QWQGs are derived from the 20th and 80th percentiles of the reference sites' data--the 80th percentiles are used where high values of an indicator cause problems (e.g. nutrients or chlorophyll-a), the 20th percentiles where low values cause problems (Secchi depth) and both the 20th and 80th percentiles where high or low values could cause problems (pH and DO);
- given for different water types, to the limit of Queensland waters (three nautical miles). Water types include open and enclosed coastal waters, lower, mid and upper estuarine waters, lowland and upland fresh or riverine waters, freshwater lakes and reservoirs, wetlands and groundwaters; and
- based on geographic regions and subregions (river basins, sub-basins and localised guidelines) for southern, central and northern Queensland watersheds east of the Great Dividing Range.

2. The level of protection (for aquatic ecosystems) means the level of aquatic ecosystem condition that the water quality objectives for that water are intended to achieve. The stated levels of aquatic ecosystem protection are:

- Level 1 - High ecological value (HEV)— effectively unmodified or highly valued aquatic ecosystems;
- Level 2 - Slightly to moderately disturbed (SMD) — aquatic ecosystems in which biological diversity has been adversely affected by human activity to a relatively small but measurable degree; and
- Level 3 - Highly disturbed (HD) — measurably degraded aquatic ecosystems of lower ecological value.

2.2 Receiving water quality information sources

Water quality information:

- informs strategic planning and development assessment - assessing current condition and trends in water quality;
- provides raw data to a range of client groups and the general public;
- informs the spatial and temporal variability that provides a basis for assessing compliance with the EPP Water and the Queensland Water Quality Guidelines;
- informs the development of reference values for Queensland waters; and
- informs regional environmental monitoring programs e.g. the SEQ Ecological Health Monitoring Program, and State of Environment reporting.

Water quality information sources include:

The **Queensland waterways database** contains current and historic water quality information from the EPA water quality monitoring program. The database includes monthly monitoring from more than 500 (mostly estuarine) sites across Queensland. View a [map of the sites monitored in Queensland](#) and click on the area or catchment of interest.

What indicators of water quality are monitored?

Brief indicator descriptions, sampling and determination methods can be [viewed here](#). The range of water quality indicators include:

- physico-chemical indicators (temperature, [pH](#), [conductivity](#), [dissolved oxygen](#), [turbidity](#));
- [chlorophyll-a](#), [suspended solids](#), [nutrient concentrations](#); and
- [sediment metal](#) concentrations, plankton samples and [faecal coliform](#) (bacteriological) counts.

How do I access water quality monitoring data and published information?

Download published water quality reports and brochures from the website [publications](#) page.

For access to the water quality monitoring data please contact the EPA Environmental Sciences Division, Freshwater and Marine Sciences, by emailing water.data@epa.qld.gov.au or telephone 3896 9250. Further information can be obtained at

http://www.epa.qld.gov.au/environmental_management/water/water_quality_monitoring

Other sources of water quality information include State and Commonwealth agencies, Local Governments, Queensland Port Authorities, Regional NRM Bodies and industry. Additionally Universities (particularly the University of Queensland, Griffith University, Central Queensland University and James Cook University of North Queensland), the Australian Institute of Marine Science, the CSIRO Division of Land and Water and the SEQ Healthywaterways Partnership conduct research projects that may inform water quality assessment.

Specific information sources include:

- [Department of Natural Resources and Water](#) (NRW) which collects, manages and delivers data on the quantity and quality of fresh water in the State's rivers and aquifers. NRW operates and maintains networks across the State to monitor:
 - quantity and [quality of surface water](#);

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- [groundwater quantity](#) and [groundwater quality](#); and
- sediment transport and aquatic ecology.

Data access is via NRW website the Stream Gauging Stations Index using [stream name](#), or [gauging station number](#). The water monitoring program operates under a certified quality management system at [Water monitoring data collection standards](#). The validated field data is entered into easy access databases using formats specified in the [Water monitoring data reporting standards](#).

- [NRW State of Rivers](#) projects provide 'snapshots' of the ecological and physical condition of Queensland riverine systems. Survey information for specific rivers is at [State of the Rivers report](#). Condition ratings include riparian vegetation condition, aquatic vegetation and habitat condition, recreational and conservation value.
- [Local Governments](#) throughout Queensland which conduct water quality monitoring programs, including recreational (biological) monitoring.
- [Great Barrier Reef Marine Park Authority](#) which conducts lower estuarine and coastal water quality monitoring.
- Regional Environment Monitoring Programs (REMPs) that are supported collaboratively by State and local government and industry in parts of the State; including Trinity Inlet, SEQ/Moreton Bay, Cleveland Bay, the Great Barrier Reef and Port Curtis. In some cases development conditions related to receiving waters monitoring may be addressed by applicants by contributing to such REMPs.
- OzCoast website which includes an estuary database and information on coastal indicators that can be accessed at <http://www.ozcoasts.org.au/>.
- Water Quality Online website which includes products developed as part of the *National Action Plan for Salinity and Water Quality*. It includes water quality assessment tools that can be accessed at <http://www.wqonline.info>.
- Ports Corporation Queensland undertakes water quality monitoring at each of its ports to assess trends in water quality parameters over time. The current program of water quality monitoring commenced in mid-2004 and the links below provide a summary of the results obtained to date. Each file contains a map of the sampling area and locations, as well as the sampling results from; [Abbot Point/Bowen](#). [Lucinda](#). [Mourilyan](#). [Thursday Island](#). [Weipa](#).
- Other information sources include the Department of Primary Industries and Fisheries (declared fish habitat areas under the *Fisheries Act 1994*, mangroves and seagrass mapping), Sunwater, SEQ Water and other water authorities throughout the State.

For further information please search the respective websites or contact the organisations.

2.3 Assessing water quality – for DA and strategic planning

Comparison of ambient or receiving water quality data from site monitoring programs or test data should be made with the WQOs for the waters under the EPP Water, either listed under Schedule 1 or from the QWQGs/ANZECC.

Compliance with the WQOs for all indicators from the Schedule 1 documents for the specific waters (and water types) is assessed by comparing the annual median value for each indicator and site with the WQOs for the water - at the stated level of aquatic ecosystems protection.

In the second case compliance is assessed by comparison with the water quality objectives from the QWQGs/ANZECC for relevant regions/subregions/catchment level information. Compliance is assessed for all indicators by comparing the annual median value for each indicator, by site and water type against the QWQGs/ANZECC guideline values.

In both assessment cases the level of level of aquatic ecosystem condition that the water quality objectives for that water are intended to achieve should be determined from either the Schedule 1 document for the waters, or from the QWQGs in conjunction with planning designations for impacted or downstream waters (e.g. marine park/national park, fish habitat areas, significant wetlands (Ramsar/Directory of Important Wetlands etc.))

Assessment of sample or test data against the WQOs for the waters

Median, 20th and 80th percentile values for each indicator at each sample site, or test data from model predictions, are compared with the WQOs as follows:

- If the median value of the sample or test data falls within the water quality objectives (less than the WQOs for nutrients, suspended solids, turbidity or chlorophyll-a; greater than the WQO for Secchi depth; less than the maximum and greater than the minimum for pH and dissolved oxygen), the water quality objectives are met and the waters are ecologically healthy; or
- If the median value of the sample or test data is not within the water quality objectives, but the 20th or 80th percentile is within the water quality objectives (20th percentile less than the WQO for nutrients, suspended solids, turbidity or chlorophyll-a; 80th percentile greater than the guideline for Secchi depth; 20th percentile less than the maximum guideline or 80th percentile greater than the minimum guideline for pH and dissolved oxygen), the waters are slightly/moderately impacted (SMD waters) with some signs of poor ecological health; or
- If both the median value of the sample or test data and 20th or 80th percentile values fall outside the water quality objectives (20th percentile greater than the WQO for nutrients, suspended solids, turbidity or chlorophyll-a; 80th percentile less than the guideline for Secchi depth; 20th percentile greater than maximum or 80th percentile less than minimum for pH/dissolved oxygen), the water quality objectives are not met and the waters are moderately/heavily impacted (HD waters).

Compliance can be assessed by producing box plots of the sample or test data (using the median values, the 20th and 80th percentiles and the highest and lowest values (not outliers) for comparison with the WQOs for the waters. Refer to Figure 2 below.

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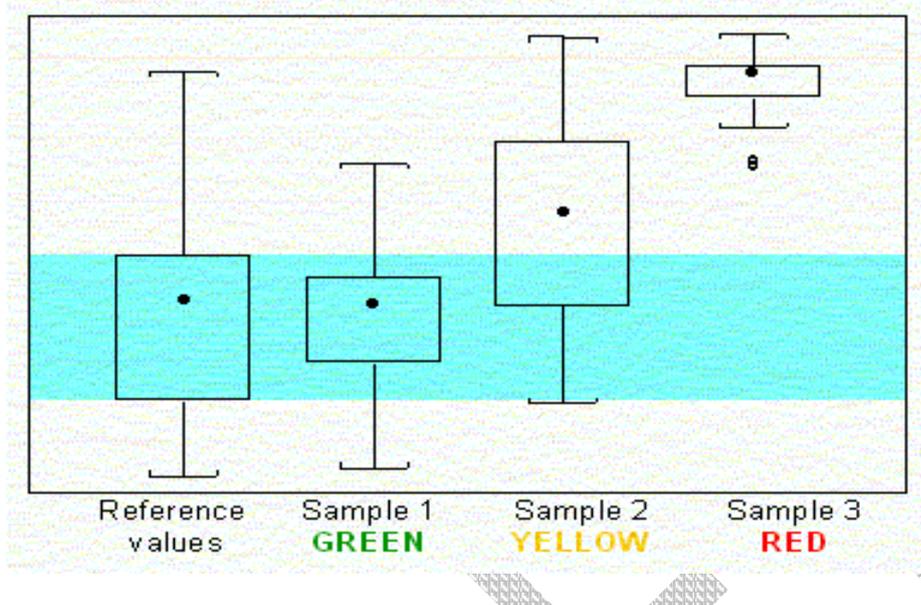


Figure 2. Box plot presentation of sample or test data against WQOs

Green: WQOs are met. Median value of sample or test data is within WQOs – sample/test site is ecologically healthy/slightly impacted.

Yellow: Median exceeds WQOs, but 20th or 80th percentile is within the WQOs – sample/test site is slightly/moderately impacted with some signs of poor ecological health.

Red: WQOs not met. Median and 20th or 80th percentile exceeds WQOs – sample /test site is moderately/heavily impacted.

Integrated assessments of sample or test sites against the WQOs for the waters

Integrated assessment combines the results from the individual indicator/site assessments as follows:

Criteria		Result
All sample or test sites green?	Yes	Green
	No	Yellow
More sample/test sites yellow than green?	Yes	Yellow
	No	Red
Any sample/test sites red?	Yes	Red
		Red

Notes

1. The S-PLUS statistical software package, or equivalent, to produce box plots for water quality assessment is the preferred method for sample/test data presentation and comparison with WQOs. S-PLUS software is available for EPA staff - contact the EPA Water Policy and Partnerships Unit by email at EPA.EV@epa.qld.gov.au, or telephone 1800 177 291.

2. The above assessment, based on annual medians, is not relevant for assessing the likely impact of toxicants, short term releases or pulse events on aquatic ecosystem values - refer to the ANZECC guidelines (via e-Guides) for approaches to these issues.

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2.4 Assessing the contribution of multiple discharges to receiving waters

In assessing receiving water quality, the current condition reflects discharges from the whole catchment - including point source emissions, urban diffuse source emissions and rural diffuse source emissions. The relative contributions from the various emission sources should be understood in the assessment of applications for further waste water discharge or in strategic planning; particularly for slightly to moderately disturbed (SMD) waters without assimilative capacity or highly disturbed (HD) waters (that have no assimilative capacity.)

Possible information sources on existing waste water discharges to waters within a given catchment include:

- the EPA point source database and licensing database that provide information on existing point source discharges (quality/quantity/location);
- the results of compliance inspections conducted in specific areas of the State that may provide additional information on point source emissions and particular waterways/catchment issues;
- Local Government may have catchment level information on urban diffuse emissions;
- Healthy waterways strategies (including water quality improvement plans) and Regional NRM Plans may provide whole of catchment information, including rural and urban diffuse emissions; and
- EPA internal reports (via ROBIN) and external research publications via the Internet; also refer to Section 2.2.

2.5 Waste water discharge to ephemeral streams – ecological and hydrological impacts

Discharge of waste water to temporary streams requires special consideration due to their unique hydrological and ecological characteristics. The importance of maintaining water quality in the small number of permanent pools in ephemeral streams during naturally dry stages includes the protection of these habitats as refugia for aquatic species during the dry season. Waste water emissions during naturally dry stages are likely to disrupt the natural ecology and impact the aquatic ecosystem, and continuous or semi-continuous discharges of waste water should be avoided. Wet weather discharges of waste water should occur when receiving water flows are sufficient, from a risk based assessment, to maintain the water quality objectives of the receiving waters. (Data from any adjacent upstream gauging station may assist in determining the release period.) Feasible disposal alternatives should be investigated; including minimising the production of waste water, reuse opportunities and retention for discharge during wet conditions. Specific mine water disposal issues of a 'one-off' nature would be considered on a case-by-case basis with the administering authority.

Receiving water quality objectives should be based on the most appropriate local reference data collected from same stream above the discharge, or in an adjacent stream not affected by waste water discharges. Monitoring data should ideally cover the wetting stage as well as recession or pool stages. In the absence of suitable reference data, default values from the Queensland and ANZECC Water Quality Guidelines should be adopted.

Information on methods to assess ephemeral stream water quality is available from http://www.acmer.uq.edu.au/research/attachments/FinalReport_TempWatersSep20042.pdf

The discharge of waste water may also have adverse impacts on the hydrology of temporary and permanent surface receiving waters. The impacts relate to the volume and velocity of discharge relative to natural flows and may include bed and bank erosion and changes to the particle size distribution of sediments. Other effects may occur on biota where there is insufficient time to complete life cycles due to changed flow regimes. As a guide,

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modelling of flow characteristics should be considered where the waste water flow exceeds 10% of the natural flow of the waterway.

2.6 EPA guidelines - sampling / experimental design / sample analysis / data analysis and pre-development water quality monitoring

The EPA Water Quality Sampling Manual, at http://www.epa.qld.gov.au/environmental_management/water/water_quality_monitoring/publications/, is to be used by relevant parties in deciding sampling, sample analysis and statistical analysis requirements under the EPP Water, including when:

- taking samples, or making tests and measurements; or
- preserving and storing samples, or performing analyses on samples; or
- performing statistical analyses on the results of sample analyses.

Manual methods or the S-PLUS statistical software package, or equivalent, should be used to produce box plots for water quality assessment of sample or test data against water quality objectives.

Where pre-development water quality monitoring is required:

- the QWQGs recommend the taking 18 samples to provide estimates of median, 20th and 80th percentiles at a reference site, refer to section 3.4.3.1 and Figure 3.4.1. As a minimum samples should be collected over a period of at least 12 months and cover seasonal variations, on the understanding that further samples would be collected to meet the recommended number of 18. Note the [ANZECC Water Quality Guidelines](#) recommend the taking of 24 samples to estimate the above percentiles at a reference site; and
- [The Australian Guidelines for water quality monitoring and reporting 2000](#) informs baseline studies that measure change, including the *Multiple Before After Control Impact* (MBACI) experimental design. MBACI examples detecting environmental impacts of marine aquaculture are at http://www.bio.usyd.edu.au/SOBS/TEACHING/ecol_04/marine/CAS%202004%20marine%20ecology%20lecture%2011.pdf.

The above protocols also inform the baseline studies required under the EPA Operational Policy *Waste water discharge to Queensland waters* in demonstrating ‘an equivalent outcome of no, or negligible, change to the physico-chemical, biological, habitat and flow attributes beyond natural variation of HEV waters, excepting, in limited circumstances, within a defined initial mixing zone measured near the waste water release outfall location. The intent is that beyond the mixing zone boundaries, current environmental quality is maintained and the aquatic ecosystem is conservatively protected over time, taking into account the precautionary principle.’ Appendix 6.4 of the Operational Policy, Application of MBACI design for HEV water assessment, provides further information.

Note

The method of assessing ‘no change’ to the physico-chemical, biological, habitat and flow ecosystem attributes of high ecological waters is given in the Queensland Water Quality Guidelines 2006 (Appendix D Compliance assessment protocols.)

2.7 Predicting the impacts of the proposed waste water discharge on the receiving waters

This Section informs Section 2.3 and Section 3 of the Operational Policy

When is predictive water quality modelling required to ascertain the impact from the proposed waste water discharge?

All development applications or environmental authority applications proposing waste water discharge to waters must quantitatively assess the impacts on the receiving waters.

- Where the assessed environmental risk of the proposed discharge is low (on the basis of toxicity assessment and contaminant load), the scale is small and spreadsheet calculations or simple box modelling indicates the increase in contaminant concentration does not exceed of the WQOs for the receiving waters, then more detailed predictive water quality modelling is not likely to be required. This circumstance may include a proposed discharge involving a small volume of waste water containing one or two well-studied contaminants at concentrations only several times greater than the well mixed mid/lower estuarine receiving waters. Refer to Attachment 2 to Section 2. Assimilative capacity must exist for the contaminant (that is the WQOs are not exceeded.)
- Commensurate with increased scale and risk, and including where the receiving waters are of high ecological value, the use of more complex predictive water quality modelling will be required to evaluate receiving waters impacts. Predictive modelling outputs would include the assessments over a range of input conditions or scenarios. Test data output should be analysed and compared with the existing receiving water quality and the WQOs of the receiving waters using box plots, refer Section 2.3.

What models / techniques should be used?

- **Mixing zone models** are used to assess water quality impacts from point source discharges. The most commonly used mixing zone model is [Cormix](#) available through the USEPA website is a water quality modeling and decision support system designed for environmental impact assessment of mixing zones resulting from waste water discharge from point sources. Although US focused, the [compilation of mixing zone documents](#) provides good background information.

Mixing zone guidance includes:

- to protect EVs, outfall diffusers would normally be required to ensure a minimum initial dilution level under the stated tidal or flow conditions (i.e. release during stated parts of the tide or above stated freshwater flows);
- the maximum lateral dimension of the mixing zone should be the lesser of 50m diameter or 30 percent of the waterway width for riverine and estuarine waters; and a radius not exceeding 100m from the diffuser port for coastal waters;
- boundaries of adjacent mixing zones be at least 200m apart, cumulative impacts should be assessed;
- compliance with receiving water quality objectives should be met within 3 stream widths or 300m from the diffuser port, whichever is the smaller; and
- application is primarily to toxicants. Nutrients should be assessed in terms of equilibrium concentrations at a certain distance (for example 300m) from the discharge port.

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- **Catchment models** typically simulate the flows and loads of suspended sediment, total phosphorus and total nitrogen from freshwater catchments with consideration of land use, rainfall, soil characteristics, vegetation cover etc. Flows and loads are routed through stream networks, typically to the tidal limits of estuaries. Catchment models are available from a number of sources including CSIRO Land and Water, eWATER CRC and Regional NRM Groups.
- **Receiving water quality models** for estuaries and embayments are specific and complex models that simulate the hydrodynamic and water quality variations in the water body subject to external inputs. Receiving water quality models enable scenario modelling of water quality to be undertaken to predict the likely impacts of contaminants. Receiving water quality models are available through major consultant organisations for specific parts of the State, and are required to be used for significant projects.
- **Box models for estuarine water quality modelling** provide a simple computational framework that may be used to determine contaminant load estimates (e.g. N and P). Box models are relatively straightforward, available through most consultant organisations or may be developed for the estuarine waters of interest. A simple box model of steady state increase of contaminant concentration is at Attachment 1 to Section 2.

2.8 Considering the results of water quality assessments in accordance with the Operational Policy

Development applications and environmental authority applications proposing to discharge waste water to receiving waters should provide information to characterise the receiving environment and predicted impacts of the proposed discharge of waste water; in accordance with sections 2.1 to 2.7 above, and in summary as follows.

- Environmental values, water quality objectives, water types and levels of aquatic ecosystem protection for the receiving waters should be provided, preferably with spatial datasets including application details and relevant overlays (e.g. protected estate and constraints mapping).
- Waste water contaminant assessment, discharge and monitoring information – refer Attachment to Section 1.
- Existing receiving water quality and ecological health information should be sourced and collated to include riverine, estuarine and coastal waters and the broadest range of indicators and indicator values.
- Future planning intent for the catchment and associated waters should be determined.
- Conduct baseline water quality monitoring for HEV waters, and as required for SMD/HD waters. Use agreed experimental design to establish pre-development water quality at control sites and proposed impact sites:
 - The QWQGs provide guidance on the number of site samples and time period to establish baseline development water quality, refer also to Section 2.6; and
 - The EPA Sampling Manual informs sampling techniques and sample analysis requirements. Sample data statistical analysis should include the calculation of median values, 20th and 80th percentiles and data outliers, by indicators, by sample sites for a given water type. Box plot presentation is preferred.

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- All applications must quantitatively assess the impact of the proposed waste water discharge on receiving water quality. Information on the proposed waste water discharge contaminants (indicators concentrations and loads) should be provided. Depending on the degree of risk, scale and initial estimates of contaminant concentration increases above background, predictive modelling may be required.
- Collate test data or site sample data on existing water quality. Use S-PLUS statistical analysis software or equivalent, comparing site sample data or site test data with the WQOs for the water type for key indicators.
- Use box plots to present data and develop integrated water quality assessments (**GREEN**, **YELLOW** and **RED** ZONES) to provide an evidence base that informs the subsequent analysis in accordance with the EPP Water:
 - **Green:** Median of site sample data and test data is within WQOs – sample or test sites are ecologically healthy/slightly impacted, WQOs are met prior to, and post the proposed discharge of the waste water;
 - **Yellow:** Median values of site sample data or test data exceeds WQOs, but 20th or 80th percentile is within the WQOs – sample /test site is slightly/moderately impacted site; and
 - **Red:** Median of site sample data or test data and 20th or 80th percentile exceeds WQOs – sample or test site is moderately/heavily impacted. WQOs are not met by the existing water quality. Further decline in water quality would be expected with additional discharge.

Assessment and decision making guidance

In assessing and deciding applications for development approval and environmental authority, the administering authority must comply with any relevant EPP requirement; consider the standard criteria and other prescribed matters. **That is, the assessment and decision making processes are determined by consideration of multiple criteria – not single criterion.** Refer to Endnotes 1, 2 and 3 for further detail.

The current EPP Water includes statements of policy about assessment and decision making that resulted from consultation on the [Regulatory Impact Statement](#) for the [Environmental Protection \(Water\) Amendment Policy No 1 2006](#) (the EPP (Water) AP). These are described in the corresponding [Explanatory notes](#) and summarized in the EPA Operational Policy.

- For proposed waste water discharge to **HEV waters** there should be no impact beyond the mixing zone (minimized to the greatest extent) and where practicable environmental offsets used to provide a net environmental gain to the receiving waters (refer Section 3 Environmental Offsets). Some assimilative capacity is preserved for future ESD.

Note that mixing zone considerations apply to all environmental management decisions involving waste water discharge to surface water in accordance with s18 of the EPP Water; considerations include the use of diffusers, limiting the size of the mixing zone and releasing waste water under stated tidal or flow conditions.

- For **GREEN ZONE** assessment - proposed discharge of waste water to SMD waters with assimilative capacity (WQOs met prior to and post the discharge):

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- seek to maintain current water quality, through innovative and proactive discussions working in close partnership with the applicant to investigate on feasible alternatives to waste water discharge - refer to the waste management hierarchy for guidance at the Attachment to Section 1);
- retain some assimilative capacity for future ESD; and
- limit non-compliance to the mixing zone, minimised to the greatest extent.
- For **RED ZONE** assessment - proposed discharge of waste water to SMD and HD waters that do not meet the WQOs (prior to or post the waste water discharge – i.e. the waters have no assimilative capacity for the discharge):
 - in constructive partnership with the applicant, seek innovative and proactive alternatives to waste water discharge (refer to the waste management hierarchy); and
 - consider the use of environmental offsets if there are no feasible alternatives to discharge.
 - Analyse key contributors discharging to catchment waters to understand the existing major emission sources. (Unrelated to the application being assessed, discussion with the Regional Manager may consider initiating a *strategic compliance management plan* involving area and industry sector inspection programs towards longer term improvements in receiving water quality).
- For **YELLOW ZONE** assessment - Median values of site sample data or test data exceeds WQOs, but 20th or 80th percentile is within the WQOs.
 - **Assess as above** - recognising there is no assimilative capacity in respect of the non-compliant water quality indicators and considering the use of environmental offsets where there is no feasible alternative to discharge. If the discharge will not affect a non-compliant indicator e.g. discharge of sediment where water clarity and any relevant biological indicators are met, assess as per green zone.

Endnotes

1. The *Environmental Protection Act 1994* (EP Act) s73A, AA, B and C informs the assessment of development applications for chapter 4 activities (other than for mining or petroleum activities), wherein the administering authority must comply with any relevant Environmental Protection Policy requirement and must consider the standard criteria of schedule 3 of the EP Act and additional information given in relation to the application. (This section does not limit the Integrated Planning Act (IPA), section 3.3.15 or chapter 3, part 5 (Decision stage) or division 2 (Assessment process) of that Act.)

Section 73B of the EP Act specifies the conditions of any development approval that may and must be imposed; including s73B (1) subject to the Integrated Planning Act s3.5.30 (conditions must be relevant or reasonable), the administering authority may impose the conditions on the development approval it considers are necessary or desirable and (2) the conditions must include any condition the authority is required to impose under an EPP requirement.

2. In assessing and deciding applications for environmental authority (mining activity) for level 1 mining projects, under s 193 the administering authority may in granting the application impose the conditions on the draft environmental authority it considers necessary or desirable.

In deciding whether to grant or refuse the application or to impose a condition the authority must:

(a) comply with any relevant Environmental Protection Policy requirement; and

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(b) subject to paragraph (a), consider the application documents for the application, the standard criteria, the wild river declaration for the area—to the extent the application relates to mining activities in a wild river area, any suitability report obtained for the application and the status of any application under the Mineral Resources Act for each relevant mining tenement.

3. The standard criteria under Schedule 3 Environmental Protection Act 1994 means:

(a) the principles of ecologically sustainable development as set out in the 'National Strategy for Ecologically Sustainable Development'; and

(b) any applicable environmental protection policy; and

(c) any applicable Commonwealth, State or local government plans, standards, agreements or requirements; and

(d) any applicable environmental impact study, assessment or report; and

(e) the character, resilience and values of the receiving environment; and

(f) all submissions made by the applicant and submitters; and

(g) the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—

(i) an environmental authority;

(ii) an environmental management program;

(iii) an environmental protection order;

(iv) a disposal permit;

(v) a development approval; and

(h) the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and

(i) the public interest; and

(j) any applicable site management plan; and

(k) any relevant integrated environmental management system or proposed integrated environmental management system; and

(l) any other matter prescribed under a regulation.

Attachment 1 to Section 2

Box Model estimation of steady state increase in total nitrogen concentration

Question – What is the steady state increase in total nitrogen concentration in a “box” of water given a constant daily load and a first order decay due to denitrification?

Conservative assumptions include:

- No advection
- No dispersion
- Tidal prism based on neap tidal range

Other assumptions include

- Losses due to denitrification – first order decay with a rate constant K_T of 0.05 day^{-1} (derived by John Bennett from modelling work on Southeast Queensland estuaries.)

The basic relationship is

$$\frac{d \text{ Total N}}{dt} = \text{Load TN} - K_T \text{ Total N}$$

i.e. the change in total nitrogen (TN) (kg) wrt. time is the load of TN (kg/day) minus losses of TN due to denitrification

Calculating tidal prism in ML

Determine areal extent (m^2) of waters upstream from discharge point.

Obtain data from site inspection/map/field visit. Distance upstream is limit of tidal influence for small streams. For large streams, use mean tidal velocity for an average tide (m/s) multiplied by time of tidal cycle e.g. 6hrs X 60min X 60secs for 2 tides/day

Calculate the tidal range under neap tides (m) from local tide data.

Tidal prism ML = areal extent (m^2) X depth (m) /1000

In this case, 40m wide X 3000 m long X 1.0m mean neap tide difference/1000

→ **Tidal prism = 120 ML**

Calculating aquaculture daily load of total nitrogen (TN)

$$\begin{aligned} \text{Daily Discharge in m}^3 &= 5\% \text{ of growout pond volume} \\ &= 0.05 \times 6 \times 5000\text{m}^2 \times 1\text{m} \\ &= 1500 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{Daily Discharge in ML} &= \text{discharge in m}^3 / 1000 \\ &= 1.5 \text{ ML} \end{aligned}$$

$$\begin{aligned} \text{Max Daily Load TN (kg/day)} &= \text{daily discharge (ML/day)} \times \text{concentration TN (mg/L)} \\ &= 1.5 \times 0.6 \\ &= \mathbf{0.9 \text{ kg/day (Scenario 1)}} \end{aligned}$$

Calculating the change in total N (ΔTN)

The Basic Relationship again is

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$$\frac{d \text{ Total N}}{dt} = \text{Load} - K_T \text{ Total N}$$

Under steady state, change in Total N wrt. time is zero, therefore:

$$\frac{d \text{ Total N}}{dt} = \text{Load} - K_T \text{ Total N} = 0$$

transforming the equation gives:

$$\begin{aligned} \text{Total N (kg)} &= \frac{\text{Load (kg day}^{-1}\text{)}}{K_T \text{ (day}^{-1}\text{)}} && \text{(Note from above, } K_T \text{ (day}^{-1}\text{) value is a given factor)} \\ &= 0.9/0.05 \\ &= \mathbf{18 \text{ kg}} \end{aligned}$$

This is the steady state additional mass of TN in the tidal prism (i.e. the box) caused by the discharge

Calculating the change in total N concentration (Δ TN)

$$\begin{aligned} \Delta \text{TN mg/l} &= \text{mass TN (kg) /volume (ML) of the tidal prism} \\ &= 18/120 \\ &= \mathbf{0.15 \text{ mg/L}} \end{aligned}$$

Assessing Impact

Add predicted increase in TN mg/L (i.e. 0.15mg/L) to ambient median TN

Scenario A: ambient median TN = 0.36mg/L

Scenario B: ambient median TN = 0.205 mg/L

Compare result to water quality objective for TN: 0.300mg/L

Alternate Scenario

Let's say that the discharge is instead to larger estuary with the following characteristics.

- Average width: 70 m for at least 12 km upstream
- Neap tidal range: same, 1.2 m
- Distance to extremity of tidal influence upstream from farm 20 km
- Average tidal current velocity during neap tides 0.5 metres per second.
- 2 tidal cycles per day i.e. approx. a 6 hour tidal cycle

To recalculate tidal prism:

1. Distance of tidal flow upstream = 0.5 m/sec X 6 hours
= 0.5 m/sec X 60 X 60 X 6 sec
= 10800 metres

2. Tidal prism

Tidal prism ML = areal extent (m²) X depth (m) /1000

In this case, 70m wide X 10800 m long X 1.2 mean neap tide difference/1000
= 907.2 ML

Calculating the change in total N concentration (Δ TN)

Δ TN mg/l = mass TN (kg) /volume (ML) of the tidal prism
= 18/907.2
= 0.02 mg/L

Assessing Impact

Add predicted increase in TN mg/L (i.e. 0.03mg/L) to ambient median TN

Scenario A: ambient median TN = 0.36mg/L

Scenario B: ambient median TN = 0.205mg/L

Compare result to water quality objective for TN: 0.300mg/L

Attachment 2 to Section 2

Steady state calculations – estimation of activity impact

A. Dilution Ratio in Creek Method

Assumptions:

- Constant flow in creek
- Constant flow of discharge
- Calculates ratio of flow in creek to flow in discharge
- Gives a guide to potential dilution available.

[Note: This does not take account of mixing zone impacts]

Assumed flows

- Turtle Creek North – 12.77 cumecs = 12.77 cubic metres per second
- Turtle Creek South – 25.3 cumecs = 25.3 cubic metres per second

Maximum waste water discharge

= 5 ML/day
= 5000 cubic metres per day
= 0.058 cubic metres per sec

Dilution Ratios

Turtle Creek North – 12.77/0.058 = 220:1

Turtle Creek South – 25.30.058 = 436:1

B. Estimated concentration in creek method

To calculate the resultant water concentration the following formula can be used:

$$C_{res} = \frac{(Q_{creek} * C_{creek}) + (Q_{dis} * C_{dis})}{(Q_{creek} + Q_{dis})}$$

With:

C_{res} = Resultant concentration in the creek in $\mu\text{g/L}$
 Q_{creek} = Flow in the creek in (m^3/s) upstream of discharge
 C_{creek} = Concentration in Creek upstream of discharge ($\mu\text{g/L}$)
 Q_{dis} = Discharge volume of activity (m^3/s)
 C_{dis} = Concentration in discharge ($\mu\text{g/L}$)

Assumptions:

- Constant flow in creek in one direction
- Constant flow of discharge into the creek
- Assumes all mix together
- Note this ignores a mixing zone effect and hence any mixing zone impacts.

Example

Data

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Q creek - 12.77 cumecs = 12.77 cubic meters per second
 Ccreek from data = 0.4 µg/L maximum dissolved copper
 Q dis = 0.058 m³/s
 Cdis = 30 µg/L maximum (assume all dissolved copper)

$$C_{resulting} = \frac{(12.77 * 0.4) + (0.058 * 30)}{(12.77 + 0.058)} = 0.5 \mu\text{g/L}$$

C. Estimated minimum dilution in creek method

Question: What if we want to know what minimum dilution is necessary to meet ANZECC trigger values?

Data

Cresulting = 1.4 (ANZECC criteria for copper)
 Q creek - x cumecs = x cubic meters per second
 Ccreek from data = 0.4 µg/L maximum dissolved copper
 Q dis = 0.058 m³/s
 Cdis = 30 µg/L maximum (assume all dissolved copper)

Substituting from equation above gives:

$$C_{resulting} = \frac{(x * C_{creek}) + (Q_{dis} * C_{dis})}{(x + Q_{dis})}$$

$$\rightarrow 1.4 = \frac{(x * 0.4) + (0.058 * 30)}{(x + 0.058)}$$

$$\rightarrow Q_{creek} = 1.6588$$

Flow in the creek (Q creek) must equal at least 1.6588 cumecs i.e. 1.6588 cubic meters per second if the resultant concentration is not to exceed 1.4 micrograms Cu per litre.

Minimum dilution ratio therefore is:

1.6588 cubic meters per second flow in creek to achieve criteria

Maximum daily discharge = 0.058 cubic meters per second

= 28.6 (rounded off say 29-30 times)

3. Environmental offsets

This Section informs Section 2.4 of the Operational Policy

3.1 What is an environmental offset in the context of waste water discharge?

Environmental offsets (offsets) means the measures taken to counterbalance the negative environmental impacts resulting from a residual waste water discharge that must first be avoided, then minimised before considering the use of offsets for any residual impacts. An offset is to be of a like-kind (i.e. the same contaminant and chemical form) and seeking to deliver a net environmental gain to the receiving waters. Offsets may be located within or outside a development site and should be legally secured.

Offsets will not replace or diminish existing environmental standards or regulatory requirements that must still be met; e.g. a discharge of poorly treated waste water or an activity that failed to incorporate best practice measures could not implement an offset to avoid adopting best practice environmental management. Offsets will not be used to allow development in areas where they could not otherwise occur or be used for purposes not otherwise allowed. They are simply intended to provide another tool that can be used during project design, environmental assessment and implementation to achieve the principles of ecologically sustainable development—the object of the EP Act.

Offsets counterbalance those impacts that still exist despite reduction through best practice waste avoidance, recycling and re-treatment, and adoption of environmentally sound discharge location and release circumstances in accordance with the EPP Water. Offsets should be distinguished from ‘abatement measures’ which refer to the range of actions that can be undertaken to reduce the level of impacts of a discharge (typically undertaken on-site and by adopting discharge strategies sensitive to environmental conditions).

3.2 When may an environmental offset be required?

The administering authority may require an offset or may approve an offset incorporated in a development proposal in making a decision about an application under the EP Act for a development approval for an environmentally relevant activity or environmental authority for a level 1 mining or petroleum activity. Refer to section 2.0 and 2.1 of the EPA Operational Policy. The policy intent is that for:

- HEV waters, where practicable the application includes a like kind environmental offset proposal - counterbalancing the discharge of residual waste water (the discharge) from the proposed ERA; and
- SMD and HD waters with no assimilative capacity, environmental offsets (offsets) may be considered by the administering authority where there are no feasible alternatives to residual waste water discharge.

For the purposes of the EPA Operational Policy, environmental offsets will not apply to SMD waters where assimilative capacity exists. Refer to the Operational Policy Section 2.3.4 Assimilative capacity and sustainable load. By definition HD waters have no assimilative capacity.

In all cases an environmental offset condition must only be imposed where it is considered to be either necessary or desirable in the context of the activity (see EP Act s 73B, 114 and 210). This means there must be a nexus between the offset and environmental protection of the subject waters, and the offset is either a necessary or desirable additional measure that assists in achieving the object of the EP Act.

Note

The Australian Government Department of Environment and Water Resources is addressing the use of environmental offsets in approval conditions under the EPBC Act, when a proposed development impacts on a matter of national environmental significance that is protected by that Act. When finalised, EPBC Act requirements should be considered in conjunction with this Operational Policy.

3.3 Queensland Government Environmental Offsets Discussion Paper

The consideration of environmental offsets is in accordance with the principles in the discussion paper on a proposed Queensland Government Environmental Offsets Policy, that are listed below.

- *Environmental impacts must first be avoided, then minimised before considering the use of offsets for any residual impacts.*
- *Offsets will not be used to allow development in areas where they could not otherwise occur, or for purposes not otherwise allowed.*
- *Offsets must achieve an equivalent or better environmental outcome.*
- *Offsets must provide environmental values as similar as possible to those being lost.*
- *Offsets must be provided with a minimal time-lag between the impact and delivery of the offset.*
- *Offsets must provide additional protection to values at risk or additional management actions to improve environmental values.*

3.4 Information on the development of an acceptable offsets proposal

In developing an offsets proposal under the EPA Operational Policy, offsets must be:

Enduring—they must offset the impact of the development for the period that the impact occurs. Where there is an approved increase in residual waste water discharge over time, a commensurate increase in offset quantity is required. Where the onset time is delayed, the offset will need to generate a larger amount of contaminant reduction in later years to balance any shortfall in the early establishment period. Development conditions or environmental authority conditions will specify the maintenance and monitoring requirements for the offset to ensure the achievement of the net environmental gain to the receiving waters over the life of the project.

Quantifiable and Monitored—the proposed environmentally relevant activity (ERA) discharge load increase and the counterbalancing offset load reduction must both be able to be measured or estimated with a reasonable level of confidence. Where the offset involves land-use change impacting on diffuse source contaminants, it is likely to be difficult to determine precisely the actual amount of pollution abated. In this case, measurement using a protocol agreed beforehand with the administering authority would be required. Measurement of baseline loads before implementation of the offset in accordance with the protocol would typically be included. Sound estimation tools should be based on the best available science and an acceptable level of understanding of how the offset measures work.

To measure the success of environmental offsets in delivering the desired environmental outcome, it is necessary that offset performance is monitored and audited, and the results included in reporting to the administering authority.

Targeted and located appropriately—they must offset the impacts on a 'like-for-like' basis (like kind offsets) of the same chemical type and form and be located appropriately. Offsets must impact on the same (receiving) waters and use offset ratios to achieve environmental equivalence between the proposed ERA discharge and offset sources. The administering authority will advise priority catchment locations for rural diffuse offsets.

Potential offset sources should discharge the same type and chemical form of contaminant and to the same waters as the proposed ERA discharge. In some cases a contaminant will be present in more than one form. For example, phosphorus is comprised of both soluble and non-soluble forms and most sources discharge a

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combination of these forms. As offset opportunities are considered, the form of the contaminant being discharged should be identified to ensure that offsets represent an equivalent impact on water quality.

The fate of a contaminant is also an important consideration in evaluating impacts. For example although an activity may discharge non-soluble phosphorus, if the environmental conditions result in indirect impacts these must also be considered (e.g. discharge to stratified receiving waters that solubilise phosphorus.) The applicant should establish:

- the type and form of the major contaminant proposed in the residual waste water discharge;
- catchment offset sources that discharge the same type and form of the contaminant;
- the impacts of concern for the contaminant and any variation based on different chemical forms; and
- the potential for differential impacts from the various forms of the contaminant.

Suitable—discharge contaminants that may be suitable for management by offsets include nutrients (nitrogen and phosphorus), sediment (TSS and TDS), organic carbon or other contaminants where the scientific basis can be demonstrated and the contaminants do not have human health impacts, irreversible environmental impacts or unacceptable biota impacts.

Criteria to determine if a particular contaminant is suitable for management by offsets include:

- the contaminant contributes to a chronic, cumulative environmental impact (load effect), not an acute, localized impact (concentration effect)—toxicants are not appropriate;
- practical off-site pollution abatement measures are available to remove the contaminant elsewhere in the catchment; and
- practical tools are available to measure or estimate diffuse and point source loads of the offset contaminant, including existing baseline loads before ERA discharge and the offset measures commence.

Contaminants such as pathogens, most heavy metals and other contaminants that are toxic, at very low levels, to humans and the environment cannot be addressed using offsets.

The Attachment to Section 3 informs phosphorus, nitrogen and sediment suitability for management by offsets.

Enforceable—the applicant is responsible for ensuring that the offset is implemented diligently and maintained in a proper and effective manner. The applicant must identify how offsite elements will be implemented. Where the applicant is not the owner of the land subject to the offset, evidence of owner consent should be included in the application and ongoing use of the land for offset activities. The location of the offset (lot and plan numbers) must be included in the Offset Agreement.

Supplementary—offsets must have been specifically proposed for the offset purpose and be beyond current regulatory requirements.

The offsets proposal must also consider financial assurance—the administering authority has discretion under Chapter 7 Part 6 of the EP Act, and applicants should discuss the possible requirement during pre-design conferencing with the administering authority. It is reasonable that any financial assurance be drawn down as offsets are progressively implemented.

3.5 Determining environmental equivalence of offsets at different discharge points - offset ratios

The application of an equivalence (or offset) ratio seeks to account for contaminant reductions (offsets) made at different points within a catchment and to ensure that the impact of the offsets from designated locations or areas are equivalent to the proposed ERA residual waste water discharge.

Offset ratios must be greater than 1:1

An offset ratio determines the quantity of contaminant that a proposed offset must reduce for each kilogram of contaminant emitted in the residual waste water discharge. The offset ratio 3:1 means that 3 kilograms of contaminant are offset for every 1 kilogram of contaminant discharged. Offset ratios account for:

- the policy intent for the management of HEV, SMD and HD waters (refer section 2.0 of the EPA Operational Policy);
- the scientific uncertainty in estimating the loads of contaminant emitted by the ERA proposal (the load being offset) and the load reduced by the offset actions; and
- the spatial, temporal, chemical and bioavailability differences between the contaminants released and offset.

Table 1 provides default offset ratios that may be used to provide a reasonable level of confidence that the contaminant discharge is offset. The default ratios are consistent with offset / trading ratios used nationally and internationally for a range of contaminants, refer <http://www.environment.nsw.gov.au/resources/framework05260.pdf> and <http://www.epa.gov/owow/watershed/trading/traenvrn.pdf>. Different default ratios may be needed to address the project contaminants and locality issues, and should be discussed at pre-design conferencing.

Table 1: Default offset ratios

Emission source of ERA contaminant	Emission source of offset contaminant	Ratio (offset : impact)	Basis of ratio (Offsets are in the same waters or different water types upstream of the ERA contaminant discharge.)
Point	Point	1.5:1	A 1:1 ratio is the minimum needed to achieve a nil net discharge. The ratio also reflects the risk and uncertainties of achieving the offset measure and to achieve a net environmental gain to HEV waters or SMD/HD waters not meeting WQOs.
Point	Diffuse (rural)	3:1	As above. In addition, the ratio has been increased to account for the greater uncertainty in achieving and quantifying rural diffuse offsets, in-stream processing effects and spatial, time and bioavailability differences.
Point	Diffuse (urban)	3:1	As above.

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Notes to Table 1

1. Table 1 provides **minimum default offset ratios** that may be used for point and diffuse offsets to waters in the same catchment. The ratios assume knowledge of the proposed ERA residual waste water discharge, over time, and the conduct of monitoring programs to inform offset compliance.
 2. Applicants may choose to develop project specific offset ratios, based on catchment and offset modelling, for consideration by the administering authority. Where offsets are proposed to be implemented in waters of **adjacent catchments with common receiving waters**, this must be agreed with the administering authority at pre-design conferencing and the offset ratios determined from catchment and offset modelling.
 3. Proposals to include **rural diffuse offsets** assumes the restoration or re-establishment of degraded riparian or wetland habitats, or other land management actions, according to priorities advised by the administering authority at pre-design conferencing.
 4. Proposals to include **urban diffuse offsets** from either new or existing urban development should also be according to the priorities advised by the administering authority. (The use of modelling techniques to demonstrate treatment train effectiveness in reducing contaminant emissions from both existing and new urban development will be required by the administering authority. Note that with respect to new urban development, offset proposals would be required to address contaminants remaining after the application of best practice environmental management for urban stormwater.)
 5. **Downstream offsets.** SMD and HD waters that have no assimilative capacity for the proposed ERA residual waste water discharge contaminants will show further deterioration in current condition and for HEV waters the natural values of HEV waters will not be maintained. Localized contaminant impacts post the ERA discharge may be exacerbated in riverine waters with low flows and/or a high capacity for contaminant retentiveness or in extended estuaries with limited tidal flushing. The adoption of downstream offsets in different water types (i.e. the offset is located in a different water type that is downstream of the proposed ERA discharge) has limited ability to address the policy intent of preventing further degradation and reversing the declining trend in water quality or maintaining natural values. Accordingly, the adoption of downstream offsets in different water types does not contribute to achieving the policy intent and is not considered suitable.
- Offsets for proposed ERA residual discharge in riverine waters should be in the same water type, using the minimum default offset ratios as in Table 1.

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3.6 Determining riparian and wetland buffer widths

The Department of Natural Resources and Water’s *Regional Vegetation Management Codes* under the *Vegetation Management Act 1999* for the relevant Queensland bioregions (available through the website at www.nrm.qld.gov.au) should be used as **default buffer widths to re-establish degraded watercourse riparian or wetland function** — providing the offsetting contaminant load reduction to receiving waters by preventing bank erosion and filtering sediments, nutrients and other contaminants from stormwater run-off.

In the context of this Operational Policy the codes are used to provide default buffer widths — equivalent to the buffer widths under the codes to be retained in the clearing of vegetation to prevent loss of riparian function. Extracts in Table 2 below are for information only and reference must be made to the appropriate Queensland bioregion code for case-by-case assessment. Examples of degraded and functioning riparian buffers are at Figure 3.

Table 2 Default riparian and wetland buffer widths

Performance requirement	Buffer width
<p>To re-establish degraded watercourse riparian or wetland function.</p> <p>Watercourses To regulate the clearing of vegetation in a way that prevents the loss of biodiversity and maintains ecological processes — remnant vegetation associated with any watercourse is protected to maintain —</p> <ul style="list-style-type: none"> a) <u>bank stability by protecting against bank erosion;</u> b) <u>water quality by filtering sediments, nutrients and other pollutants;</u> c) <u>aquatic habitat; and</u> d) <u>wildlife habitat.</u> <p>Wetlands To regulate the clearing of vegetation in a way that prevents the loss of biodiversity and maintains ecological processes — remnant vegetation associated with any significant wetland and/or wetland is protected to maintain —</p> <ul style="list-style-type: none"> a) <u>water quality by filtering sediments, nutrients and other pollutants;</u> b) <u>aquatic habitat; and</u> c) <u>wildlife habitat.</u> 	<p>Guideline buffer widths to re-establish degraded watercourse riparian and wetlands function — shown below as <i>bold/italics/underlined text</i>.</p> <p><u>Buffer width</u> Clearing does not occur —</p> <ul style="list-style-type: none"> a) in any <u>watercourse</u>; b) within <u>200 metres from each high bank of each watercourse with a stream order 5 or greater.</u> c) within <u>100 metres from each high bank of each watercourse with a stream order 3 or 4;</u> and d) within <u>50 metres from each high bank of each watercourse with a stream order 1 or 2.</u> <p><u>Buffer Width</u> Clearing does not occur —</p> <ul style="list-style-type: none"> a) in any <u>wetland</u>; b) in any <u>significant wetland</u>; c) within <u>100 metres from any wetland;</u> and d) within <u>200 metres from any significant wetland.</u>

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Alternatively, applicants may conduct site based modelling studies acceptable to the administering authority to determine **riparian and wetland buffer widths** for Queensland bio-regions; e.g. the CSIRO Land and Water at <http://www.clw.csiro.au/publications/technical99/tr32-99.pdf>. In either case (i.e. default or site specific study) the riparian vegetation structure design must restore full ecological function; e.g. according to CSIRO Land and Water management objectives at http://downloads.lwa2.com/downloads/publications_pdf/PN061234_34-36.pdf.

Best practice environmental management includes fencing to exclude stock at least 5m upslope from the top of the bank, ensuring the bank is fully vegetated, incorporating a grass strip filter of the design width (but at least 15m) between the stream and the land use, adding an additional width equal to the height of the bank where this is greater than 15m, and including 30m or three widths of native trees/scrubs along the top of the bank.

Note that determining the **buffer length** to satisfy offset load requirements will require case by case land use and locality assessment, as prioritised by the administering authority. Site based modelling will be required.



Figure 3 Examples of degraded and effectively managed riparian ZONES © Photographs CSIRO Land and Water

Attachment to Section 3

A. Offset suitability for phosphorus

Sources of phosphorus include point sources such as waste water sewage treatment plants and diffuse sources such as agricultural activities. Phosphorus discharges and in-stream concentrations can be readily measured and the contaminant is relatively stable as it travels through waterways. As a result, water quality equivalence can be established between offset load reductions and ERA load increases.

Contaminant forms. Phosphorus forms include:

- Soluble phosphorus, as dissolved ortho-phosphates, that is more bioavailable than nonsoluble forms.
- Non-soluble sediment-bound or particulate-bound phosphorus, that is not as likely to promote rapid algal growth but has the potential to become biologically available over time.

The concentration of total phosphorus is based on the sum of the soluble and non-soluble phosphorus. Due to phosphorus cycling in a waterbody (conversion between forms), offsets should consider total phosphorus expressed in terms of annual loads as a common metric with ERA discharge loads.

Actual forms of phosphorus being discharged should be identified to establish an equivalent impact on water quality. E.g., if offset reductions have substantially divergent chemical form to ERA discharges (e.g., one primarily discharges soluble phosphorus while another primarily discharges non-soluble phosphorus) then the two may not be environmentally equivalent. Most diffuse phosphorus from grazing/rural lands is sediment-bound, non-soluble phosphorus and from irrigation/horticulture in soluble form.

Impact. Excessive phosphorus concentrations have both direct and indirect effects on water quality. Direct effects include nuisance algae growth. Indirect effects include low dissolved oxygen, elevated pH, cyanotoxins from blue-green algae production and trihalomethane in drinking water systems.

Phosphorus **fate and transport** in waterways are well understood. The phosphorus “retentiveness” of a waterway describes the rates that nutrients are used relative to their rate of downstream transport. Areas of high retentiveness are usually associated with low flows, impoundments, dense aquatic plant beds and heavy sedimentation. Offsets that involve phosphorus discharges through these areas will likely require higher offsets to achieve water quality equivalence. In areas with swift flowing water and low biological activity, phosphorus is transported downstream faster than it is used by the biota, resulting in low levels of retentiveness and minimal aquatic growth. In reaches where phosphorus is transported rapidly through the system, lower offsets may be required.

Timing. The key consideration for phosphorus offsets is the seasonal load variability amongst emission sources. Agricultural diffuse source loadings will vary seasonally, with greater loadings likely during the growing season and during storm events associated with soil runoff. Point sources generally discharge continuously.

Refer *Water Quality Trading Assessment Handbook, US EPA, November 2004* available at http://www.epa.gov/owow/watershed/trading/handbook/docs/NationalWQTHandbook_FINAL.pdf.

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B. Offset suitability for nitrogen

Anthropogenic sources of nitrogen discharging to receiving waters include point sources, such as waste water treatment plants and industrial discharge, and diffuse sources from agricultural activities and rural lands. Human activity has had an important influence on nitrogen cycles causing an increase of mobilized nitrogen. In particular nitrogenous fertilizer use has increased nitrogen input to receiving waters since widespread use began in the 1950's. In addition, both natural and human disturbances of natural ecosystems (e.g., forest fires, forest clearing) can contribute significant quantities of biologically available nitrogen to receiving waters.

Nitrogen discharges can be measured or calculated and tracked along a waterway.

Contaminant forms. Nitrogen forms include:

- Organic nitrogen that refers to nitrogen contained in organic matter and organic compounds, and may include both dissolved and particulate forms. Sources of organic nitrogen include decomposition of biological material, animal manure, soil erosion, waste water treatment plants and some industries. Organic nitrogen is not available for aquatic plant uptake, but over time organic forms may convert to inorganic, bioavailable forms.
- Inorganic nitrogen that includes nitrate (NO_3^-), nitrite (NO_2^-), ammonia (NH_3) and ammonium (NH_4^+). The primary sources of inorganic nitrogen are mineralized organic matter, nitrogenous fertilizers, point source discharges and atmospheric deposition. Inorganic nitrogen is bioavailable.

Total nitrogen is typically calculated based on the total load - it is assumed that all of the organic nitrogen will become bioavailable within a relevant time period. Offsets are based on total nitrogen load.

Impact. The effects of excessive nitrogen include those related to eutrophication—such as habitat degradation, algal blooms, hypoxia, anoxia and direct toxicity effects. While nutrient and eutrophication impacts associated with excess phosphorus may be more commonly of concern in freshwater systems, nitrogen is generally the limiting nutrient in marine environments and thus has a greater impact in estuarine systems. Some forms of nitrogen may pose particular problems; including ammonia that can cause localized toxicity problems and high concentrations of nitrate in drinking water may raise human health concerns.

A key consideration in determining offset requirements is to understand the nitrogen loss from the waterway. In addition to nitrogen exiting the waterway via irrigation diversions is nitrogen attenuation in the waterway, e.g. vegetation can draw dissolved inorganic nitrogen (NO_3^- and NH_4^+) from the system. Another form of attenuation involves the process of “denitrification” whereby nitrate is reduced to gaseous nitrogen mainly by microbiological activity. Waterway reaches associated with high denitrification are usually associated with low, shallow flows. If offset nitrogen is mainly in the form of nitrate a (potentially large) portion of nitrogen may not reach the receiving waters and hence higher offset requirements. Conversely, nitrogen loads discharged to swiftly flowing, deep waters will have less opportunity for denitrification and have lower offset requirements.

Another factor important to water quality impacts in estuarine environments is the degree of flushing activity, particularly from tides. For example some estuarine waters may have a low level of tidal activity, mixing, and flushing. It is likely that these zones will retain the nitrogen for long periods of time and may have significant water quality concerns from discharge to such waters.

Timing. Nitrogen offsets are expressed in terms of annual loads as a common metric to ERA discharge loads. While point sources such as WWTPs are likely to have relatively consistent discharge timing, rural diffuse sources will have variable loadings that change seasonally based on land management activities and increased nitrogen levels during periods of high rainfall.

C. Offset Suitability for sediments

Sediment from erosion or unconsolidated deposits is transported by, suspended in, or deposited by water. The erosion, transport and deposition of sediment become a problem when increases in sediment supply exceed the water body assimilation capacity. Sediment problems involve the presence of excess fine sediment such as silt and clay particles that increase turbidity when suspended, and form muddy bottom deposits when they settle. Excessive fine suspended and bedload sediments cause aquatic ecosystem impairments.

Sources. Major sources include soil erosion carried by surface runoff and within-channel erosion of banks and bedload sediments.

In catchments where human activity has markedly increased overland flow and run-off, and in-channel erosion and sediment load, excess sediment may be a common event with resulting impairment. Diffuse sediment sources include streambank destabilization due to riparian vegetation removal, agricultural activities without adequate buffer zones, urban sources during stormwater runoff from construction and permanent land development activities, sand and gravel extraction and road construction and maintenance.

Impacts. Excessive amounts of sediment can directly impact aquatic life and fisheries. Deposition can choke spawning gravels, impair fish food sources and reduce habitat complexity in stream channels. Stream scour can lead to destruction of habitat structure. Sediments can cause taste and odour problems for drinking water, block water supply intakes, foul treatment systems, and fill reservoirs. High levels of sediment can impair swimming and boating by altering channel form, creating hazards due to reduced water clarity, and adversely affecting aesthetics.

Indirect effects include low dissolved oxygen levels due to the decomposition of organic sediment materials and water column enrichment of attached nutrients loads. Elevated stream bank erosion rates also lead to wider channels that can contribute to increased water temperatures.

Contaminant forms. Sediment sources discharge a range of particle sizes and loads based on:

- Suspended or “water column” sediments are particles that are small and light enough to remain suspended in the water column, generally less than 1 mm. Sources discharge two types of these suspended sediments: geological particles, which are derived from rock and soil, and biological particles such as planktons and other microscopic organisms.
- Bedload sediments are generally larger particles that are too heavy to be suspended in the water column. They are discharged by diffuse sources and are transported along the bed of the stream and range in size from fine clay particles to coarse material.

Timing. Sediment delivery to streams from diffuse sources is episodic and rainfall related. Metrics for sediment offsets are expressed as average load per year.

Waste water discharge to Queensland waters

Operational policies provide a framework for consistent application and interpretation of legislation by the Environmental Protection Agency, which incorporates the Queensland Parks and Wildlife Service. Operational policies will not be applied inflexibly to all circumstances. Individual circumstances may require an alternative application of policy.

This operational policy¹ provides both policy advice and technical information for officers assessing development applications or environmental authority applications under the Environmental Protection Act 1994, Environmental Protection (Water) Policy 1997, Integrated Planning Act 1997 and State Development and Public Works Organisation Act 1971 for environmentally relevant activities discharging residual waste water to Queensland waters, including to waters of high ecological value. The operational policy includes the consideration of mixing zones, assimilative capacity, environmental offsets and environmental values and water quality objectives in assessing and deciding applications. It also informs applicants in preparing applications.

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¹ This operational policy supersedes the EPA Procedural guide *Licensing discharges to aquatic environments* and is informed by the EPA Procedural Guide *Procedural information for the operational policy Waste water discharge to Queensland waters*. (The latter document will remain draft and the subject of consultation until finalised late in the first quarter of calendar 2008.)

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1. Operational policy overview

1.0 Policy subject

This document summarises and explains the policies that apply when assessing applications under the [Environmental Protection Act 1994](#) (the EP Act) that may involve discharge of waste water² to Queensland waters³, including to waters of high ecological value (HEV). It also applies when assessing applications under other Acts that involve environmental values (EVs) of water or water quality objectives (WQOs), decisions made under the *State Coastal Management Plan 2001* and Regional Coastal Management Plans.

1.1 Key legislation and policy frameworks

The operational policy is based primarily on the EP Act and the [Environmental Protection \(Water\) Policy 1997](#) (the EPP Water). The object of the EP Act is “to protect Queensland’s environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development)” (from Section 3 of the EP Act). The explanatory notes to Section 5 of the EP Act (Obligations of persons to achieve object of Act) require “all people who are given power under this Act, to use that power to protect the Queensland environment and do so consistent with the principles of ESD”.

The current EPP Water includes statements of policy about assessment and decision making that resulted from consultation on the [Regulatory Impact Statement](#) for the [Environmental Protection \(Water\) Amendment Policy No 1 2006](#) (the EPP (Water) AP). These are described in the corresponding [explanatory notes](#). This operational policy provides further information on the implications of ‘scheduling’ EVs and WQOs under the EPP Water for residual waste water discharge. Refer also to the [EPA information sheet Scheduling environmental values and water quality objectives](#).

The operational policy also informs officers and applicants on key provisions of the EPP Water, the [Queensland Water Quality Guidelines 2006](#) and the [ANZECC Water Quality Guidelines](#).

The environmental offsets policy at Section 2.5 is to be used in conjunction with the Queensland Government Environmental Offsets Policy.

Relevant legislation, intergovernmental agreements and other EPA Operational policies are listed at [Section 4](#).

1.2 Application of policy

This operational policy applies when assessing or deciding applications (hereinafter referred to as development applications) relating to activities that are proposing to discharge residual waste water to waters, such as:

- development approvals under the [Integrated Planning Act 1997](#) (IPA) for EP Act chapter 4 activities (non-mining and non-petroleum environmentally relevant activities (ERAs)) prescribed under the [Environmental Protection Regulation 1998](#);
- environmental authorities under the EP Act for mining and petroleum activities;
- the assessment of *Environmental Impact Statements* prepared under the EP Act chapter 3 or the [Environmental Protection and Biodiversity Conservation Act 1999](#) (the EPBC Act);
- projects declared to be significant projects by the Coordinator General under the [State Development and Public Works Organisation Act 1971](#) (the SDPWO Act);

² Under the EPP Water, waste water means liquid waste and includes contaminated stormwater.

³ Queensland waters means all waters that are within the limits of the State and includes all tidal (coastal and estuarine) and non-tidal (riverine) waters, groundwaters and wetlands (see the definition in the *Acts Interpretation Act 1954*).

- development that is the subject of designation of land for community infrastructure under the [Integrated Planning Act 1997](#);
- when assessing transitional environmental programs or environmental evaluations under the EP Act; and
- when making environmental management decisions under the EPP Water involving waste water release on land, waste water recycling and the release of contaminated stormwater that may impact on surface waters or groundwaters.

In assessing development applications for EP Act chapter 4 activities the administering authority must comply with any relevant Environmental Protection Policy requirement and must consider the standard criteria of schedule 3 of the EP Act ([see Glossary of Terms](#)) and additional information given in relation to the application.

If the application seeks an increase in the scale or intensity, the administering authority must assess the application having regard to the proposed activity, the existing activity and the potential environmental harm the proposed activity and the existing activity may cause. Refer to section 73AA of the EP Act for applications in a wild rivers area.

Subject to IPA, the administering authority may impose **conditions on the development approval** it considers are necessary or desirable, and must include any condition the authority is required to impose under an Environmental Protection Policy requirement. For other conditions that may be imposed, refer to section 73B (3) and (4) of the EP Act.

In assessing and deciding applications for environmental authority (mining activity) for level 1 mining projects the administering authority may in granting the application impose the conditions on the environmental authority it considers necessary or desirable.

In deciding whether to grant or refuse the application or to impose a condition the authority must:

- (a) comply with any relevant Environmental Protection Policy requirement; and
- (b) subject to paragraph (a), consider - application documents for the application, the standard criteria, the wild river declaration for the area—to the extent the application relates to mining activities in a wild river area, any suitability report obtained for the application and the status of any application under the *Mineral Resources Act 1989* for each relevant mining tenement.

The operational policy also informs the application of EVs and WQOs in the assessment of non-ERA development applications, including under the *State Coastal Management Plan 2001* and Regional Coastal Management Plans (State Planning Policies under IPA). Information on [Implementing the State Coastal Management Plan](#) includes the Planning Scheme Guideline and Development Assessment Guideline. These guidelines provide advice on reflecting the relevant policies of the State and Regional Coastal Management Plans into Local Government planning schemes and for development assessment. Relevant policies include 2.4.1 Water quality management, 2.4.4 Stormwater management and 2.4.5 Groundwater.

A glossary of terms is at Appendix 6.1.

2. Policy/technical issues determination

2.0 Policy statements

The statements of policy informing assessment and decision making on applications for ERAs discharging residual waste water to Queensland waters are at [Explanatory notes for EPP \(Water\) AP](#) and summarized as follows. The policy context is considered with respect to receiving waters that have the biological integrity of:

a. Effectively unmodified (high ecological value) aquatic ecosystems

“The management intent for high ecological value aquatic ecosystems is to maintain the natural values; including the physico-chemical, biological, habitat and flow attributes. For any new ERA a decision to release waste water to high ecological value surface waters, or groundwater, is the least preferred option. Under the waste management evaluation procedure of section 15 of the Environmental Protection (Water) Policy 1997 (the waste management evaluation procedure), the management hierarchy requires the sequential evaluation of waste water prevention and waste water treatment and recycling before the evaluation of the release of waste water to land, sewer or surface water.

In addition, the activity must be carried out in accordance with best practice environmental management for the activity.

However if some release of waste water from the activity to high ecological value surface water is environmentally acceptable after consideration of the waste evaluation procedure, and there are no practicable alternative surface water discharge locations, the ERA would need to demonstrate:

- *an equivalent outcome of no, or negligible, change⁴ to the physico-chemical, biological, habitat and flow attributes beyond natural variation of the waters, excepting, in limited circumstances, within a defined initial mixing zone measured near the waste water release outfall location. The intent is that beyond the mixing zone boundaries, current environmental quality is maintained and the aquatic ecosystem is conservatively protected over time, taking into account the precautionary principle;*
- *some environmental assimilative capacity⁵ is preserved for future ecologically sustainable development;*
- *the proposal is in the public interest⁶ and provides outstanding net benefits to the region, or State as a whole⁷;*
- *where practicable, the proposal includes a like kind environmental offset⁸; and*
- *compliance with State Government obligations under intergovernmental agreements which include the management and protection of world heritage areas under the UNESCO Convention⁹; the management and conservation of wetlands under the [Ramsar Convention on Wetlands](#)¹⁰; and the management and protection of migratory birds and their environment under JAMBA and CAMBA¹¹”; or*

⁴ The method of assessing ‘no change’ to the physico-chemical, biological, habitat and flow ecosystem attributes of high ecological waters is given in the Queensland Water Quality Guidelines 2006 (Appendix D Compliance assessment protocols.)

⁵ The environmental assimilative capacity is broadly the capacity of the environment to receive some human induced input of contaminants or alteration, without causing unacceptable change.

⁶ Refer to the standard criteria listed under Section 3 of the *Environmental Protection Act 1994*.

⁷ Refer to the Terms and abbreviations section of the *State Coastal Management Plan 2001*.

⁸ To be of a ‘like-kind’ the environmental offset would need to be based on the same contaminant and preferably in the same water. However the environmental offset proposal would be considered by the administering authority on a case-by-case basis; seeking to deliver a net environmental gain to the water as a whole.

⁹ The *Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO) 1972*.

¹⁰ *RAMSAR Convention on Wetlands, Iran 1971*.

¹¹ Japan Australia Migratory Bird Agreement and China Australia Migratory Bird Agreement. Australian Treaty Series, respectively 1981 No.6 and 1988 No.22. Department of Foreign Affairs and Trade. Canberra.

b. Slightly to moderately disturbed aquatic ecosystems

“The management intent for the release of waste water to surface waters having the biological integrity of slightly to moderately disturbed aquatic ecosystems is considered with respect to the existing water quality.

For any new ERA, if after consideration of the waste evaluation procedure the release of contaminants to surface water is environmentally acceptable, the management intent is summarised below:

- *where the existing water quality is better than the scheduled water quality objectives, the management intent is to maintain the current water quality; while allowing in some circumstances the use of some of the remaining assimilative capacity for future development and population growth; and*
- *where the existing water quality corresponds to the scheduled water quality objectives, the management intent is to maintain the water quality; and*
- *where the existing water quality is of a lower quality than the scheduled water quality objectives, the management intent is to improve the water quality and prevent further degradation. Attainment of the scheduled water quality objectives will be sought through continual improvement over time and, depending on existing water quality, may be a long-term goal. Environmental offsets of a ‘like kind’ may be considered by the administering authority where there are no feasible alternatives to the release of waste water.*

In addition, the activity must be carried out in accordance with best practice environmental management for the activity. For existing ERAs the continuous improvement requirement of development conditions applies...’; or

c. Highly disturbed aquatic ecosystems

“The management intent for the release of waste water to surface waters having the biological integrity of highly disturbed aquatic ecosystems is to halt the decline and reverse the trend in water quality.

For any new ERA, if after consideration of the waste evaluation procedure the release of contaminants to surface water is environmentally acceptable, the management intent is to halt the decline and reverse the trend in existing water quality. However it is recognised that attainment of scheduled water quality objectives is a long-term goal.

In addition, the activity must be carried out in accordance with best practice environmental management for the activity. For existing environmentally relevant activities the continuous improvement requirement of development conditions also applies.

Environmental offsets of a ‘like kind’ may be considered by the administering authority where there are no feasible alternatives to the release of waste water.”

The above statements of policy are considered in the following sections 2.1 to 2.5, in conjunction with the Queensland and ANZECC Water Quality Guidelines and the role of EVs and WQOs in water quality assessment. An overall assessment flowchart is at Figure 1, the corresponding task list for assessing the discharge of residual waste water is at Table 1. A glossary of terms is at [Appendix 6.1](#).

Figure 1 — Assessment flowchart

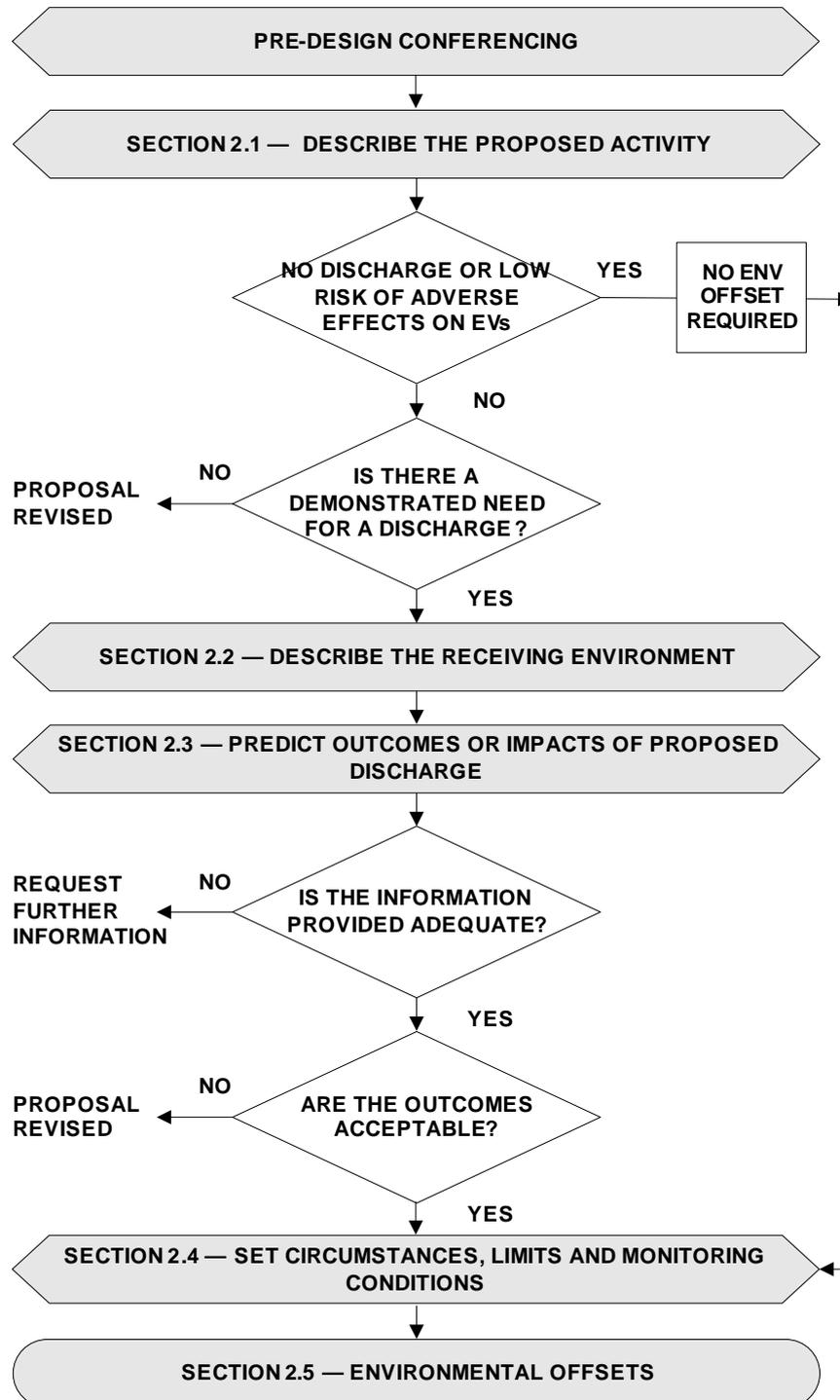


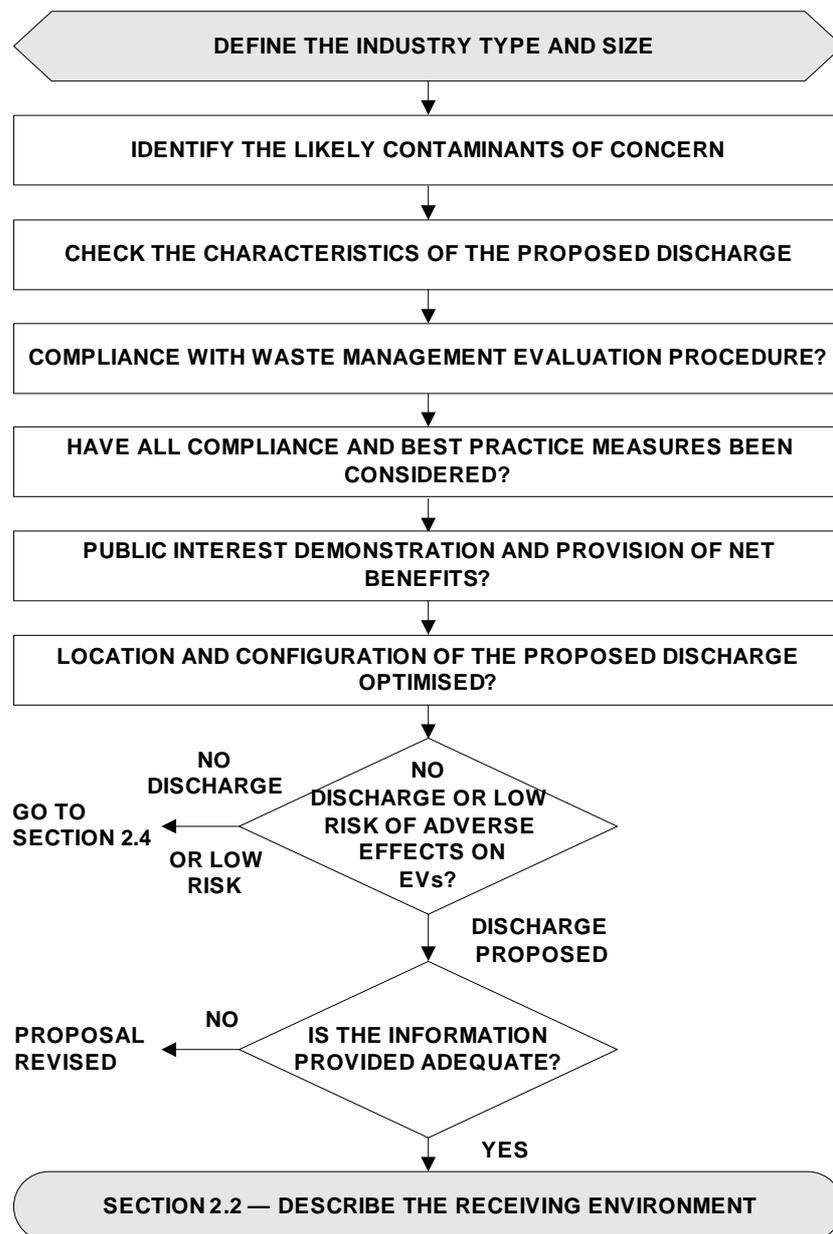
Table 1 — Task list for assessing the discharge of residual waste water

Section	Activity	Tasks list
2.1	Describe the proposed activity	<p>Define the industry type and size (proposed production).</p> <p>Is a residual waste water discharge proposed, or is the discharge assessed as low risk of having an adverse effect on an environmental value?</p> <p>Identify the potential contaminants of concern in the proposed discharge.</p> <p>Check the characteristics of the proposed discharge (quality/quantity/variability).</p> <p>Check the location and configuration of the proposed discharge.</p> <p>Have all reasonable and practicable measures been used to avoid or minimise the discharge (for example best practice, source reduction, recycling)?</p>
2.2	Describe the receiving environment	<p>Identify water bodies potentially affected by the proposed discharge. For each water body, what are the sustainable loads for key contaminants? What proportion of the sustainable load is used by this proposal?</p> <p>Check government planning requirements that apply to these water bodies (e.g. Ramsar, EPA Referable Wetlands, National Parks and Fish Habitat Areas).</p> <p>Has relevant information on the receiving environment been provided? Is it adequately described given the contaminants and risks associated with the proposed discharge?</p> <p>Are the EVs and WQOs for these waters listed in the EPP Water Schedule 1? (If not EVs and WQOs from the <i>Queensland Water Quality Guidelines 2006</i> and ANZECC Water Quality Guidelines apply).</p> <p>Have other sources and loads of contaminants in the catchment, including future loads, and previous history, been considered?</p>
2.3	Predict outcomes of the proposed activity	<p>Identify the need for predicting outcomes of the proposed activity (i.e. is modelling required?) and what predictive methods/models were used.</p> <p>Were the predictive methods used appropriately?</p> <p>If a mixing zone is proposed; check the EPP Water (Section 18) and ANZECC Water Quality Guidelines.</p> <p>For receiving water bodies, are WQOs met and EVs protected? If not, does the activity contribute to achieving them in the future?</p> <p>Determine the need for consideration of environmental offsets.</p>
2.4	Set limits, circumstances and monitoring conditions	<p>Specify any circumstances (for example limitations or timing issues) related to the approved discharge.</p> <p>Derive end-of-pipe limits from approved discharge loads/characteristics.</p> <p>Include compliance monitoring for the end-of-pipe/receiving environment</p> <p>Include reporting requirements for the approved activity.</p> <p>As required, condition the execution of an environmental offset agreement.</p>

2.1 Describe the proposed activity and discharge

This section involves the assessment of information provided by the applicant on the description of the proposed activity, as shown in Figure 2 below and summarised in the following text.

Figure 2 — Activity description and assessment



2.1.1 Define the industry type and size (estimated production)

The industry type and scale will help to classify the potential environmental risk from the proposed activity and discharge of residual waste water. The scale of the activity can be specified in production quantities such as area of production for aquaculture farms, tonnes of throughput for processing industries or equivalent persons in the case of sewage treatment.

2.1.2 Identify the potential contaminants of concern in the discharge from the proposed activity

The first step in assessing the discharge of residual waste water from the proposed activity is identifying the source waste streams and potential contaminants of concern. Contaminants can be a gas, liquid or solid, an odour, an organism, energy (as in a thermal discharge) or a combination of contaminants. Common industry point source discharges and their likely effects are summarised in Table 2.

Note that some industries/ERAs are commonly associated with particular classes of aquatic contamination; for example Waste Water Treatment Plants and nutrients. The [National Pollutant Inventory emission estimation technique manuals](#) list 90 priority substances on the basis of health and environmental risk, by industry sector, and the [USA EPA Toxic Release Inventory](#) lists 313 priority substances.

These inventories may assist in identifying other key contaminants by industry/ERA. The information can be used as a guide to check information in the application. A search of the academic literature and the internet would be undertaken for more information on specific activities not mentioned. Contaminants are related to process inputs and outputs and can transfer from media other than water (for example leach from solids, scrubber effluent, etc). Contaminants in residual waste water may also occur as unintended by-products of processes (for example dioxins and metal compounds).

Depending on the character and resilience of the receiving environment, and the degree of risk, direct toxicity assessment may be required on any available laboratory or pilot plant samples to complement literature evaluation of the additive toxicity of contaminants in the proposed discharge. Such analysis more closely resembles the situation in the natural environment than single chemical testing approach. Refer to the [ANZECC Water Quality Guidelines — volume 2, Section 8.3.6](#).

Table 2 — Potential issues of concern and water quality contaminants

Point source discharges	Potential issues	Water quality contaminants
Sewage effluent	Asphyxiation of aquatic animal life (e.g. low dissolved oxygen levels leading to fish kills), algal blooms, smothering of flora and fauna, impairment of ecosystem structure and function, and public health risks.	Carbonaceous material, nutrients, pathogens, suspended solids, toxicants (metals/metalloids, pesticides, residual disinfectants and pharmaceuticals).
Abattoir effluent	Asphyxiation of aquatic animal life (e.g. low dissolved oxygen levels leading to fish kills), algal blooms, smothering of flora and fauna, impairment of ecosystem structure and function, and public health risks.	Carbonaceous material, suspended solids, nutrients, pathogens, residual disinfectants and toxicants.
Mine discharges	Toxicity of sulphate, acid/alkaline solutions and metals/metalloids. Increased availability of metals due to pH changes, smothering of flora and fauna impairment of ecosystem structure and function, and salinisation. May affect stock and irrigation water.	pH, sulphate, temperature, suspended solids, turbidity, salinity, toxicants (metals/metalloids and other chemicals, including fluoride).
Aquaculture discharges	Asphyxiation of aquatic animal life (e.g. low dissolved oxygen levels leading to fish kills), algal blooms, smothering of flora and fauna, impairment of ecosystem structure and function, diseases and introduced species.	Carbonaceous material, suspended solids, nutrients and toxicants. Diseased organisms and antibiotics may be an issue in some operations.

Point source discharges	Potential issues	Water quality contaminants
Sugar mill cooling waters	Low dissolved oxygen levels leading to fish kills, elevated temperatures may lead to fish kills and other effects on fauna and flora.	Carbonaceous material, temperature and antifouling agents.
Chemical processing plants	Toxicity of acids, alkalis, metals or industrial chemicals. Increased availability of metals from pH changes, smothering of flora and fauna, algal blooms and low dissolved oxygen levels leading to fish kills.	pH, sulphate, toxicants (ammonia, metals/metal compounds (including sulphides)/metalloids, pesticides, and other chemicals), suspended solids, carbonaceous material, temperature, nutrients and by-products.
Power stations - blowdown water	Toxicity of metals and metalloids. Smothering of flora and fauna. Elevated temperatures and salinisation.	Suspended solids, toxicants (metals, metalloids and chemicals), temperature and dissolved salts.

2.1.3 Check the characteristics of the discharge from the proposed activity

The quality and quantity of the discharge from the proposed activity should be clearly characterised. This must include concentrations, typically averages and worst-case values of all potential contaminants of concern, assuming the treatment technology is working effectively. The quantity of the discharge must be similarly expressed for volumes and resulting contaminant loads. The expected variability with time is a further important consideration and percentiles may be used to express this. Wet weather influences must be considered and separate wet weather discharge characteristics defined where applicable.

The method used to estimate these characteristics must be clearly defined and realistically achievable from practical and economic viewpoints. This may be demonstrated with reference to guidelines, pilot plant results or previous applications of the adopted waste water treatment technology. Alternatively, process models may be used to predict these characteristics.

2.1.4 Have all best practice measures been used to avoid or minimise the discharge? Have all compliance matters been addressed?

The mandatory waste management evaluation assessment consideration is required under the EPP Water and the [Environmental Protection \(Waste Management\) Policy 2000](#) (EPP Waste). Assessment usually involves benchmarking against waste management principles, relevant best practice environmental management (BPEM) and evaluation of discharge alternatives. A range of processing options for the proposed activity are usually available to the applicant to prevent, abate or mitigate the waste water discharge and its impacts. These measures include segregating waste streams, source reduction, substitution of chemicals used, cleaning and processing with minimal water, recycling, reuse and best practice treatment and disposal alternatives.

a. Best practice environmental management for the proposed activity

The application should demonstrate that the management of the proposed activity will achieve an on-going minimisation of the activity's environmental harm through cost effective measures assessed against the measures currently used nationally and internationally for the activity. Best practice environmental management technology standards are industry and contaminant specific. Guidance is available from sources including environmental guidelines, research organisations, equipment manufacturers and performance records of industry sector leaders. A technology based standard using best practice environmental management would comprise a benchmark to satisfy the EPP Water waste minimisation provisions.

b. Compliance with the Environmental Protection Policies — waste management evaluation

The application must demonstrate that the proposed activity complies with the [EPP Water](#) provisions, including Sections 14 to 24, the EPP Waste provisions, including Sections 10 to 13 and 15 to 17 (as relevant) and consider the [Queensland Water Recycling Guidelines 2005](#) and the National Water Quality Management Strategy's [Australian Guidelines for Water Recycling: Managing Health and Environmental Risks 2006](#).

The latter guidelines provide the framework to encourage the adoption of sustainable water recycling to better manage water resources, and to support economic growth while protecting the environment and safeguarding public health. For industrial waste streams it should also be demonstrated that a release of effluent to sewer, subject to Local Government conditions, is not an acceptable option. A letter from the relevant Local Government advising that discharge to sewer would not be permitted is the common way that this may be demonstrated.

c. Some discharge of residual waste water shown to be unavoidable and environmentally acceptable

Waste water discharge to receiving waters is the least preferred option. The application must demonstrate that waste management evaluation procedures have been addressed and best practice environmental management measures have been used to avoid or minimise the residual discharge to water, and there are no alternate discharge locations or other residual waste water treatment, reuse or disposal options that cause less harm to the environment.

Environmentally acceptable in the context of this paragraph means incorporating all best practice and practicable waste minimization measures.

d. Compliance with State Government obligations under Intergovernmental Agreements and other statutory instruments

The application must comply with, and assessment and approval processes must address matters of State interest, including relevant State Government obligations under inter-government agreements including:

- [Intergovernmental Agreement on the Environment](#);
- [Agreement under the Council of Australian Governments \(COAG\) Water Reform Framework](#);
- [Convention on Wetlands \(Ramsar, Iran, 1971\)](#);
- [UNESCO World Heritage Convention 1972](#); and
- International Agreements Relating to Migratory Birds and Wetlands (the Japan-Australia Migratory Bird Agreement ([JAMBA](#)), the China-Australia Migratory Bird Agreement ([CAMBA](#)) and the [Directory of Important Wetlands Australia](#)).

Inter-government agreements contain a range of State obligations. Examples include the promotion the sustainable use and conservation of Ramsar wetlands, protecting world heritage areas and adopting ecologically sustainable development in natural resource decision-making and approval processes. State obligations under COAG include the implementation of the [National Water Quality Management Strategy](#).

Matters the subject of the agreements may be of national environmental significance under the EPBC Act and trigger Commonwealth assessment and approval processes. The applicant is responsible for self-assessment and referral to the Australian Government for impact assessment on a matter of national environmental significance. For further information refer to the Department of Environment and Heritage website, EPBC Act Policy Statements — [Significant Impact Guidelines/Matters of National Environmental Significance](#).

Relevant statutory instruments having the effect of State planning policies include the *State Coastal Management Plan 2001*, Regional Coastal Management Plans (Wet Tropical Coast, Cardwell - Hinchinbrook,

Curtis Coast, South-east Queensland) and the *South East Queensland Regional Plan 2005 – 2026*. **State planning policies** include [SPP 2/02 \(Planning and Managing Development Involving Acid Sulphate Soils\)](#) and [SPP 2/07 \(Protection of Extractive Resources\)](#) that identifies those extractive resources of State or regional significance where extractive industry development is appropriate in principle, and aims to protect those resources from developments that might prevent or severely constrain current or future extraction when the need for use of the resource arises.

EPA Referable Wetlands datasets are available to State and Local Government through the Queensland Government *Infolink* and development triggers for land in or near are at [Assessable development under Integrated Planning Regulation 1998](#).

e. For HEV waters — is the proposal in the public interest and does it provide outstanding net benefits to the region, or State as a whole?

Public interest under the standard criteria of Schedule 3 of the EP Act may be ascribed as meaning the interest of the public as distinct from the interest of the individual(s).

Net benefits to the region, or the State as a whole, has the meaning under the [State Coastal Management Plan 2001](#).

These matters may be addressed if, for example:

- the proposal provides a public service such as municipal sewage disposal or provides goods or services to the Queensland community to meet an identified demand and there is no alternative option that is capable of meeting that demand; and
- the potential environmental, economic and social impacts of the project (whether beneficial and adverse) have been assessed at a regional or State level, depending on the project scale; and strongly supports the proposal.

Note the public interest and applicable environmental impact studies, assessments or reports are a part of the standard criteria under Schedule 3 of the EP Act that must be considered in assessing all applications.

2.1.5 Check the location and configuration of the discharge from the proposed activity

The location of the proposed discharge is important as it determines the receiving waters potentially affected. Further, the potential impacts of the proposed discharge are influenced by the configuration under which it is operated (for example some discharges may only occur in the wet season or under slack water, or flood or ebb-tide conditions). A further consideration is the diffuser or outfall configuration. A diffuser may be used to provide better mixing in the initial zone. Outfalls may be submerged to promote mixing or achieve aesthetic goals. The application should explain the rationale behind the proposed discharge location and configuration. Similarly, the rationale for rejecting alternatives to discharge should be explained.

It would typically be necessary and desirable for a discharge pipe to be submerged below low water spring datum, except in cases of denser than ambient waste waters where submergence may exacerbate adverse environmental effects.

2.1.6 ERAs with low assessed risk or no discharge of residual waste water

If the proposed ERA does not involve a direct or indirect discharge of residual waste water to waters, then conditions prohibiting waste water discharge would be included. If the ERA includes a discharge, but represents a low risk of having an adverse effect on an environmental value, then further detailed steps may not be required. Subject to addressing the matters in [Section 2.1](#), and checking for any matters in [Section 2.2](#) that would preclude the discharge, the assessment should proceed to [Section 2.4](#).

A low risk of having an adverse effect on an environmental value would generally occur when pollutant loads are decreasing and are a relatively minor contribution to the receiving water, and when toxicant concentrations in the discharge are below trigger values listed in Section 3.4 of the ANZECC Water Quality Guidelines.

Another case may be a relatively infrequent discharge such as overtopping of waste water storage during flood conditions.

Where no toxicant trigger values are available but published information suggests a chemical may be of concern, direct toxicity assessment may be required on any available laboratory or pilot plant samples to ensure risks are low. Refer to the [ANZECC Water Quality Guidelines — volume 2, Section 8.3.6](#) and [Appendix 6.2](#) of this operational policy.

Development applications involving contaminants found to be low risk or involving no discharge of waste water require no further receiving water quality assessment.

Development conditions would require monitoring and reporting to annually confirm the absence of adverse effects on environmental values or would prohibit waste water discharge (in development applications where no discharge was proposed). Development conditions would also typically specify the nature of the permitted discharge and require monitoring of discharge volume and quality to ensure the activity was carried out as described in the application. In most cases, conditions also typically prohibit discharge of contaminated stormwater. For some activities, stormwater treated to render it less hazardous may comprise a waste water stream that is permitted to be discharged subject to conditions.

Summary

Is there a demonstrated need for a discharge of residual waste water? Are relevant EPP and other compliance issues addressed?

Note that in deciding whether to grant or refuse an application the administering authority must comply with any relevant EPP requirement and must consider the standard criteria of Schedule 3 of the EP Act.

Applications must demonstrate that the discharge of residual waste water from the proposed activity is unavoidable and environmentally acceptable, and other EPP requirements and other compliance requirements are addressed.

If not demonstrated the application should be revised following an information request.

Applicants are encouraged to discuss the above requirements at pre-design conferencing.

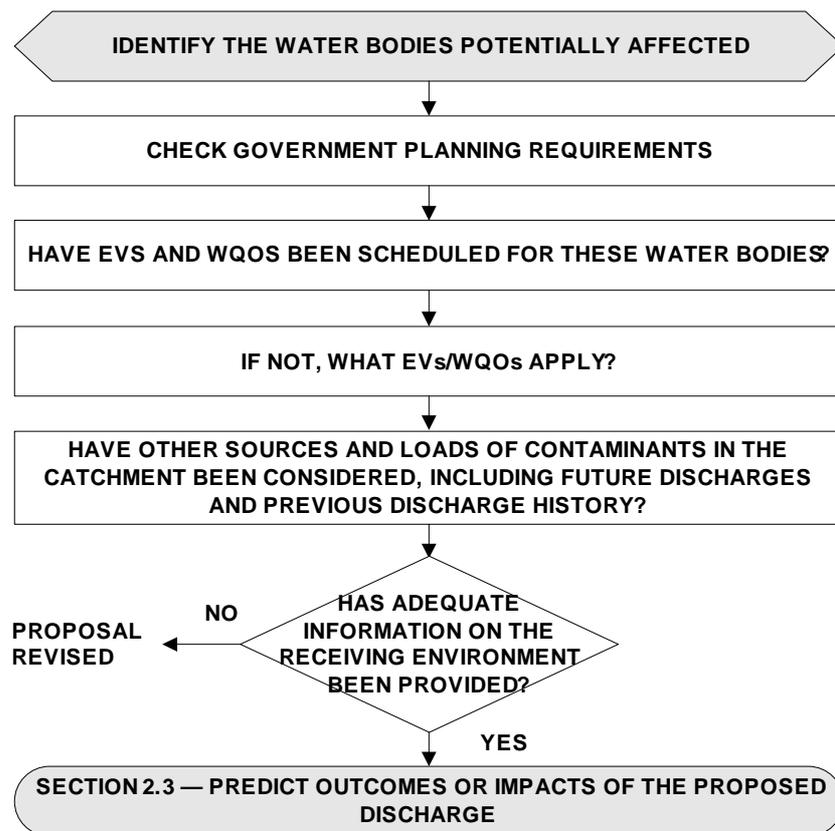
Pre-design conferencing is offered by the EPA to all prospective applicants seeking direction and advice on development applications; including on the preparation of development applications and the necessary documentation to ensure that lodged applications are supported by the requisite information to enable the administering authority to make a decision. Applicants are encouraged to compile information for pre-design conferencing of concepts and plans.

2.2 Describe the receiving environment

This section involves the assessment of information provided by the applicant on the description of the receiving environment, as shown in Figure 3 below and summarised in the following text.

For the receiving waters potentially affected by the proposed discharge, the applicant should identify the EVs and WQOs and provide a description of the existing character, resilience and environmental values of the receiving environment. Refer Appendix 6.1 for the glossary of terms.

Figure 3 — Description of receiving environment

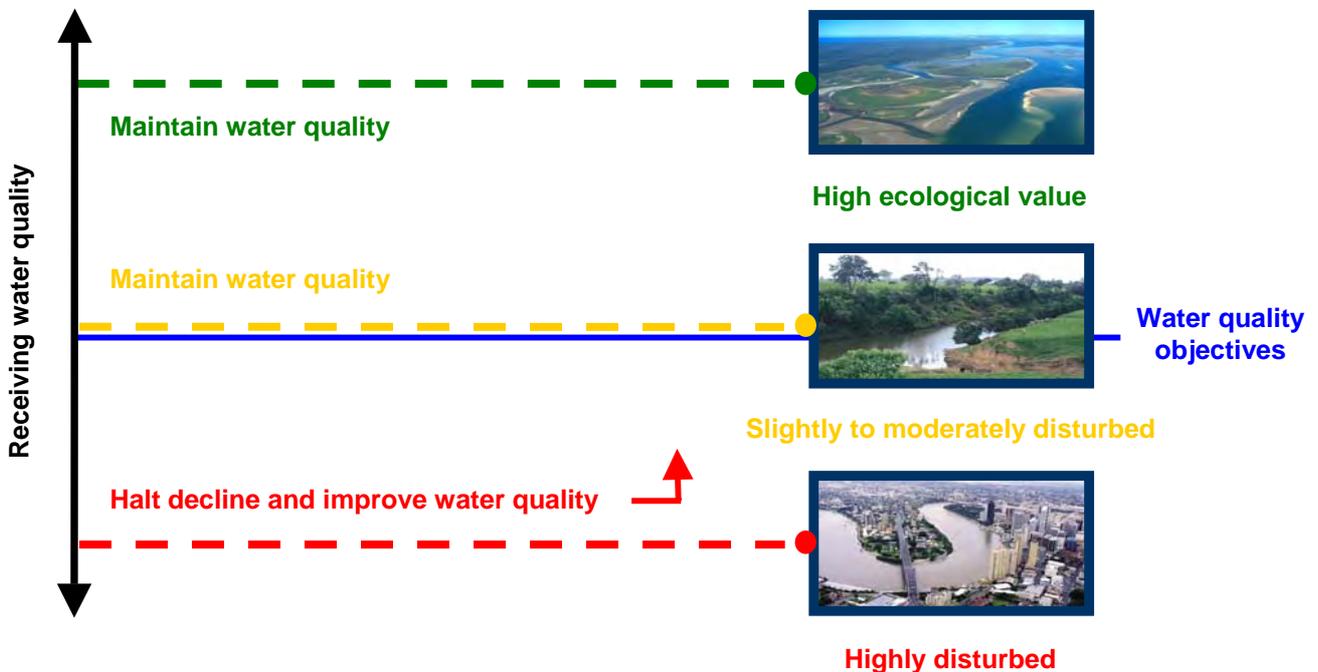


2.2.1 Identify the water bodies potentially affected by the proposed discharge

The intent is to characterize the receiving waters including EVs, WQOs and levels of ecosystem protection. Key information sources are the EPP Water (Schedule 1) and the *Queensland Water Quality Guidelines 2006*, for waters not listed under Schedule 1. As in Section 2.2.2, other State and regional planning documents may also be relevant.

It is important to determine what receiving water ecological health monitoring data is available and how it compares with the relevant water quality objectives and the policy intent (refer Figure 4 below, [Section 2.2.3](#) and [Section 2.3](#)).

Figure 4 — Receiving water quality, water quality objectives and management intent



EVs relevant to the receiving waters should be used for the assessment of development applications. For example the affected water body might be a bay, an estuary or riverine waters, and different EVs and WQOs will apply to different parts of the water body. This information is either contained in the documents referenced in Schedule 1 of the [EPP Water](#) (accessible via the [EPA website](#)) or from the *Queensland Water Quality Guidelines 2006*. Local information may need to be obtained if the latter does not adequately characterise the receiving waters, refer [Section 2.2.5](#).

Further, the levels of aquatic ecosystem protection need to be determined as either high ecological value (HEV) or slightly-to-moderately disturbed (SMD) or highly disturbed (HD). Levels of aquatic ecosystems protection may be available from a number of sources including the EPP Water, State and Regional Coastal Management Plans (Areas of State Significance (Natural Resources)), the [Directory of Important Wetlands Australia](#) and Marine Parks and National Parks designations for waters in areas of protected estate. Further guidance in assigning the level of aquatic ecosystem protection is given in Table 3, Section 2.2.2 and the ANZECC Water Quality Guidelines (Section 3.1.3).

2.2.2 Check applicable government plans or requirements

Environmental management objectives, levels of aquatic ecosystem protection and other relevant matters are often specified in applicable planning designations. These matters are a part of the standard criteria of Schedule 3 of the EP Act that must be considered by the administering authority in deciding the application. Examples of Commonwealth requirements include matters of national environmental significance, such as Ramsar listed wetlands and World Heritage Areas, threatened species, as well as Great Barrier Reef Marine Park requirements. Examples of State requirements include the State and Regional Coastal Management Plans, Marine Park zoning plans, Water Resource Plans, Fisheries Habitat Areas, National Parks, EPA Referable Wetlands (refer Section 2.1.4 d) and the Great Barrier Reef Water Quality Protection Plan. Local Government information may also include relevant designations in Local Government planning schemes.

2.2.3 Check applicable environmental impact studies, assessments or reports

Relevant information may be available through Commonwealth and State Government Agencies and Authorities, Non-Government Agencies and Local Government web sites, and internet and library searches; or required by the applicant.

2.2.4 Has relevant information on the receiving environment been provided? Is it adequately described given the contaminants and risks associated with the proposed discharge?

It is essential that ecosystem health and catchment information is obtained to assess the outcomes of the proposed activity. Information must be provided on both the character and resilience of the receiving environment to address the standard criteria of Schedule 3 of the EP Act and would include current local ecosystem health and water quality information, potential catchment pollutant sources and local catchment issues. This information may already exist; however it must be current and adequately address temporal and spatial variations to be representative of current conditions. The information may need to be established as part of special investigations prior to lodging the development application. **Pre-design conferencing to address these issues is strongly encouraged.**

Local or regional ecological health monitoring data may be available for the receiving waters (for example from EPA, Department of Natural Resources and Water (DRNW), regional natural resource management bodies or Local Government). The information will be required for comparing the existing water quality of the receiving waters with the WQOs, and must relate to the specific contaminants and assessed risks associated with the proposed residual discharge of waste water to the receiving waters. Current ecological health information may also be required for calibration of predictive models, refer [Section 2.3](#) and Appendix 6.3.

In considering the proposed discharge of residual waste water, the policy intent relates to the level of ecosystem protection and the existing receiving water quality, as shown in Figure 4 and summarised in Table 3.

There may be reports, environmental studies or monitoring results that assist in characterising the receiving environment from sources such as the EPA, the DNRW, the Department of Primary Industries and Fisheries (DPIF), other State Government departments, Local Government, universities, external research organisations and industry groups. This information is a valid consideration under the standard criteria of Schedule 3 of the EP Act.

Note that the precautionary principle must be considered where EVs for waters are threatened and information on the resilience of the system is unknown or limited.

Table 3 — Levels of aquatic ecosystem protection, policy intent and environmental management decisions

High ecological value
<p>The policy intent for high ecological value waters is to afford a high degree of protection of the EVs by ensuring no measurable change to water quality, biological diversity or flow condition. Applications proposing residual waste water discharge to HEV waters should be accompanied by local reference data and local biological effects data. Where practicable the proposal should include a 'like kind' environmental offset, seeking to deliver a net environmental gain to the water.</p> <p>For toxicants listed in Section 3.4 of the ANZECC Water Quality Guidelines, environmental management decisions would include trigger values for toxicants¹² to protect 99 percent of species in the affected water. HEV waters may include fish habitat areas, dugong protection areas, Marine Parks, National Parks and Areas of State Significance (Natural Resources) under State and Regional Coastal Management Plans. Additional HEV waters may be identified through State or regional strategies, ecological studies or stakeholder consultation.</p>
Slightly to moderately disturbed
<p>The policy intent for slightly to moderately disturbed waters is dependent upon current water quality. If the current water quality is better than the WQOs, the intent is to maintain current water quality — using some assimilative capacity. If the current water quality is worse than the WQOs, the intent is to prevent further degradation and improve water quality over time.</p> <p>Environmental offsets of a 'like kind' may be considered by the administering authority where there are no feasible alternatives to discharge of residual waste water.</p> <p>For toxicants listed in Section 3.4 of the ANZECC Water Quality Guidelines, environmental management decisions would include trigger values for toxicants¹³ to protect 95 or 99 percent of species in the affected water. The applicant may also use risk analysis techniques, including direct toxicity assessment; all supporting documentation should be supplied with the development application. EPA officers should request assistance from the Environmental Sciences Division in assessing the validity of the data.</p>
Highly disturbed
<p>The policy intent for highly disturbed waters is that receiving water quality should:</p> <ul style="list-style-type: none"> a) improve towards achieving the WQOs to protect the EVs, over time; and b) not measurably deteriorate as a result of the proposed discharge. <p>For toxicants listed in Section 3.4 of the ANZECC Water Quality Guidelines, environmental management decisions would include trigger values for toxicants for slightly to moderately ecosystems would be adopted first, although lower levels of protection (for example 90 percent of species) may apply in some cases. An application for a discharge into HD waters should be supported by reference to local monitoring data.</p> <p>Environmental offsets of a 'like kind' may be considered by the administering authority where there are no feasible alternatives to the discharge of residual waste water.</p>

¹² See Table 3.4.2 of the ANZECC Water Quality Guidelines.

¹³ Refer above.

2.2.5 Have EVs and WQOs for the waters been listed in Schedule 1 of the EPP Water?

EVs and WQOs for waters listed under Schedule 1 of the EPP Water must be adopted and considered in assessing development applications.

2.2.6 If EVs and WQOs are not listed under Schedule 1 of the EPP Water, what EVs/WQOs apply?

Where EVs and WQOs for the waters have not been specifically set in Schedule 1 of the EPP Water then, under Section 11(2) of the EPP Water, the WQOs are the set of water quality guidelines that will protect all EVs for the waters, including the Queensland and ANZECC Water Quality Guidelines.

Where the default guideline values are inappropriate for the receiving environment, for example due to non-anthropogenic reasons such as high organic carbon, WQOs would be based on water quality guidelines derived from data collected at appropriate local reference sites — refer [Section 3.1](#).

Table 4 lists EVs for waters, refer also to Appendix 6.1. The EPA guideline [Establishing draft environmental values and water quality objectives](#) sets out the process for establishing EVs and WQOs under the EPP Water.

Table 4 — Environmental values for waters

EVs of water	Examples of suitability for use
<p>Aquatic ecosystems EVs The level of aquatic ecosystems protection that the WQOs are intended to protect includes:</p> <ul style="list-style-type: none"> • High ecological value ecosystems • Slightly to moderately ecosystems • Highly disturbed ecosystems 	<p>Maintain or improve the biological integrity of the respective aquatic ecosystems condition (HEV, SMD, HD).</p> <p>Total to partial complement of aquatic and adjacent terrestrial habitat and biota diversity and abundance (depending on the level of protection), including water associated wildlife.</p>
<p>Human use EVs include:</p> <ul style="list-style-type: none"> • Recreation and aesthetics 	<p>Primary contact recreation (e.g. swimming).</p> <p>Secondary contact recreation (e.g. boating).</p> <p>Visual recreation (e.g. natural landscape).</p>
<ul style="list-style-type: none"> • Drinking water 	<p>Water sources used for drinking water.</p>
<ul style="list-style-type: none"> • Primary industries 	<p>Irrigation, general agricultural use and stock watering.</p> <p>Stock watering.</p> <p>Human consumption of aquatic foods (fish, crustacean and mollusks) — commercial and recreational sources.</p> <p>Aquaculture.</p>
<ul style="list-style-type: none"> • Industrial 	<p>Generic processes (heating and cooling).</p> <p>Specific industries (textile, chemical, paper and pulp).</p> <p>Power generation (hydro-electric).</p>
<ul style="list-style-type: none"> • Cultural and spiritual 	<p>Protection of cultural resources — places or objects of historic or indigenous significance or value.</p>

2.2.7 Have other sources and loads of contaminants in the catchment been considered, including future discharges and previous discharge history?

For some contaminants such as nutrients and sediment it is necessary to consider other catchment sources and loads, and if the activity will be contributing to these loads. Considering catchments loads is particularly important where WQOs are not currently being achieved in receiving waters potentially affected by the discharge and multiple discharge sources exist.

It should be noted that the EPP Water also requires discharge of waste water from future developments to be considered in the decision making process. Possible sources of information include development applications, Local Government sewerage planning strategies, the [EPA Point Source Database](#) and the Department of Infrastructure and Planning. This aspect is important because the administering authority would not allocate all available assimilative capacity to a single application, and an application should not seek the discharge of a contaminant where the proposed load was a significant proportion of the sustainable load; i.e. the contaminant load consistent with the maintenance of the WQOs for the receiving waters. The concept of sustainable load including consideration of assimilative capacity is addressed further under [Section 2.3.4](#).

The sustainable load can be determined by studies of aquatic ecosystem health and modelling to predict the effect of natural catchment and anthropogenic loads (diffuse and point source) on the water quality objectives of the receiving water. This process is generally undertaken in collaboration with regional natural resource management bodies and other relevant stakeholders.

For some receiving waters, previous management actions have resulted in the reduction of contaminant loads in order to achieve water quality objectives. The administering authority would consider it important that improved environmental outcomes be maintained, rather than re-establish discharge loads. Load history may also give insight into the likely effect of certain levels of discharge on water quality. Environmental offsets may be considered by the administering authority for SMD and HD waters with no assimilative capacity for the contaminant, and where there are no feasible alternatives to the discharge of residual waste water.

Summary

Has adequate information been provided to describe the character, resilience and environmental values of the receiving environment? Have applicable government plans, requirements, environmental impact studies, assessments or reports been considered?

Note that the above relates only to part of the standard criteria of Schedule 3 of the EP Act. All the standard criteria and other prescribed matters must be considered by the administering authority in deciding whether to grant or refuse the application.

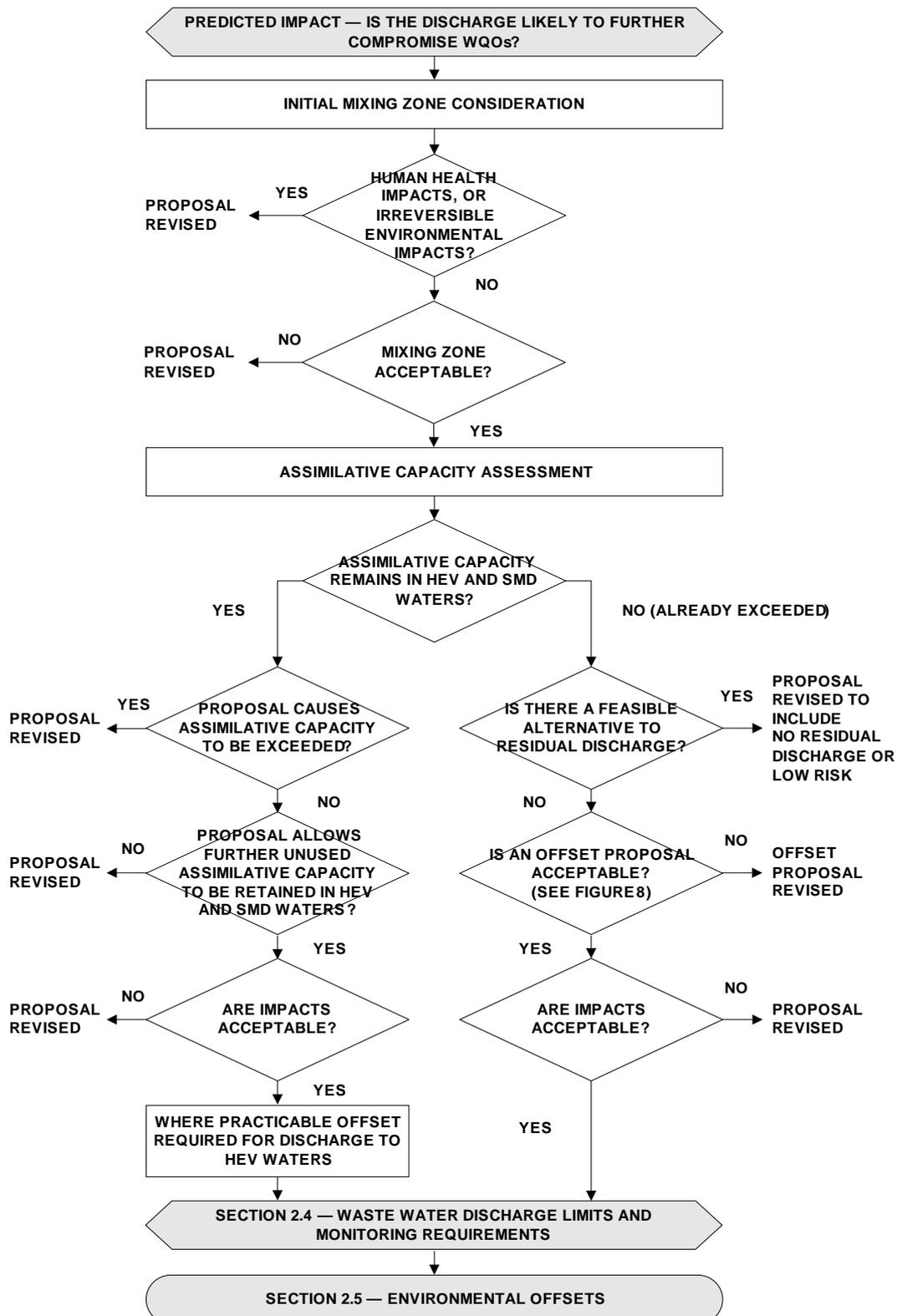
If not demonstrated, the application should be revised following an information request.

Applicants are encouraged to discuss the above requirements at pre-design conferencing.

2.3 Predict outcomes or impacts of the proposed discharge

This section involves the assessment of information provided by the applicant on the predicted outcomes or impacts of the proposed discharge, as summarised in the following text and shown in Figure 5 below.

Figure 5 – Prediction of impacts of proposed discharge



2.3.1 Predicted impact of the proposed discharge of residual waste water on the EVs and WQOs of the receiving waters

Prediction of the environmental outcomes or impacts that would result from the proposed ERA requires the completion of quantitative assessments which may involve numerical modelling procedures to estimate contaminant loads, changes to receiving waters contaminant concentrations and the effects of mitigation actions. Refer to Appendix 6.3 — *Numerical modelling of environmental impacts and mitigation actions*.

Prediction of the impact of the proposed discharge of residual waste water on receiving water quality should be compared to the WQOs — in the context of the policy intent at Section 2.0, which is summarised below and shown at [Figure 4](#). Existing receiving water quality should be the baseline comparison for impact assessment.

a. For the discharge of residual waste water to high ecological value (HEV) receiving waters

The policy intent in considering an application to discharge residual waste water into high ecological value receiving waters is to maintain the natural values; including the physico-chemical, biological, habitat and flow attributes.

b. For the discharge of residual waste water to slightly to moderately disturbed (SMD) receiving waters

The policy intent in considering an application to discharge residual waste water into slightly to moderately disturbed receiving waters is considered with respect to the existing water quality — either maintain (use some assimilative capacity) or improve (over time).

c. For the discharge of residual waste water to highly disturbed (HD) receiving waters

The policy intent in considering an application to discharge residual waste water into highly disturbed receiving waters is to halt the decline and reverse the adverse trend in water quality. Highly disturbed receiving waters do not have any assimilative capacity. It is recognised that attainment of WQOs for highly disturbed receiving waters is a long-term goal.

2.3.2 Where WQOs are not currently being achieved, is the discharge likely to further reduce receiving water quality?

If the WQOs of the receiving waters that are potentially affected by the proposed discharge are not currently being achieved, a significant environment risk is associated with the proposed discharge as further environmental harm is likely to occur. In this case the EVs will not be protected and pre-design conferencing with the applicant should consider alternatives. Where the discharge of residual waste water from the proposed ERA may not otherwise be avoided, reused, recycled or other disposal alternatives adopted; further considerations by the administering authority should include environmental offsets where there are no feasible alternatives to the discharge of residual waste water — refer to [Section 2.5](#).

2.3.3 Initial mixing zone

Mixing zones are a mandatory consideration under the EPP Water and applications must:

- comply with Section 18 of the EPP Water (waste water releases to surface water);
- consider the [ANZECC Water Quality Guidelines](#) for mixing zones;
- include the results of the baseline water quality monitoring in the area of the proposed mixing zone; and
- for HEV waters — provide predictive modelling results that demonstrate no or negligible change to the ecological attributes beyond the mixing zone, refer to [Appendix 6.2](#).

A mixing zone is a permitted zone of non-compliance with the receiving WQOs and is primarily for managing soluble toxicants where concentrations in the discharge are above toxicant trigger values in Section 3.4 of the

ANZECC Water Quality Guidelines. Where this is the case, further risk assessment including direct toxicity assessment (DTA) for biological effects, should be considered prior to mixing zone assessment.

Refer to the [ANZECC Water Quality Guidelines — volume 2, Section 8.3.6](#). Where the toxicant concentrations in the discharge are found to not cause toxicity, mixing zone assessment may not be required. Results of DTA will also be used to assess the actual dimensions of the mixing zone.

Various predictive models are available for estimating initial mixing zones, evaluating outfall diffuser designs and defining areas around the outfall where concentrations may exceed WQOs; refer Appendices [6.2](#) and [6.3](#).

The administering authority would not approve a mixing zone if inclusion would be likely to result in human health impacts, irreversible environmental impacts, unacceptable impacts to biota or where the discharge of residual waste water was characterised by a lack of effluent plume dispersion.

Mixing zone considerations include:

- only one mixing zone, minimised to the greatest practicable extent in accordance with the waste management hierarchy, is permitted for an ERA;
- spatially defining the mixing zone based on compliance with estimated receiving environment concentrations using mean flows and maximum expected toxicant concentrations for the discharge against chronic toxicant concentration (refer Appendix 6.2). The diameter (as depicted in Figure 6) should be measured from the diffuser port and should be defined by considering the maximum extent from a range of tidal conditions in tidal areas covering at least slack tides and mid-tide conditions for all toxicants present in the discharge. In non-tidal streams, the minimum consecutive seven day average flow with a 10-year recurrence interval is recommended as a guide to minimum dilution conditions;
- ensuring the mixing zone would not provide a barrier to the migration of aquatic fauna in riverine and estuarine waters, i.e. not take up the width of the stream. As a general rule, the maximum lateral dimension should be the lesser of 50m diameter or 30 percent of the waterway width for riverine and estuarine waters and a radius not exceeding 100m from the diffuser port for coastal/marine waters;
- avoiding overlap of mixing zones from neighboring discharges. It is recommended that the edges of the mixing zones be at least 200m apart. The combined affect should be assessed;
- not impinging on the shore line; for example, based on the mean on the low water spring tide (Mean Low Spring Tide);
- the use of mixing zones is not appropriate for managing the discharge of nutrients, bio-accumulatory or particulate substances. For nutrients, see discussion below for management using reference based assessment;
- mixing zones are typically not applicable to waters with significant and regular use for primary contact recreation, existing aquaculture development approvals, areas allocated to aquaculture under planning frameworks, waters of high ecological value, conservation significance or scientific importance or near potable water intakes;
- the discharge limits should be set such that within the mixing zone the residual waste water discharge does not cause odours, surface discolouration, visible floating foam, oils, grease, scum, litter or other objectionable matter;
- contaminant concentrations in the mixing zone must not be acutely toxic to fish, other aquatic vertebrates, commercial species or endangered wildlife, cause significant irreversible harm including objectionable bottom deposits, the growth of undesirable aquatic life or the dominance of nuisance species (such as algal blooms). The use of toxicity-based guidelines or site-specific biological effects

data is usually required to define the boundary of the mixing zone (refer Figure 6 and Appendix 6.3); and

- for large flowing freshwater streams where effluent discharges are unlikely to have significant density difference to the receiving waters, the effluent plume may extend a considerable distance downstream. The applicant would need to confirm the proposed discharge did not violate the WQOs of the receiving waters after full lateral mixing.

When assessing thermal discharges and oxygen demanding substances, acute effects should not occur anywhere in the receiving waters, for example no harmful dissolved oxygen sags are caused. In these cases, maximum concentrations and loads should be modeled and assessed to assess potential impacts. Predicted environmental concentrations and levels should be compared to known acute effect levels.

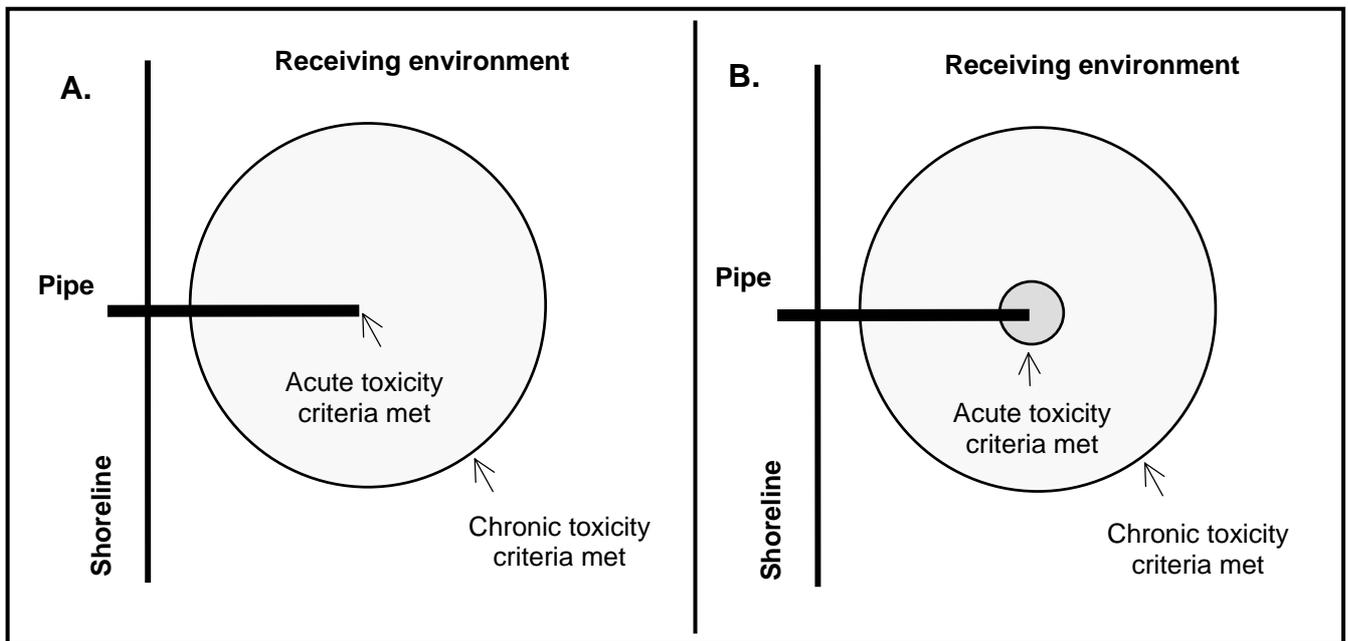


Figure 6 — Spatially defining an initial mixing zone.

A. Low risk configuration where acute toxicity levels are met end-of-pipe.

B. Configuration that involves a small zone within the mixing zone where acute toxicity criteria may not be met but have a low risk of causing acute toxicity.

When assessing effects of contaminants that are based primarily on a reference condition rather than direct effects, for example nitrogen and phosphorus concentrations, assessment typically requires water quality objectives to be met on a percentile basis (for example median concentration). It is not necessary that such concentrations are met directly at the discharge point as effects of dilution, assimilation and average receiving environment conditions should be considered. Prediction of effects of these discharges is typically a far-field issue and needs to consider the assimilative capacity of the waters (see Section 2.3.4).

Monitoring of effects of discharges in these cases is typically undertaken in the centre of waterway channel at various distances from the discharge point. Compliance with reference criteria should be met within 3 stream widths or 300m, whichever is the smaller as a general guide. Approval of zones with exceeded water ambient quality objectives greater than this size may be granted in specific cases where social and economic considerations support the discharge of residual waste water and there are no other feasible alternatives. Regardless, localised environmental harm should not occur, for example smothering of corals with benthic algae from nutrients.

For discharges involving contaminants that are not directly toxic, diffusers are still desirable and may also be required to achieve good initial dilution and avoid undesirable effects such as visible plumes or slicks and biological effects such as avoidance behavior. Modeling may be required to design the diffusers to optimize dilution and location. For example, it would generally be desirable to achieve at least a 1:50 dilution within 100m in any direction from the discharge point of the release. Discharges from pipes should also be located so that they are submerged under all tidal conditions, unless the discharge is denser than ambient. Discharges to poorly mixed waterways should be discouraged, for example upper estuaries, below barrages and small waterways with limited tidal exchange.

In cases where a mixing zone was permitted, development conditions would require the applicant to install measures such as diffusers on which the predictions were based and require a compliance monitoring program to verify that the minimum dilution ratios and concentrations predicted for mixing zone were achieved at the modelled or DTA determined mixing zone boundary.

Specific considerations include:

- Loss of aesthetic enjoyment or generation of an objectionable odour;
- **Public notification.** As the environmental values for waters may be prejudiced by the inclusion of a mixing zone, impact assessable development applications proposing a mixing zone should become public knowledge through the public notification stage of the application. Development conditions may require signage to identify the location of the adjacent mixing zone;
- **The precautionary principle** must be applied where environmental values are threatened and information on the resilience of the system is limited. Consequently the administering authority must, in considering the application and assessing risks to the ecological health of waters outside the mixing zone, adopt the precautionary principle to ensure that the current environmental quality is maintained beyond the mixing zone boundaries and that human health and aquatic ecosystems are conservatively protected within the mixing zone; and
- For HEV waters **peer review assessment** of the mixing zone proposal is required, including the demonstration of the lack of impacts beyond the mixing zone boundaries, and must be submitted with the development application. The EPA can advise of potential peer reviewers.

2.3 4 Assimilative capacity and sustainable load

a. Policy issues

Refer to Section 2.0.

Assimilative capacity is the capacity of the receiving waters to receive some human induced input of contaminants, or alteration, while still achieving the water quality objectives.

b. Release of assimilative capacity in HEV and SMD waters for discharge of residual waste water

Decisions about the use of assimilative capacity in HEV and SMD receiving waters for the discharge of residual waste water must be considered after all options to manage the waste water have been assessed and managed by the administering authority in the context of sustainable and efficient use of scarce resources — see also sub-section *d* below, *Assimilative capacity of HEV water not to be exceeded by discharge of residual waste water*.

A development application should demonstrate that the assimilative capacity of the receiving waters is not exceeded and that some assimilative capacity is preserved for future ecologically sustainable development - the proportion proposed to be consumed should be determined.

As a guide, the majority proportion of the assimilative capacity should be retained for future ecologically sustainable development.

The administering authority may consider the role of market-based instruments in managing these issues (for example flexible or incentives based mechanisms). For HEV waters the policy intent is that, where practicable, the application includes an environmental offset proposal seeking to deliver a net environmental gain to the water as a whole, see Section 2.5.

c. What are the sustainable loads for key contaminants?

The sustainable load of a particular contaminant is the maximum amount that a water body can receive without failing to meet the WQOs and therefore adversely affecting EVs. The concept of sustainable load is particularly important for oxygen demanding substances, nutrients, sediments and toxicants. It should be noted that toxicants are generally a near-field issue¹⁴ and that suspended sediments can have an adsorbed toxicant load which can adversely affect pelagic species and benthic fauna and flora directly, as well as indirectly through contamination of food sources (for example, seagrass and organic detritus)..

d. Assimilative capacity of HEV water not to be exceeded by discharge of residual waste water

The demonstration of 'no or negligible change' to the ecological indicators beyond the mixing zone boundaries also demonstrates that the HEV water assimilative capacity is not exceeded. Refer to [Appendix 6.2](#).

e. Where assimilative capacity is exceeded — prior to assessment

In some SMD waters the assimilative capacity for specific contaminants may already be exceeded. This may be evident from ecological health monitoring and remedial programs may be underway to restore ecological health by reducing loads of specific contaminants.

Where the current receiving water quality does not meet the WQOs, the policy intent for slightly-to-moderately disturbed (SMD) waters is to prevent further degradation and improve water quality over time.

Highly disturbed (HD) waters do not have any assimilative capacity. The policy intent is to halt the decline and reverse the trend in water quality, recognising the attainment of receiving WQOs is a long term goal.

For ERAs seeking to discharge residual waste water to receiving waters without assimilative capacity, alternatives to the discharge and alternate discharge locations should be re-evaluated before undertaking an assessment of how worse water quality will become. If there are no feasible alternatives to prevent, control or abate the discharge of residual waste water or to mitigate the impacts through alternative discharge strategies, then environmental offsets may be considered by the administering authority — see Section 2.5.

For waters with no assimilative capacity, achieving the receiving WQOs would be sought on a catchment wide basis involving all ERAs discharging waste water to the receiving waters through continual improvement over time, and additionally considering diffuse source (urban and rural) emissions. Depending on the existing receiving water quality, achievement of the WQOs may be a long-term goal. The [EPA Strategic compliance management program](#) typically includes area/sub-catchment, industry sector and licensed activity inspections that seek, amongst other things, to improve receiving water quality on a catchment basis. The program may involve all activities discharging to a particular water body.

In the case of an existing industry that is a key contributor to the impaired water quality in SMD or HD waters, reductions in discharge loads would be considered for any application to increase scale or intensity, or as part of the above EPA program to restore waterway health.

¹⁴ Sustainable loads should relate to an area of influence based on the issues of concern. For example, effects from sediment bound toxicants on benthic communities may be a localised issue.

The public interest consideration and other considerations under the standard criteria of Schedule 3 of the EP Act may be important in the assessment of applications proposing the discharge of residual waste water to SMD or HD receiving waters, where assimilative capacity is exceeded.

Relevant considerations may include:

- the proposal provides a public service such as municipal sewage disposal or provides goods or services to the Queensland community to meet an identified demand and there is no alternative option that is capable of meeting that demand; and
- applicable environmental impact studies, assessments or reports.

Summary

Is the information provided adequate?

Is sufficient information provided about the proposed activity that addresses the above matters? If necessary, further information should be requested.

Are the outcomes/impacts acceptable?

Further information may also be required to address deficiencies or achieve better environmental outcomes, for example using alternative technologies, management practices, discharge locations. Pre-design conferencing is important in raising issues and exploring options at the earliest possible time, and in seeking advice and direction on documentation, plans and information requirements.

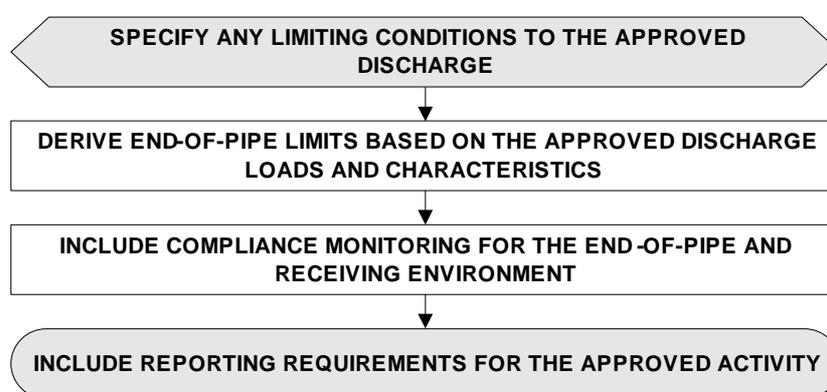
Pre-design conferencing is encouraged to address the prediction of impacts of the discharge on receiving waters, mixing zone and assimilative capacity requirements.

2.4 Set residual waste water discharge limits, discharge and impact monitoring requirements

Once the outcomes of the proposed activity are deemed acceptable, it is necessary to determine the appropriate residual waste water discharge limits and monitoring requirements, the latter in compliance with Sections 26 and 27 of the EPP Water, for inclusion in the development conditions. The derived development conditions, including discharge characteristics, limits, release (discharge) and impact monitoring requirements should reflect the inputs used in predictions.

Other factors for consideration include the environmental risk of the industry type and the use of best practice environmental management for the activity. Appropriate discharge limits and performance monitoring can be decided upon by undertaking the following steps that are summarised at Figure 7.

Figure 7 — Consideration of specific development conditions



2.4.1 Specify any circumstances related to the approved discharge

Approval to discharge must be constrained to the residual waste water, after waste minimisation measures have been implemented. The conditions must state that only approved waste water may be discharged. The location of the discharge, including any need for submergence or a diffuser, should be specified. Certain limitations or timing issues may also be conditional to the approval. For example, the discharge may only be permitted at outgoing tides (ebb-tide release), certain months of the year or only during wet weather flows exceeding a stated level. Outfall submergence below local low water to avoid visual impacts and enhance mixing is generally required, unless the discharge is not buoyant. Other precautions such as signage may be desirable depending upon the nature and the location of the discharge.

The protocols for monitoring must comply with Section 10 of the EPP Water and be in accordance with the [EPA Water Quality Sampling Manual](#) and the ANZECC Water Quality Guidelines. Compliance assessment protocols for different levels of aquatic ecosystems protection (HEV, SMD and HD waters) are at the Queensland Water Quality Guidelines.

2.4.2 Derive discharge limits based on the approved discharge loads and characteristics

WQOs would not normally be used directly for regulatory purposes and therefore discharge limits for the end-of-pipe need to be derived that will achieve these WQOs. The process of deriving the limits can be divided into selecting the indicator (for example dissolved oxygen concentration), determining the relevant limit type (for example minimum) and choosing the limit and units (for example 6mg/L). General guidance for setting limits is shown in Table 5. Derived information would be used in conditioning development approvals, environmental authorities, transitional environmental programs and environment protection orders.

a. Indicators

Limits should be placed on any indicators that can be practically measured at the end-of-pipe and are relevant to the discharge quality. These might include toxicants, nutrients, oxygen-consuming substances, suspended solids, dissolved oxygen, pH and pathogen indicators such as *Enterococcus spp.* The discharge loads proposed for the activity and assessed in the above processes would be used as a basis for setting these limits. For waste streams that may vary over time, for example municipal sewage may receive varied trade waste inputs, an additional qualitative condition that requires that the release must not have any other properties nor contain any other organisms or other contaminants which are capable of causing environmental harm is recommended to address this issue.

b. Discharge volume limits

Maximum volumes permitted for discharge on any one day would be considered, including wet weather flows for waste water treatment plants (WWTPs),

c. Percentiles and frequency

Development conditions may include limits combining percentiles (for example the 80th percentile) and must include maximum values (or minimum values in cases such as dissolved oxygen discharge of very cold water where adverse effects are related to low values rather than high values). Maximum values are particularly important for toxicants that have an acute impact on the environment (refer [Table 3](#) and Table 3.4.2 ANZECC Water Quality Guidelines for trigger values for toxicants to protect 99, 95 and 90 percent of species). In addition, maximum values can be applied for compliance monitoring to a single sampling event whereas percentiles can only be applied over a number of sampling events. Maximum values also ensure a proper standard of treatment applies at all times. Percentiles may be employed when relevant to treatment technology and when percentile performance is used in impact assessment studies to evaluate medium to long term environmental outcomes, for example nutrient loads and risks of nutrient enrichment.

Table 5 — Guidance for setting limits for indicator types

Contaminant type	Limit type/s	Guidance for limits
Toxicants	Maximum No observed effect level (NOEL)	No acute toxicity in initial mixing zone (i.e. end-of-pipe). No chronic effects outside initial mixing zone. Additional multiplying factors may be used in the case of bio-accumulating and bio-concentrating contaminants. No build-up in sediments, exceeding relevant trigger levels. No build-up in seafood species (Food Standards Code). Irrigation, stockwater and drinking water protected where these are relevant values.
Nutrients	50 th percentile Maximum Mass loads	50 th percentile to achieve mass load (and prevent local impacts). Maximums to prevent local impacts (generally three times limit for 50 th percentile). Mass loads based on systems sustainable load or capacity.
Sediments	Maximum	Use levels achievable by BPEM (e.g. 50 mg/L)
Salinity	Maximum	Maximum to prevent local impacts.
Pathogenic indicators	Maximum Median 4 out of 5	Limits based on 2005 National Health and Medical Research Council (NHMRC) Water Guidelines (e.g. for faecal coliforms, <i>Enterococcus spp.</i> and pathogenic protozoa).

Waste water discharge to Queensland waters

Contaminant type	Limit type/s	Guidance for limits
Temperature	Maximum Minimum	Maximum temperature elevation based on receiving waters.
Residual disinfectant	Maximum Minimum	Maximum based on likely decay time and effects on biota.
Dissolved oxygen concentration	Minimum	Best practice environmental management.
Oxygen demand and suspended solids	Mass loads 80 th percentile Maximum	Mass loads based on systems sustainable load or capacity. 80 th percentile to achieve mass load (and prevent local impacts). Maximums to prevent local impacts (generally three times limit for 80 th percentile).

Minimum values are necessary for dissolved oxygen concentration levels and pH in discharges. Percentiles are important as they encompass ongoing high quality treatment in the longer term, whilst allowing reasonable fluctuation in the treatment process. Note that percentiles are not suitable for some characteristics (for example residual chlorine) and should not be applied without relevant maxima or minima.

Activities with substantial discharges such as large WWTPs would typically be required to meet a long-term percentile (annual), short-term percentile (six week) and maximum limits. As this involves significant sampling effort (for example weekly), this may not be appropriate for a small-scale discharge such as that from a small caravan park's WWTP. In this case, monthly monitoring against maximum limits and annual percentile would be more reasonable. The method of determining maximums and percentiles should incorporate expected and acceptable fluctuations in concentrations and loads consistent with best practice.

Typically loads are implicitly conditioned through a combination of both concentration and volume limits. In some cases, load-based limits may be set (for example daily, weekly or annually).

This is done by setting a limit on the mass of a particular contaminant discharged per day, calculated by multiplying the volume released that day by the most recent monitoring result for the contaminant. Percentile load limits are expressed as the proportion of a number of consecutive daily loads that must meet the relevant limit (for example five out of 10 consecutive daily loads must not exceed a stated mass).

Where loads are used to quantify discharge limits, concentrations should also be included. This prevents the discharge of a smaller volume of very poorly treated effluent that would meet a load limit.

d. Limits and units

Limits need to be set for each quality characteristic in appropriate units based on potential effects and available analytical methods (refer Table 5). Analytical methods are given in the [EPA Water Quality Sampling Manual](#). Scientific experts should be consulted where required.

2.4.3 Include requirements for discharge monitoring and receiving environment impact monitoring

The administering authority must consider requiring the applicant to monitor waste water releases and to carry out impact monitoring of the effect of the waste water releases. Compliance monitoring decisions, monitoring frequency and indicators must be in accordance with the provisions of sections 26 and 27 of the EPP Water. Compliance monitoring may be applied to a combination of end-of-pipe, the local receiving environment and the regional receiving environment.

Further information on setting up monitoring programs can be obtained from the [Australian Guidelines for Water Quality Monitoring and Reporting \(2000\)](#) Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ). Refer also to Appendix 6.4 for the application of Multiple Before-After Control-Impact monitoring program for HEV water assessment.

Discharge or end-of-pipe monitoring should relate to the criteria and limits decided above. This type of monitoring is a direct measure of the performance of the activity and is necessary to assess compliance with a condition of a development approval, environmental authority, or transitional environmental program or environment protection order. It may also be required to determine whether a system is working true to its design specifications to avoid environmental harm. End-of-pipe monitoring does not provide direct information on the impact of the discharge on the receiving environment.

Impact or ambient monitoring within the local receiving environment should focus on protecting the EVs of the receiving waters through comparison of monitoring data with the WQOs. The ambient monitoring program may also be designed to monitor those locations near known discharges or other inputs into the waterway, where water quality objectives are most likely not be met (for example mixing zones). Ambient monitoring data may be used for performance assessment and for calibrating water quality models.

As the WQOs for the receiving waters may be affected by other activities in the catchment, non-compliance with WQOs may not be solely attributed to the performance of a particular point source discharge. This is particularly the case where impacts occur over time in tidal estuaries. An example of where ambient monitoring may more immediately relate to effects of an activity is measurement of sediment plumes downstream of a dredging operation and comparing it to up-current conditions. Other reasons for requiring ambient monitoring may be to monitor mixing zone characteristics, verify conclusions of an environmental impact assessment, study or report, to decide future disposal strategies or if there is concern about the levels of a particular contaminant in waters.

Ambient monitoring can provide information on regional ecosystem health and other relevant water quality information required to assess EVs. Such programs may be coordinated through regional partnerships comprising groups of stakeholders involved in the catchment. A contribution by the applicant to existing regional ecological health monitoring programs may be an alternate to applicant monitoring.

Compliance monitoring of residual waste water discharge and the receiving environment would normally commence when the approved activity commences, however baseline ecological health monitoring of receiving waters may be required by the applicant to characterise the receiving environment in the preparation of the development application. For further details refer to the Queensland Water Quality Guidelines Appendix C, Table C3 — Data for stand alone use in developing local guidelines (a minimum of 18 data values, over 12 months at two reference sites.)

2.4.4 Include reporting requirements for discharge and impact monitoring

The provision of monitoring data and reports to the administering authority should be set out as development conditions. Requirements should include reporting performance against development approval, environmental authority, transitional environmental program or environment protection order conditions, prompt notification of breaches of development conditions and other incidents likely to cause environmental harm; and the assessment of impact monitoring of the effect of waste water releases. The EPA has a database to receive electronic data from licensees. This is currently available for WWTPs.

Summary

The administering authority must consider requiring the applicant to monitor the discharge of residual waste water against approval conditions and to carry out impact monitoring of the effect of the residual waste water releases.

Pre-design conferencing is encouraged, including addressing any requirement for baseline ecological health monitoring of the receiving waters prior to lodging an application.

2.5 Environmental offsets

a. Policy issues

Refer to Section 2.0 for detail. The policy intent is that for:

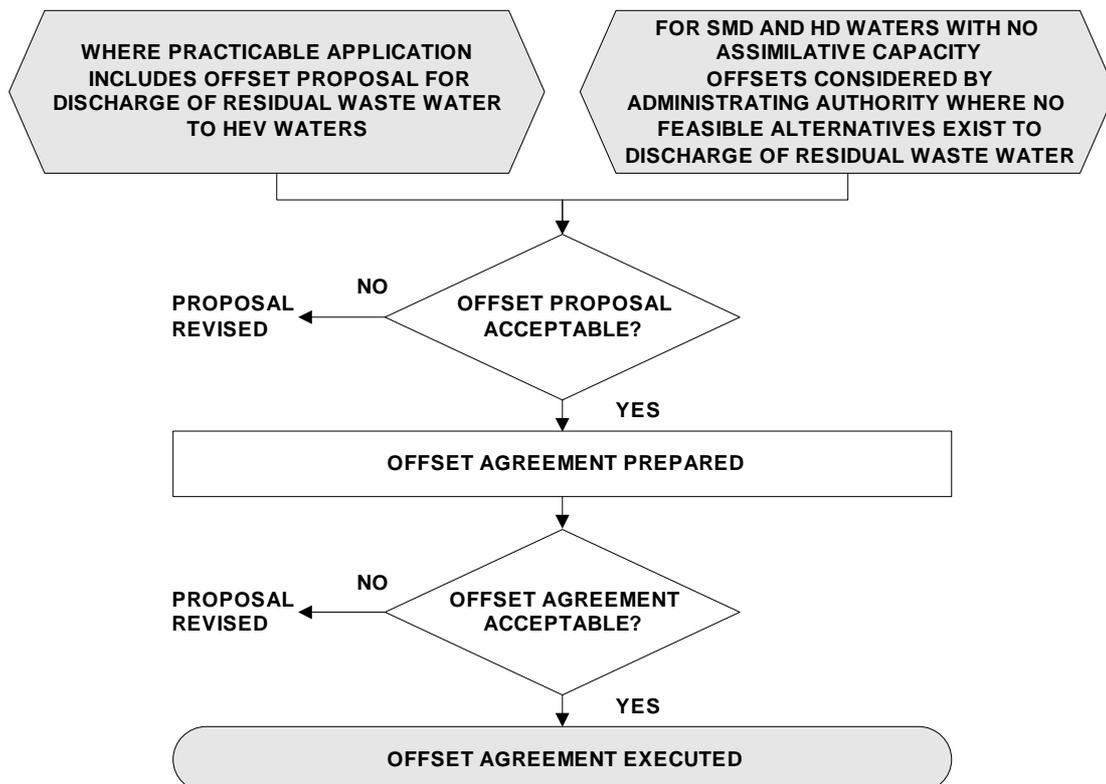
- HEV waters, where practicable the application includes a like kind environmental offset proposal - counterbalancing the discharge of residual waste water (the discharge) from the proposed ERA¹⁵; and
- SMD and HD waters with no assimilative capacity, environmental offsets (offsets) may be considered by the administering authority where there are no feasible alternatives to residual waste water discharge.

For the purposes of the EPA operational policy, environmental offsets will not apply to SMD waters where assimilative capacity exists. Refer to Section 2.3.4. By definition HD waters have no assimilative capacity.

In accordance with the above, and consistent with the overarching principles of the discussion paper¹⁶ on the proposed Queensland Government Environmental Offsets Policy, the aim of providing environmental offsets is:

- to maintain the biological integrity of HEV waters, by counterbalancing the discharge of residual waste water (the discharge) from the proposed ERA with a like kind environmental offset; and
- to improve the water quality of SMD and HD waters by providing an offset that both counterbalances the proposed residual waste water discharge and provides additional assimilative capacity.

Figure 8 — Environmental offsets



Further to the above policy intent, where it is practicable and the discharge is suitable for management via offsets the application should include a like kind environmental offset proposal (offset proposal) that would be

¹⁵ The Australian Government is considering environmental offsets as approval conditions under the EPBC Act when a proposed development impacts on a matter of national environmental significance. When finalised, EPBC Act requirements should be considered in conjunction with this operational policy.

¹⁶ Subject to the finalisation of the proposed Queensland Government Environmental Offsets Policy in 2008, any inconsistencies will be addressed by further review of this operational policy.

considered by the administering authority on a case-by-case basis seeking to deliver a net environmental gain to the receiving waters as a whole.

The consideration of offsets must only occur after all options to avoid, reuse, recycle or adopt other disposal alternatives have been addressed in accordance with the waste management evaluation procedure under the EPP Water, and the discharge is demonstrated to be unavoidable and environmentally acceptable.

Figure 8 above depicts the matters that are detailed in the following sections.

b. Like kind offsets

To be of a 'like kind' offsets must be of the same contaminant and chemical form and preferably a point source emission impacting on the same waters as the proposed ERA discharge. To avoid further impairment of waters that have no assimilative capacity for the proposed ERA contaminants, offsets should impact on the same waters as the proposed ERA discharge. Where this is not practicable, offsets to waters in the same catchment would be considered by the administering authority.

Where it is not practicable to secure point source offsets, then diffuse urban offsets (from new and existing urban development) or diffuse rural offsets would be considered by the administering authority. The priority and spatial location of diffuse offsets would be advised by the administering authority during pre-design conferencing, reflecting catchment priorities established under planning processes completed by recognised entities under the EPP Water. Offset proposals must reduce contaminant discharges to a level below individual load limits for point sources and beyond minimum performance standards for diffuse sources.

c. Net environmental gain

The offset quantity should seek to deliver a net environmental gain to the water as a whole. Net environmental gain for a water, the subject of discharge from the proposed ERA, is based on a 'nil net discharge' and additionally takes account of the environmental risk and uncertainty and the policy intent for the waters (maintaining natural values or the lack of assimilative capacity and water quality objectives not being met-respectively for HEV and SMD/HD waters.)

d. Equivalence ratios

Offset sources are assigned a quantity equivalence (or offset) ratio accounting for:

- environmental risk and uncertainty resulting from the effects of separation distance, attenuation, the nature of the offset (point or diffuse source), performance variation over time, delayed onset time, different chemical forms and bioavailability; and
- the maintenance of the biological integrity of HEV waters and to prevent further degradation and reverse the trend in water quality of SMD and HD waters. The latter aspect would be considered by the administering authority in the context of the whole catchment assessment and the contribution from point source discharges.

For like kind point source offsets emitting to the same water type and effective from the time of the proposed ERA discharge, an equivalence ratio greater than 1 is required.

Equivalence is less likely:

- with increased distance from the proposed ERA discharge location;
- where the offset load reduction is effected in different water types in the same catchment;
- where urban or rural diffuse source offsets are involved; or
- where the timing of offset reductions is delayed from the project commencement date.

Consequently higher quantity offset ratios would be assigned in these circumstances reflecting the increased risk of delivering a net environmental gain, quantified over the project life.

If diffuse rural offsets are included in the offset proposal, the offset should rehabilitate or restore degraded riparian or wetland habitats according to priority locations advised by the administering authority. Other land use management actions that reduce rural diffuse emissions may be considered by the administering authority. Proposals to include urban diffuse offsets from either new or existing urban development should also be according the priorities advised by the administering authority.

The EPA procedural guide *Procedural information for the operational policy waste water discharge to Queensland waters*, provides guidance in determining environmental equivalence through minimum default offset ratios and determining riparian and wetland buffer widths.

e. Discharge contaminants must be suitable for management by offsets

Discharge contaminants that are potentially suitable for management by offsets include nutrients (nitrogen and phosphorus), sediment (TSS and TDS), organic carbon, contaminated stormwater or other contaminants where the scientific basis can be demonstrated and the contaminants do not have human health impacts, irreversible environmental impacts or unacceptable biota impacts.

f. Development application to include an offset proposal

Where required the development application must include an offsets proposal that meets the acceptability requirements listed below. The onus is on the applicant to provide sufficient information to allow the administering authority to consider whether the offset proposal is acceptable.

g. Acceptability of offset proposal

At pre-design conferencing the administering authority would advise on the requirements for an acceptable offset proposal, that must:

- meet statutory, regulatory and planning requirements and be enforceable—through development conditions, covenants or contracts;
- be additional to the consideration of EPP and EP Act provisions, as summarised in Sections 2.1 to 2.4;
- be enduring--offset the impact of the development from commencement and for the period that the impact occurs. Where onset is delayed, offsets must balance any initial shortfall over the project life;
- be suitable and targeted--contaminants must be suitable for management by offsets, be of the same contaminant and chemical form;
- be capable of being supplied and secured by the applicant or authorised agent;
- be appropriately located--apply to the same waters impacted by the proposed residual waste water discharge, or to other water types in the same catchment;
- initially consider point source offsets and then diffuse urban offsets or diffuse rural offsets (involving the restoration of degraded riparian or wetlands buffers) in accordance with catchment priorities as advised by the administering authority;
- seek to achieve a net environmental gain to the receiving waters;
- demonstrate compliance through emissions monitoring and reporting to the administering authority;
- be compatible with any flexible or incentive based mechanisms such as nutrient trading; and,
- address other elements, pending case by case assessment by the administering authority.

h. Offset agreement

If the offset proposal is acceptable to the administering authority and the application is approved, the administering authority must include development conditions that require the applicant:

- to secure the offsets proposal through an agreement between the applicant and the administering authority; and
- to execute the agreement before the commencement of site works, that:
 - includes a memorandum of agreement if the offset proposal involves either the State or a Local Government;
 - includes a deed of agreement for private developers; and generally use a financial guarantee, refundable on demonstrated offset establishment;
 - requires rural diffuse offsets to be legally secured with covenants or conservation agreements and addresses the on-going management and maintenance of offset sites, where relevant; and
 - requires the offset to be recorded on the appropriate register.

Other elements may need to be considered, pending case by case assessment by the administering authority.

i. Financial contribution

The discussion paper on a proposed Queensland Government Environmental Offsets Policy (QGEOP) provides for financial contributions to be made to meet offset requirements in certain circumstances. The discussion paper outlines several principles that must be complied with for a financial contribution to be acceptable. The use of financial contributions under the operational policy will be considered further upon the implementation of the QGEOP.

Summary

Pre-design conferencing is encouraged to address environmental offset requirements

3. Additional information

3.0 Process for using default EVs and WQOs

Where EVs for the waters have not been specifically set in Schedule 1 of the EPP Water, then, under Section 11(2) of the EPP Water, the WQOs are the set of water quality guidelines (the *Queensland Water Quality Guidelines 2006* and the ANZECC Water Quality Guidelines) that will protect all EVs for the waters.

Where the above guideline values are considered inappropriate for the receiving environment the following provides information on default EVs and WQOs based on water quality guidelines derived from data collected at appropriate local reference sites.

a. **Define default EVs**

Information on existing and possible future EVs should be obtained from maps, site inspections, surveys, local knowledge, water abstraction licences, planning documents, scientific studies and monitoring data. It is recommended that any changes to default EVs be agreed upon through consultation with key stakeholders, such as representatives of government, community, and industry groups.

EVs may be discounted if sufficient information can be obtained to justify that this value does not currently exist and is unlikely to exist in the future. It should be noted that the protection of the aquatic ecosystems and visual aesthetics should always be included as an environmental value of any water body. However, the level of aquatic ecosystem protection can vary between water bodies or zones of water bodies.

b. **Define default environmental goals**

Locally specific information on EVs can be used to propose environmental goals. These goals define in more detail what needs to be protected and represent major subdivisions of EVs. Examples of typical environmental goals for EVs include protection of specific habitats (such as seagrass beds), protection of specific aquatic species (such as wallum frogs), minimisation of algal blooms, and maintenance of biodiversity or protection of the public during swimming activities.

c. **Define default water quality indicators**

The next step involves determining the water quality indicators and concentrations required to protect the identified EVs. This is a technical process to be conducted by the applicant and involves reference to water quality data and guidelines. The indicators and concentrations determined in this step will become the WQOs for the next step of the process.

Water quality indicators may include physical-chemical, biological or toxicant measures applying to a combination of water, sediment and biota. Some sources of information to determine suitable indicators for protection of EVs are included in Table 6 below.

d. **Define default WQOs**

To determine default WQOs, trigger values can be taken from published guidelines (for all values) or from local reference data (for aquatic ecosystem protection only). Once the numerical criteria are determined, they should be listed in a matrix of water quality indicators versus EVs for each geographical zone that has different EVs. For some indicators in a particular zone, different guideline numbers may be quoted to protect more than one EV or goal. In these cases, the more stringent guideline should be adopted as the default water quality objective for that indicator.

Reference data for Queensland waterways can be obtained from the EPA, or as listed in Table 6. Guidelines for biological, toxicants and sediment indicators and for primary industry, recreational water quality and drinking water values can be obtained from the ANZECC Water Quality Guidelines. Local reference information may be particularly important in determining the water quality characteristics required to protect local aquatic

ecosystems. This would be the case if there are known unique species, such as acid frogs that require low pH conditions.

Determining default WQOs to protect aquatic ecosystems often requires significant technical input and should be considered as trigger values, below which a very low risk to the environment from that pollutant may be assumed. Default WQOs may depend on the levels of aquatic protection assigned for each zone. Further information on how to determine levels of aquatic ecosystem protection is provided in [Table 3](#).

The *Queensland Water Quality Guidelines 2006* will become a repository for such sub-regional and local information for Queensland waters as it becomes available, and should be referenced for the default WQOs. The ANZECC Water Quality Guidelines will remain important for a range of indicators (for example toxicants and pathogens).

3.1 Use of local reference data

The *Queensland Water Quality Guidelines 2006* and ANZECC Water Quality Guidelines recommend using data from local reference sites to derive WQOs. The three main steps in the process are to establish a suitable reference site, collect sufficient data and calculate typical reference ranges and objectives. For further detail refer to Section 7.4.4 of the [ANZECC Water Quality Guidelines](#) (Volume 1.)

Table 6 — Guideline and reference information for determining WQOs

EVs of Water	Sources of guideline and reference information
Aquatic ecosystem	EPA website for the Queensland Water Quality Guidelines and physical-chemical reference data. National water targets online for nutrients, turbidity and salinity. National Water Quality Management Strategy website for biological, toxicant and sediment guidelines. Fact sheets on biological indicators and groundwater are at the above site.
Recreation and aesthetics	National Water Quality Management Strategy website. National water targets online for nutrients, turbidity and salinity. World Health Organisation Guidelines .
Drinking water	Australian Drinking Water Guidelines (NHMRC 2004).
Primary industries	National Water Quality Management Strategy website.
Industrial	National Water Quality Management Strategy website.
Cultural and spiritual	EIS assessments and other site specific information where relevant. Refer also the State Coastal Management Plan .

Reference sites are used to define the condition of a stream without impacts from discharges. They should ideally be in the same stream, a short distance upstream of the proposed discharge being assessed. If monitoring is possible before the discharge commences, a site downstream of the proposed discharge may be appropriate (note that it is not appropriate to use the same waterway to develop water quality criteria if it receives waste discharges or its quality is materially affected by non-point source runoff). If no suitable sites are identified in the stream, sites may be chosen in another local stream with similar hydrological, geological and ecological characteristics.

A list of reference sites for riverine, estuarine and coastal waters is included in the *Queensland Water Quality Guidelines 2006*.

For physical and chemical indicators and toxicants, the ANZECC Water Quality Guidelines recommend a minimum of two years of monthly data to define reference conditions. If objectives are derived from less data, they may be unreliable. Established Queensland or ANZECC Water Quality Guidelines reference conditions are preferred in this case. It is also crucial in researching reference conditions that appropriate quality assurance measures are applied to sample collection, preservation and analysis (refer to the [EPA Water Quality Sampling Manual](#)).

Once sufficient data have been collected, WQOs can be determined from the reference range of the data. This is the range from the 20th percentile to the 80th percentile of data and represents the typical range that would be expected for that indicator in the absence of the discharge. Most physical, chemical and toxicant indicators only require an upper water quality objective derived from the 80th percentile. For pH and dissolved oxygen where low values are also undesirable, lower WQOs are also derived from the 20th percentile.

3.2 Temporary streams

Temporary streams are defined as streams that do not flow continuously all year round. They include ephemeral streams, which only flow after significant rainfall, as well as intermittent streams, which only stop flowing during extended dry periods. Temporary streams go through a series of hydrological stages, from a wetting stage following rain (including the first flush), through a recessional stage, to a pooled stage or completely dry stage.

Discharge of waste water to temporary streams requires special consideration due to their unique hydrological and ecological characteristics. Such emissions are likely to disrupt the natural ecology and impact the aquatic ecosystem. Continuous or semi-continuous discharges during naturally dry stages should be avoided, and wet weather discharges occur when receiving water flows are sufficient, from a risk based assessment, to achieve the receiving water quality objectives. The nearest upstream gauging station should be used to determine the release period. Feasible alternatives should be investigated such as minimizing the production of waste water, reuse and retention to discharge during wet conditions. Specific mine water disposal issues of a 'one-off' nature would be considered on a case-by-case basis with the administering authority.

Receiving water quality objectives should be based on the most appropriate local reference data collected in the same stream above the discharge or in a similar stream in the area that is not affected by the discharge. Monitoring data should ideally cover the wetting stage as well as recessional or pool stages. In the absence of suitable reference data, default values from the Queensland and ANZECC Water Quality Guidelines should be adopted.

3.3 Hydrological impacts

The discharge of waste water may have adverse impacts on the hydrology of temporary and permanent surface receiving waters. The impacts relate to the volume and velocity of discharge relative to natural flows, and may include bed and bank erosion and changes to the particle size distribution of sediments. Other effects may occur on biota where there is insufficient time to complete life cycles due to changed flow regime. As a general guide, modelling of flow characteristics should be considered where the waste water flow would exceed 10 percent of the natural minimum flow of the waterway.

3.4 Riparian habitat impacts

Discharge of waste water may adversely affect riparian vegetation. For example, nutrient rich discharges may lead to weed infestation of habitats where vegetation is adapted to a low nutrient regime. Visual recreation is a declared environmental value of a water that likely to be adversely affected if a water way becomes weed infested. Similarly saline groundwater discharged into a freshwater stream or clearing may adversely affect riparian vegetation.

3.5 Public health impacts

Protection of public health usually requires that multiple barriers between effluent and drinking water or contact water be in place. The monitoring for typical water quality indicators such as *Enterococcus spp.* is not for pathogenic organisms, but indicators of possible contamination and hence does not necessarily guarantee safe levels. Apart from effluent treatment trains, barriers usually include dilution and significant distances between outfalls and places where potential exposure and water use occurs.

In some cases these barriers may not be present, for example where:

- the effluent is not substantially diluted by a watercourse/ocean prior to public access; and
- persons may come in contact with the effluent (for example, a beach or recreational area); or
- the waters are essentially fresh, which may encourage children to ingest the waters;

then alternative discharge locations should be evaluated, or more specialised public health assessment approaches adopted. Refer to the [Guidelines for Managing Risk in Recreational Waters \(NHMRC 2006\)](#) for further information on assessing suitability of recreational water quality.

3.6 Groundwater impacts

Additional considerations exist when applying the guidelines to groundwater, or to water bodies directly or indirectly affected by groundwater. An example of a direct impact is where the groundwater is suitable for drinking. In this case, the guideline values should be applied directly to the groundwater. An example of an indirect impact is where the groundwater is not directly used but the movement of the groundwater impacts on a secondary water body with defined values. In this case it is necessary to consider the values to be protected, as well as the effects of the attenuation zone, the flux rate of the groundwater and any dilution achieved.

4. Relevant legislation, intergovernmental agreements and EPA operational policies

Relevant legislation, intergovernmental agreements and EPA operational policies include:

- *Environmental Protection Act 1994*;
- *Environmental Protection (Water) Amendment Policy No 1 2006* — Subordinate Legislation No. 30 of 2006 and its explanatory notes;
- *Environmental Protection (Water) Policy 1997* — Subordinate Legislation No. 136 of 1997, including Sections 15–19 and Schedule 1, and the explanatory notes;
- *Environmental Protection (Waste Management) Policy 2000*, including Part 3 Waste management hierarchy and Part 4 Environmental management decisions concerning waste;
- *Queensland Water Quality Guidelines 2006*;
- *Queensland Water Recycling Guidelines 2005*;
- *State Coastal Management Plan — Queensland's Coastal Plan 2001*;
- *Integrated Planning Act 1997*;
- *State Development and Public Works Organisation Act 1971*;
- *Environment Protection and Biodiversity Conservation Act 2000*;
- *National Water Quality Management Strategy*, including the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* (the ANZECC Water Quality Guidelines) and the *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) 2006*;
- Intergovernmental Agreement on the Environment;

- Guidelines for Managing Risks in Recreational Water Quality (NHMRC 2005);
- Agreement under the Council of Australian of Australian Governments Water Reform Agenda;
- International agreements relating to migratory birds and wetlands (Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA));
- Directory of Important Wetlands Australia;
- *Australian and New Zealand Guidelines for Fresh and Marine Waters 2000* (Volume 2. Appendix 1 Mixing zones adjacent to effluent outfalls);
- EPA operational policy [Licensing waste water releases from existing marine prawn farms in Queensland](#);
- EPA operational policy [Approval of sewage treatment plants including options for use of reclaimed water](#);
- EPA Information sheet [Case study 1 — Licensing discharges from sewage treatment plants](#); and
- EPA Information sheet [Case study 2 — Licensing discharges from sewage treatment plants](#).

5. Further information

For further information please contact the EPA Ecoaccess Customer Service Unit on:

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Approved by


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6. Appendices

Appendix 6.1: Glossary of terms

Administering authority means the administering authority under the EP Act, and will be the chief executive of the Environmental Protection Agency or the Local Government's chief executive officer.

The chief executive of the DPIF has delegated authority for ERAs 3 and 4 (i.e. cattle feedlotting and pig farming). These ERAs have been delegated to the DPIF.

Applicant means the applicant for a development approval or environmental authority application. In the context of this operational policy it may also mean employees of organisations contracted by the applicant to assist in the preparation of the application.

Aquatic ecosystems is defined in the ANZECC Water Quality Guidelines as the animals, plants and micro-organisms that live in water, and the physical and chemical environment and climatic regime in which they interact. It is predominantly the physical components (for example light, temperature, mixing, flow, and habitat) and chemical components (for example organic and inorganic carbon, oxygen, nutrients) of an ecosystem that determine what lives and breeds in it, and therefore the structure of the food web. Biological interactions (for example grazing and predation) can also play a part in structuring many aquatic ecosystems.

Assessable development means development specified under Part 1, Schedule 8 of IPA and includes the carrying out of a chapter 4 activity, other than an activity (or part of an activity) for which a code of environmental compliance has been approved.

Assessment manager for an application for a development approval means the Local Government or the entity prescribed under the [Integrated Planning Regulation 1998](#).

Assimilative capacity means the capacity of the receiving waters to receive some human induced input of contaminants, or alteration, without causing the water quality to deteriorate so the water quality objectives are no longer met.

Basin means the major hydrological drainage basins in the national spatial database provided by Geoscience Australia. Australia is divided into drainage divisions which are sub-divided into water regions which are in-turn sub-divided into river basins. The data, which includes the name and number of each Queensland drainage division, region and river basin, is available at the [Australian Government Geoscience Australia](#) website.

Best practice environmental management is defined in the EP Act as the management of the activity to achieve an on-going minimisation of the activity's environmental harm through cost effective measures assessed against the measures currently used nationally and internationally for the activity. Section 21(2) lists measures to be regarded in deciding best practice environmental management of an activity. These measures include, but are not limited to, strategic planning, systems and training, product and process design, public consultation, waste prevention/treatment and disposal.

Biological integrity of a water is defined in the EPP Water as the water's ability to support and maintain a balanced, integrative, adaptive community of organisms having a species composition, diversity and functional organisation comparable to the natural habitat of the locality in which the water is situated.

Catchment means the total watershed draining into a river, creek, reservoir or other body of water. The limits of a given catchment are the heights of land (such as hills or mountains) separating it from neighbouring catchments. Catchments can be made up of smaller sub-catchments.

Character, resilience and environmental values of the receiving environment – see **Resilience**.

Code of environmental compliance is a document that contains standard environmental conditions for an ERA, or part of an ERA.

Complete mixing means, with reference to mixing zone considerations, the effluent is completely dispersed through the receiving waters.

Compliance monitoring means the activity of monitoring the approved discharge and comparing against the specified development conditions. This will generally occur at the discharge pipe. Monitoring can also be required for the receiving environment. Compliance should not be based on the receiving environment monitoring results alone, particularly where other factors in the catchment may contribute to non-compliance.

Concurrence agency for an application for a development approval under IPA means an entity prescribed under a regulation as a concurrence agency for the application.

Contaminant is defined in Section 11 of the EP Act as a liquid, gas, solid or other forms, that is released into the environment.

Cultural resources is defined in the *State Coastal Management Plan 2001* as places or objects that have anthropological, archaeological, historic, scientific, spiritual, visual or ecological significance or value.

Development application means an application for a development approval or environmental authority under the EP Act and subordinate EPP Water, IPA or the SDPWO Act for ERAs proposing to discharge of residual waste water to Queensland waters.

Decision notice means the written notice issued under IPA by the assessment manager to notify an applicant of the decision for their application in relation to a development approval.

Development condition means a condition of a development approval imposed by the assessment manager or concurrence agency under IPA.

Direct toxicity assessment (DTA) means the assessment of the combined effects of a number of compounds of unknown identity and concentration in an effluent. DTA provides an integrated measure of the aggregate/additive toxicity of chemicals and accounts for interactions between compounds. The DTA approach has been adapted from conventional toxicity testing approaches using the same methods, species selection and extrapolation to receiving waters (refer to ANZECC Water Quality Guidelines Volume 2, Section 8.3.6).

Ecological health is defined in the ANZECC Water Quality Guidelines as the health or condition of an ecosystem. It is the ability of an ecosystem to support and maintain key ecological processes and organisms so that their species compositions, diversity and functional organisations are as comparable as possible to those occurring in natural habitats within a region (also termed ecological integrity). The concept of ecological health is applicable to all complex ecosystems and sustainability is a key element of the concept.

Ecologically sustainable development (ESD) is defined in the EP Act as the protection of Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles for ESD as published in the [National Strategy for Ecologically Sustainable Development 1992](#) are a part of the standard criteria of Schedule 3 of the EP Act and include the precautionary principle. They must be considered when making decisions to grant or refuse an application.

Environmental authority application means an application under the EP Act for an environmental authority.

Environmental offsets in the context of this operational policy means the positive measures taken to counterbalance the adverse environmental impacts of the development resulting from the residual waste water discharge that cannot be avoided, reused, recycled or otherwise disposed in accordance with the waste management evaluation procedure under the EPP Water. An offset is to be of a like-kind (i.e. the same

contaminant and chemical form), is located outside the development site and seek to deliver a net environmental gain to the waters.

Environmentally relevant activity (ERA) means a mining activity or an activity prescribed under a regulation as an ERA (where a contaminant will or may be released into the environment when the activity is carried out and the release will or may cause environmental harm). Schedule 1 of the *Environmental Protection Regulation 1998* lists the non-mining ERAs and section 39 (1) lists the ERAs devolved to Local Government.

Environmental values (EVs) is defined in the EPP Water as the qualities of a water that make it suitable for supporting aquatic ecosystems and human water uses (refer also Section 9 of the EP Act). EVs need to be protected from the effects of pollution, waste discharges and deposits to ensure healthy aquatic ecosystems and waterways that are safe for community use. Particular waters may have different EVs. The list of EVs and the waters they can potentially apply to, are tabulated below.

Environmental value	Potentially applicable to:	
	Tidal waters	Fresh (non-tidal) waters
<p>Protection of aquatic ecosystems (Aquatic ecosystem EV)</p> <p>Protection of aquatic ecosystems, under three possible levels of protection relating to the following three ecosystem conditions:</p> <ul style="list-style-type: none"> • High ecological value waters; • Slightly to moderately disturbed waters; and • Highly disturbed waters. <p>(suitability for seagrass has also been specifically identified for some waters as a component of this EV)</p>	✓	✓
<p>EVs other than aquatic ecosystem EV (called human use EVs)</p> <p>Suitability for human consumers of wild or stocked fish, shellfish or crustaceans (suitability for oystering has also been specifically identified for some waters)</p> <p>Suitability for primary contact recreation (for example swimming)</p> <p>Suitability for secondary contact recreation (for example boating)</p> <p>Suitability for visual (no contact) recreation</p> <p>Protection of cultural and spiritual values</p> <p>Suitability for industrial use (including manufacturing plants, power generation)</p> <p>Suitability for aquaculture (for example red claw, barramundi)</p> <p>Suitability for drinking water supplies</p> <p>Suitability for crop irrigation</p> <p>Suitability for stock watering</p> <p>Suitability for farm use</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>	<p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p> <p>✓</p>

Far-field waters means, in the context of an initial mixing zone, the waters beyond the specified boundaries of the mixing zone.

General environmental duty means the duty that applies to all persons in Queensland to take all reasonable and practicable measures to prevent or minimise environmental harm when carrying out an activity that causes, or is likely to cause, environmental harm. It is defined in Section 319 of the EP Act.

High ecological value (HEV) waters is defined in the *Queensland Water Quality Guidelines 2006*, as amended, as waters that have the biological integrity of effectively unmodified (intact) ecosystems or waters that are highly valued.

Information request means the additional information given about an application that is supplied by the applicant, at the request of the assessment manager or concurrence agency under IPA. It includes an EIS supplement.

Intergovernmental Agreement on the Environment means the agreement made on 1 May 1992 between the Commonwealth, the States, the Australian Capital Territory, the Northern Territory and the Australian Local Government Association.

Level of protection (for aquatic ecosystems) is defined in the *Queensland Water Quality Guidelines 2006*, as amended, as the level of aquatic ecosystem condition that the water quality objectives for that water are intended to achieve. The levels of aquatic ecosystem protection are:

- Level 1 High ecological/conservation value aquatic ecosystems — effectively unmodified or other highly valued systems;
- Level 2 Slightly to moderately disturbed aquatic ecosystems — ecosystems in which aquatic biological diversity may have been adversely affected to a relatively small but measurable degree by human activity; and
- Level 3 Highly disturbed aquatic ecosystems — measurably degraded ecosystems of lower ecological value.

Like kind environmental offsets means the offsetting load reductions from other point source and diffuse source emissions of the same contaminant (and chemical form).

Mixing zone (or initial mixing zone) is defined in the EPP Water as an area where residual waste water mixes rapidly with surface water because of the momentum or buoyancy of the waste water and turbulence of the surface water. Within the initial mixing zone dilution of the effluent contaminants takes place, water quality degradation occurs and certain water quality objectives may be exceeded.

Multiple Before-After, Control-Impact (MBACI) means water quality assessment studies that are designed to assess change to the water body from a particular input or disturbance. Such water quality assessments give the greatest confidence that any observed differences between control and impacted sites are not simply a result of natural variation between places or times.

Near-field waters means, in the context of an initial mixing zone, the waters immediately adjacent to the specified boundaries of the mixing zone.

Net environmental gain for a water the subject of residual waste water discharge from the proposed ERA, means the counterbalancing environmental offsets produce a net environmental outcome -- based on a 'nil net discharge' and additionally accounting for the environmental risk/uncertainty and the lack of assimilative capacity and water quality objectives not being met.

Offsets agreement means the agreement between an applicant and the EPA, Local Government or other party that secures the offsets proposal.

Offsets proposal means the proposal acceptable to the administering authority that quantitatively offsets, for the life of the proposed development, the discharge of residual waste water from the ERA to achieve a net environmental gain to the receiving waters.

Peer review or expert peer review means the commissioning, by the applicant, of a nationally or internationally recognised expert in the relevant discipline, to provide independent expert written assessment of the technical/scientific work of either the applicant, or the applicant's consultant for inclusion in the application.

Precautionary principle is defined in the [National Strategy for Ecologically Sustainable Development 1992](#) as where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of the precautionary principle, public and private decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment and an assessment of the risk-weighted consequences of various options. Decisions to grant or refuse an application must consider the precautionary principle as part of the standard criteria of Schedule 3 of the EP Act.

Public interest may be ascribed as meaning the interest of the public as distinct from the interest of the individual(s).

Queensland Water Quality Guidelines means the *Queensland Water Quality Guidelines 2006*, as amended, prepared by the EPA.

Queensland waters is defined in the [Acts Interpretation Act 1954](#) as all waters that are within the limits of the State or coastal waters of the State.

Resilience of the receiving environment means the ability of an ecosystem to adjust or respond to progressive impacts **and** the ability to recover following cessation of the natural or anthropogenic disturbance. Information on both the recovery and response phases is required to **characterise resilience and the sensitivity of the receiving environment**. In particular, information on the recovery phase is crucial because it is the indicator of reversibility or irreversibility of the impact.

Standard criteria is defined in Schedule 3 of the EP Act as:

- (a) the principles of ecologically sustainable development as set out in the 'National Strategy for Ecologically Sustainable Development'; and
- (b) any applicable environmental protection policy; and
- (c) any applicable Commonwealth, State or Local Government plans, standards, agreements or requirements; and
- (d) any applicable environmental impact study, assessment or report; and
- (e) the character, resilience and values of the receiving environment; and
- (f) all submissions made by the applicant and submitters; and
- (g) the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—
 - (i) an environmental authority;
 - (ii) a transitional environmental program;
 - (iii) an environmental protection order;
 - (iv) a disposal permit; and
 - (v) a development approval; and
- (h) the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and

- (i) the public interest; and
- (j) any applicable site management plan; and
- (k) any relevant integrated environmental management system or proposed integrated environmental management system; and
- (l) any other matter prescribed under a regulation.

Stream order is a standard means of describing streams. The smallest streams in a drainage network have no tributary streams. These are called first order streams. Two first order streams unite to form a second order stream. Second order streams only have first-order streams as tributaries. Third order streams only have second and first order streams as tributaries, etc. As the order of the stream increases, the discharge increases, the gradient decreases, the velocity increases, and the channel dimensions (width and depth) increase to accommodate the increased discharge.

Sustainable load of a particular contaminant means the maximum amount of the contaminant that a water body can receive without exceeding the related WQOs, and therefore adversely affecting EVs.

Trigger values means the numerical criteria that if exceeded require further investigation for the pollutant of concern. If not exceeded, a low risk of environmental harm can be assumed.

Waste management evaluation procedure in making environmental management decisions about the release of residual waste water from an ERA means, under the EPP Water, the assessment processes for prioritising waste management practices (waste management hierarchy) to achieve the best environmental outcome.

Waste water treatment plants (WWTPs) means sewage treatment plants, advanced waste water treatment plants, water reclamation plants and all other synonyms for treatment plants whose primary function is to treat a water based waste stream.

Waste water means, under Schedule 2 of the EPP Water, a liquid waste and includes contaminated stormwater.

Water means the whole or any part of surface water or groundwater, tidal or non-tidal, and including any river, stream, lake, lagoon, swamp, wetland, unconfined surface water, natural or artificial watercourse, dam, tidal waters (estuarine, coastal and marine waters to the limit of Queensland waters) and underground or artesian water.

Water quality indicator (for an EV) is defined in the EPP Water as a property that can be measured or decided in a quantitative way. Examples of water quality indicators include physical indicators (for example temperature), chemical indicators (for example nitrogen, phosphorus, metals) and biological indicators (for example macroinvertebrates, seagrass and fish).

Water quality objectives (WQOs) are, the WQOs specified in Schedule 1 of the EPP Water to protect the EVs for waters. WQOs are long term goals for water quality management. They are numerical concentration limits or narrative statements established for receiving waters to support and protect the designated EVs for those waters. They are based on scientific criteria or water quality guidelines, but may be modified by other inputs (for example social, cultural, and economic).

Water types means waters with similar characteristics. The water types covered by this document are based on water types established in the *Queensland Water Quality Guidelines 2006*. Water types include coastal waters (open and enclosed), estuarine waters (lower, middle and upper), tidal canals, constructed estuaries, marinas and boat harbours, freshwaters (lowland, upland and dams/reservoirs), wetlands and ground waters. WQOs applying to different water types are outlined in the documents under Schedule 1 of the EPP Water.

Appendix 6.2: Mixing zone determination

Matters to be addressed in the development application must include:

a. Use of Direct Toxicity Assessment

The development application must demonstrate that the contaminants in the proposed residual waste water discharge are not acutely toxic to aquatic organisms inside the mixing zone or exceed the No Observed Effect Level, or equivalent (for example, the No Observed Adverse Effect Concentration) outside the mixing zone.

Where the proposed residual waste water discharge includes a contaminant(s) for which there is a lack of environmental effects data the development application must include the results of Direct Toxicity Assessment (DTA). Testing may be based on samples from demonstration plant, pilot plant or laboratory scale to complement a literature review.

This information is relevant to DTA of discharged effluent, whether required prior to licensing approval or as part of post-approval monitoring. DTA of effluent is also referred to as Whole of Effluent Toxicity testing.

DTA of an effluent is applicable to discharges that pose a potentially acute toxic exposure risk to aquatic fauna in the receiving environment. Typically, this involves cases where the concentrations of multiple chemical and/or elemental substances in the effluent exceed, or are likely to exceed, the known Toxicant Trigger Values presented in the ANZECC Water Quality Guidelines. The potential for synergistic toxicological effect can also be demonstrated through the use of DTAs. DTA of effluent would generally apply to residual waste water treatment plants that have the potential to receive commercial or industrial effluent as part of the trade waste system, or Advanced Waste water Treatment Plants (AWTPs) that produce a Reverse Osmosis Concentrate (ROC), or other similarly concentrated waste streams.

Specific requirements may include:

- The proponent should submit a DTA program and Toxicity Identification Evaluation (TIE) program for review and approval by the QLD EPA prior to commencement of the DTA program;
- DTA should be conducted on the effluent as it would be delivered to the end-of-pipe;
- The use of toxicity testing for licensing requirements should preferably employ cellular-based (mode of action) methods over whole organism tests where a QLD EPA and [National Association of Testing Authorities](#) (NATA) approved method for those tests exist¹⁷. This would negate any requirement for animal ethics approval (in most cases), standardises tests for marine and freshwater discharges, and provides more defined information on the form of toxicity;
- DTAs should be conducted on samples that are *representative of the discharge*;
- The frequency of licensed DTAs should initially be on at least an annual basis and in cases where there is seasonal variability in the quality of the effluent, on the effluent that represents the worst-case. Case-specific factors, such as the frequency and volume of the discharge, changing influent or effluent quality characteristics, and the Environmental Values (EVs) of the receiving environment should be taken into consideration when determining the frequency of the licensed DTA requirements for the discharge;
- The test organisms to be used for DTAs are to be chosen in accordance with Section 8.3.6.8 of the ANZECC Water Quality Guidelines, taking into consideration locally occurring species, the location of the discharge and nature of the receiving environment;

¹⁷ There are very few validated cellular based/methods currently available. Consequently the great majority of DTA-related bioassays will be Whole of Organisms tests.

- The toxicity tests chosen for the DTA should demonstrate that the effluent is neither acutely toxic within the initial mixing zone, nor exhibit observable chronic (or alternatively sub-lethal) toxicity in the test specimens outside of the mixing zone;
- The toxicity limits derived from the DTA should be reported to the EPA as No Observed Effect Level or No Observed Adverse Effect Concentration (for example NOAEC at 10% effluent concentration);

Applicable TIE procedures, as provided in the approved DTA program, must be undertaken if, following the QLD EPA review of the reported DTA results, the QLD EPA requests in writing that TIEs are required to be performed.

b. Spatial definition

The development application must specify the proposed mixing zone; including the location, boundary and area. In cases where the proposed residual waste water discharge is to a river, the percentage of the width occluded or blocked by the mixing zone must also be specified.

The mixing zone boundary may be determined by indicator concentrations in the residual waste water. Where indicator concentrations are predicted to be statistically indistinguishable from the receiving water concentrations, complete mixing has occurred and the mixing zone is presumed to have ended. Only one mixing zone, minimised to the greatest practicable extent may be included in the development application.

Where the assessed environmental risk is low, spreadsheet calculations may be used to establish plume geometry and the dilution of contaminants. This circumstance may include, for example, a proposed discharge involving a small volume of residual waste water containing one or two well-studied contaminants at concentrations only several times greater than the receiving waters.

Commensurate with increased scale and risk, the use of predictive numerical modelling may be required to evaluate mixing processes and impacts in the near-field. Model outputs would include the prediction of the size and behavior of the effluent plume and mixing zone impacts, in both the water column and sediments, over a range of input conditions. The development application must include both the results of numerical modelling and any experimental work for the assessment of impacts.

Predictive numerical modelling may incorporate relevant functional relationships between the contaminant discharge and environmental quality indicators likely to be affected. Where functional relationships are unknown, consistent with assessed environmental risk, additional laboratory or field experiments may be required to understand the likely effects of a discharge (for example to understand the impact of effluent contaminants on benthic communities in marine sediments).

General information on predictive numerical modelling is at [Appendix 6.3](#).

c. Assessment of no or negligible change to HEV receiving waters

The development application must address both baseline monitoring of relevant indicators in the near-field, beyond the mixing zone boundary, and predictive impact modelling of the effects of the proposed waste water discharge to demonstrate no or negligible change to the physico-chemical, biological, habitat and flow attributes, above natural variation, in the near-field beyond the mixing zone boundaries. These matters and post operational water quality monitoring requirements are addressed below.

1. Establishment of baseline condition

The development application must establish the baseline water quality against which the no or negligible change requirement may be assessed for the natural range of values of physico-chemical, biological, habitat and flow indicators relevant to the proposed ERA.

To characterise the natural condition the baseline water quality monitoring program design should be consistent with the requirements of the *Before* component of a *Multiple Before-After Control-Impact* (MBACI) water quality assessment program (or equivalent assessment program). Refer [Appendix 6.4](#) for MBACI water monitoring experimental design.

The adoption of MBACI water monitoring experimental design would allow the baseline data to be used in the predictive impact modelling of the effects of the proposed discharge to demonstrate no or negligible change in the near-field, beyond the mixing zone boundaries. The data may also be used for post operational compliance monitoring of impacts.

The baseline monitoring design must include at least two near-field monitoring sites adjacent to the proposed boundary of the mixing zone at the impact site. These near-field sites may comprise monitoring sites for the *Impact* location of the MBACI water quality monitoring design. A comparable number of indicators must be monitored at two control sites. Refer [Appendix 6.4](#) for MBACI water monitoring experimental design.

The *Queensland Water Quality Guidelines 2006* recommend collection of a minimum of 24 samples over two years. However, this requirement may need to be adjusted for some biological and habitat indicators (for example indicators that represent an environmental response integrated over a longer timeframe). The two year time period is recommended to allow some measure of inter-annual variation. While two years will not capture the entire range of such variation it must provide some indication of its likely magnitude.

Notwithstanding, the aim is to properly characterise the whole natural range of the selected indicators and maximize the chance of detecting changes in environmental indicators beyond the effect sizes stipulated in the *Queensland Water Quality Guidelines 2006*.

2. Prediction of impacts of the proposed ERA—demonstration of no or negligible change

Having established the natural baseline, the development application must determine the effects of the proposed residual waste water discharge within the initial mixing zone and the near-field immediately beyond the mixing zone boundaries. The no or negligible change test would be satisfied if no significant difference was predicted between the impact site and the two control sites. Operational risks must be addressed.

For technical detail refer to Sections 8.4.2, 8.4.3 and 8.4.4 of the *Queensland Water Quality Guidelines 2006* and Section 3.2.2.1 of the [Australian Guidelines for Water Quality Monitoring and Reporting \(2000\)](#).

Peer review assessment must be submitted with the development application.

3. Post operational monitoring

Development conditions must include the requirement for the applicant to initiate the *After* component of the *Multiple Before-After Control-Impact* (MBACI) monitoring program (or equivalent monitoring program) when the operation is at design capacity, or within 12 months of commissioning, to demonstrate actual compliance with the no or negligible change requirements.

As a guide, 24 sample sets over a 12-month period would be required.

Post operational non-compliance would require the implementation of expedited compliance actions under a *transitional environmental program* or other instruments under the EP Act.

After compliance is demonstrated, on-going water quality monitoring would be required. For some waters and contaminants there is the possibility of achieving this requirement through a contribution to a joint agency/stakeholder ecological health monitoring program.

In the context of continuous improvement the development conditions may also require the preparation and implementation of a *transitional environmental program* to reduce the size of the mixing zone, over time.

Appendix 6.3: Numerical modelling of environmental impacts and mitigation actions

Choice of model

The models used should be “fit for purpose” and any work based upon sound science and the best available information. The size and potential risk of the proposed activity will determine the scope and extent of the modelling required.

Predictive tools such as mathematical models are often required when assessing the benefits of various management options (or scenarios). Different types of computer models exist, including hydrodynamic (mixing and flow), water quality (biogeochemical), catchment (export) and groundwater models. The type of model used will depend on the application but generally a combination hydrodynamic and water quality models would be required to simulate receiving waters for decisions involving continuous point source discharges. Catchment models may be used to provide inputs into receiving water models. Hydrodynamic and water quality models are discussed further below.

The choice of hydrodynamic models needs to account for the properties of the discharge, bathymetry, as well as the local mixing conditions in the receiving waters. Some discharges such as brine concentrates from reverse osmosis plants have elevated salt concentrations or mineral processing effluents may have elevated temperatures. Receiving waters may also not be well mixed in all dimensions. For example some estuaries periodically stratify due to salt wedge formation. The model needs to be able to simulate the appropriate density effects or thermodynamic processes for the specific application.

Mixing models used to assess mixing zones are generally hydrodynamic models that simulate the initial dilution of the discharge with the receiving environment. To obtain concentration predictions in the mixing zone, background levels need to be added to the dilution predictions. These may be sourced from far-field models or estimates from monitoring.

Water quality models simulate the water quality processes occurring within waterways. The model of choice needs to include the relevant biogeochemical processes relevant to the contaminants in the discharge and the characteristics of the receiving environment. For example, for carbonaceous matter, the model will need to simulate the heterogenic bacterial activity that breaks down the carbonaceous matter. This process also consumes oxygen and therefore the models need to simulate surface re-aeration and solubility etc. For nutrients, the model will usually need to simulate the growth of algae and primary production.

A technical description of the model should be provided to the EPA covering the history of the model, development history, published articles and details of the conversion of the model into a software package. Details of the experience and training of the model users should be provided. Other requirements include a statement of objective to explain clearly the situation being modelled and the objectives of the modelling study and outputs required from the model. The choice of model should be justified to demonstrate that the model used is suitable for this study including examples of previous applications in similar situations and a conceptual diagram of how the model represents environmental processes.

Data inputs to the model

The quality of inputs to the model will greatly affect the predicted outcomes. All modelling assumptions should be stated. Initial assessment should include a review of the flows and contaminant concentrations for the proposed activity and other activities to be modelled. These usually form the basis of the scenarios used for the model runs. How well do they represent the likely release in terms of quantity and variability? For constant concentrations and flows, do they represent average or worst-case condition? For what period of time do the worst-case conditions exist, and how frequently? Further data inputs will include initial conditions (particularly for water quality variables) and boundary conditions (tidal flow and elevations at the seaward or upper catchment boundary of the model) of the model and these should be checked. The choice of environmental data such as

rainfall will often be determined by the choice of baseline conditions. It is generally recommended that a statistical dry year is used to assess point source scenarios.

Data used for the modelling study and its source should be clearly defined, including the source, quality assurance and expected errors. Any data manipulation and related assumptions should be detailed. Raw data in electronic form should be made available to the EPA, on request.

Uncertainty of predictions (calibration)

The ability of the model to make reliable predictions will strongly depend on the above issues and should ideally be tested through both calibration (adjustment of model parameters to reproduce measured data) and validation (a comparison of predicted values against measured data). Validation is used to demonstrate the model accuracy. Without calibration or validation, model prediction should only be used for qualitative comparisons, rather than quantitative comparisons against water quality objectives. Sensitivity analysis can be used to demonstrate the effect of varying input data or parameters on key output variables. The uncertainty of model predictions should be stated and incorporated into any conclusions made by the applicant.

Appendix 6.4: Application of Multiple Before-After Control-Impact design to HEV water assessment

Introduction

The purpose of Multiple Before-After Control-Impact (MBACI) sampling designs is to allow a logically and statistically valid assessment of impact in the context of overall environmental variability. A discussion of these designs is available in Underwood (1992). Its application to HEV areas is aimed at determining whether or not the no change criterion has been met following commencement of an activity.

As its name implies, MBACI designs involve collecting samples before and after (BA) an impact may potentially occur to determine the significance of any change. It also involves collecting before and after samples at both control and impact (CI) sites. Inclusion of control sites makes it possible to infer whether changes detected at an impact site are due to the activity under investigation or are simply the result of broader scale natural variations that exist in the environment and are unrelated to the activity. The use of Multiple (M) control sites is to protect against the possibility of drawing erroneous conclusions from results at a single site, where an observed change may also be due the natural cycles occurring at different times in different places.

In scientific methodology, an experimental treatment is applied to some instances (for example fertiliser applied to a field or a new drug given to patients) and the results in these instances compared to those from testing instances where the treatment is absent (for example no fertiliser or a placebo given). An MBACI sampling program is essentially just a scientific experiment in which the experimental treatment is commencement of the subject activity, this being introduced at the project site and but not control sites.

The use of MBACI to assess change within HEV areas is essentially no different to its application elsewhere. It involves identification of adequate control and impact sites and collection of sufficient samples to allow a reasonable chance of detecting a predefined quantum of change. More detailed guidance on these issues with respect to HEV areas is provided below.

Indicators

The selection of indicators will of course be related and sensitive to the type of activity proposed. As a general guide, indicators must include:

- Indicators that reflect the potential direct physico-chemical impact of the activity in the water column;
- Where applicable, indicators that measure the potential impact on sediments; and
- Indicators that measure the biological response to the activity.

Control sites

Under the MBACI design, the smallest number of control sites is two. Additional sites will increase the strength of any inferences drawn from the program. The control sites must have similar hydrological, environmental and biological characteristics to the impact sites (in the before period). This may need to be verified through a pilot survey or existing information. In streams, control sites can be sited upstream of impact sites and/or in nearby similar (un-impacted) waterways. In embayments and estuaries, control sites must be located in physically and biologically similar locations but far enough away from the impact area to be unaffected once the activity commences. For small estuaries, use of similar nearby estuaries is preferable if this is practicable. Control sites must not be in a location in which material human activities take place (for example another waste water discharge or channel dredging).

Impact sites

It is undesirable to replicate the potential impact and thus there will typically be only one impact site. This will be located adjacent to the proposed mixing zone (if any) for the discharge or activity. For water quality assessment,

at least two water quality monitoring sites must be located in the near-field adjacent to the mixing zone at the impact site. In smaller streams, the mixing zone must not be more than one third of the stream width. The near-field may be in the mid point of the stream adjacent and downstream of the mixing zone. In large estuaries or embayments, the near-field zone may be an area within 50m of the boundary of the mixing zone.

Number of samples

Where pre-existing data is unavailable or only available for some indicators, the data from the before phase of the MBACI program will be used establish both the environmental goals for environmental impact assessment and collect the before condition data for the requisite environmental monitoring program. The number of samples required is predicated on the need to achieve a relatively precise definition of existing condition (for the selected indicators) and also to have a reasonable chance of detecting an environmental change occurring at the requisite environmental effect size.

For HEV waters, the management aim is to have no change, but this is not logically or statistically testable. Instead, testing is carried out on the hypothesis that implementing the activity will significantly change monitored environmental variables. If the data do not support this, the null hypothesis that no significant change occurs is accepted.

As the testing is to determine if a change occurs, some minimum detectable environmental change needs to be defined. For physico-chemical water quality indicators, this issue is prescribed through a default method of assessing no change. This method is detailed in the Queensland Water Quality Guidelines in Section 8.4.2.1.1. In brief, during the before period, a minimum of 24 samples must be collected over a period of two years. The two-year time period is recommended to allow some measure of inter-annual variation. While two years will not capture the entire range of such variation it must provide some indication of its likely magnitude. These samples are taken as reasonably practicable at the same time for impact and control sites.

In the after period, an initial collection of 24 samples at each site is required. For continuous discharges or activities, this may need to be undertaken in a period of not less than 12 months. However, for intermittent discharges, the collection of samples must be tailored to the periods of discharge and potential impact.

For biological indicators the default approach described above may not be appropriate. Due to the wide range of possible biological indicators and differing time frames over which biological variables integrate impacts, it is not practicable to provide a prescriptive approach. However, the overriding aim remains the same i.e. to establish the natural range and to be able to detect any change to the natural range of values. The following general guidance is provided.

The before distribution of population values needs to be established with reasonable precision. This means that sufficient numbers of samples must be collected such that reasonably tight confidence intervals¹⁸ (CI) around the estimated population 20/50/80 percentiles are established (CI ranges for the three percentiles must be clearly separated). What constitutes a sufficient number will vary depending on the indicator. The number of samples taken will depend upon natural variability of the chosen indicator(s). The number of samples is a compromise between degree of information gain with increasing replication and time, cost and practicality of increasing sampling effort. However, if the selected indicator is so variable that impractically high numbers of samples are required to achieve the desired outcome, then an alternative indicator must be considered.

The overall objective is to obtain a reasonable estimate of the sample population. A useful technique is to determine the coefficient of variation for increasing degrees of sample replication and sampling effort (for example plot size to estimate which techniques will give a reasonable estimate of variability).

¹⁸ In the default method for physico-chemical indicators, use of the 75th rather than 95th percentile CIs is recommended. This is similarly recommended for biological indicators. While this leads to an increase in the chance of making Type 1 errors, it considerably tightens up the CI ranges and decreases chance of Type II errors. This is considered a reasonable trade off for these HEV waters

Sampling in the post-activity period must similarly aim to collect sufficient samples to be able to develop tight confidence intervals around the estimated population 20/50/80 percentiles. The before and after percentiles (with their associated confidence intervals) can then be compared for evidence of change. These percentiles are used so that monitoring may detect changes, which result in shifts in median levels as well as changes in variability.

Use of existing data

Where there is sufficient existing data from relevant sites for a particular indicator, the proponents may make use of this. The existing data could be used to characterise the environment and establish environmental goals for that indicator(s). If an environmental monitoring program is currently being conducted in relevant places, this data may be used for *before conditions* at control sites and/or the impact site as required.

Where long term data sets are available, information gained from assessment of spatial and temporal variation of an indicator could potentially be used to modify the program. For example, if spatial variation in an embayment was found to be very small for a particular indicator, this might justify a reduction in the number of control sites required to the minimum level.

In numerous waterways in Queensland, stakeholders jointly contribute to and carry out monitoring programs, a practice EPA encourages. A proponent proposing to use such data may need to contact stakeholders to discuss mutually acceptable arrangements for use of data and participation in the program.

An important caveat on the use of existing data is that it must be of proven high quality (i.e. it must have documented Quality Assurance information).

Reference

Underwood, A.J. (1992) Beyond BACI: the detection of environmental impacts on populations in the real, but variable world. *Journal of Experimental Marine Biology and Ecology*. 161: 145-178.

Conditions for Coal Mines in the Fitzroy Basin

Approach to Discharge Licensing

1. Introduction

This document describes the proposed approach for deriving consistent and appropriate limits and conditions for Coal mine discharges and supports the draft Conditions for Coal Mines in the Fitzroy Basin. The proposed approach aims to minimise the risk of discharges on downstream environmental values of receiving waters and be consistent with current legislation, departmental policy and State/National water quality guidelines. This includes the department's Policy for wastewater discharges to Queensland waters (<http://www.epa.qld.gov.au/publications?id=2272>), the Queensland Water Quality Guidelines (2006) and the ANZECC/ARMCANZ Fresh and Marine Water Guidelines 2000.

2. Managing and Characterising Discharges

The first step in assessing a licence proposing a wastewater discharges is to demonstrate the unavoidable need for that discharge. Water is a resource and most mines require substantial amounts of water even if for coal washing and/or dust suppression. A well planned and effective water management system is essential for having sufficient water for the mine during dry times but also having sufficient available storage/free-board to ensure discharges are infrequent and only associated with major storm events. Effective water management requires separate storage of water with varying water quality (such as storage of process water/groundwater, surface water runoff), appropriate infrastructure to accommodate sufficient water storage and appropriate flood design and control.

Where the need for a discharge is demonstrated, the next step is to characterise the wastewater and identify the potential contaminants or associated hazards that may exist. This may require an understanding of historical wastewater quality and/or information on local groundwater quality, geology types, the process/treatment systems involved and the broader water management strategies to be adopted. Currently, salinity (measured as electrical conductivity) and suspended sediment (and pH to a lesser extent) are known to be major water quality issues that require regulation. However, for other characteristics such as metals/metalloids, a legitimate need for regulation it is likely to vary from case to case. However, in the majority of cases there is currently a lack of data. Further information needs to be collected on both wastewater and natural waters. An interim approach is required for setting discharge conditions where water quality data insufficient or not currently available.

3. Environmental Values and Ephemeral Streams

After characterising the discharge, the next step requires environmental values and water quality objectives for waterways potentially affected by the discharge to be assessed. Depending on the risks from the discharge (based on its volume, contaminant concentrations, duration and location), this step will need to be done to a lesser or greater spatial extent. With greater risk, environmental values and potential impacts will need to be considered further a field. Environmental values and water quality objectives specified in the Environmental Protection (Water) Policy 1997 must be considered for assessment of all waterways including ephemeral streams. Environmental values for drinking water, stock watering, irrigation, recreation, industrial use and aquaculture may exist downstream of the discharge depending on the discharge location. The guidelines for these environmental values will form the basis of default water quality objectives and will typically not differ between permanent and temporary flowing streams. Various published guideline values are shown in Tables 1 to 6.

Many coal mines are situated in areas of ephemeral/intermittent streams. Current reference-based water quality guidelines for aquatic ecosystem protection (for example, in the Queensland Water Quality Guidelines, 2006) are available only for permanent flowing streams. Nonetheless, it is proposed that these guidelines be used for impact assessment and licensing discharges to ephemeral streams until local reference information becomes available. In addition, in mining areas it is common that background concentrations may be elevated as a result of historical anthropogenic activities and/or natural causes (certainly the case for some metals). Deriving local guidelines and background data is ideally needed but requires sufficient reliable data from monitoring of appropriate sites. Monitoring of ephemeral streams can be challenging given the infrequent and unpredictable nature of flow and the logistical issues involved with accessing and taking event related sampling. There is currently insufficient information for some contaminants as to how levels change with rainfall and flow. For electrical conductivity (EC) it is unlikely that high EC is associated with high flows in contrast to suspended sediment solids or turbidity which is typically elevated during rainfall-associated events.

For many sites there will be an absence of suitable monitoring data. In this case, reference-based guidelines from permanent flowing streams can be used for deriving end-of-pipe limits or trigger values in a precautionary sense, although consideration needs to be given to the above points. Where good local referenced data has been collected, this could be used to derive local reference-based guidelines (typically 75th percentiles for median EC, 80th percentiles for other reference-based water quality indicators such as pH, turbidity and suspended sediment). Typically at least 18 data points would be required and collected over at least 3 rain events. This may require 2 years of data but is dependant on rainfall frequency. Data from multiple reference sites could be amalgamated in most situations. The Queensland Water Quality Guidelines propose that this approach also be used for metals/metalloids where local reference conditions may be elevated.

4. Potential Water Quality Impacts

Effects of Salinity on Aquatic Organisms

Salinity has the potential to cause both acute and chronic toxicological effects in aquatic organisms. There is currently no nationally published toxicity trigger for salinity effects in freshwater environments although there is published information on the effects of salinity on fish, macroinvertebrates and other biota. Thus the recommended approach is to consider the ambient reference-based guidelines as discussed in Section 7. Generally, setting EC limits based on reference-based conditions will address potential concerns with toxicity given that discharge levels will typically be below toxicity thresholds. However, for situations where the stream has assimilative capacity for salinity, it may be possible to have discharge levels at or above toxicity thresholds and through dilution, still meet reference-based guidelines in-stream within a short distance downstream. The general policy position in this case is that the discharge should not result in any toxicity within the initial mixing zone.

Based on the comments by Hart (2008) in a recent review of water quality in the Fitzroy Basin, EC values of less than 1500 $\mu\text{S}/\text{cm}$ are unlikely to affect adult fish although salinity around 1000-1500 $\mu\text{S}/\text{cm}$ may effect early life stages of fish. Macroinvertebrates are unlikely to be affected at below around 1000 $\mu\text{S}/\text{cm}$. However, for those species adapted to quite low salinity (200-300 $\mu\text{S}/\text{cm}$) such as in the south of the Fitzroy Basin, permitting ambient EC concentrations to reach 1000-1500 $\mu\text{S}/\text{cm}$ would adversely affect the community structure, especially at a species level. A conservative trigger used in the ANZECC guidelines (1992) was Total Dissolved Solids (TDS) of 1000 mg/L (this converts to an EC of approximately 1500 $\mu\text{S}/\text{cm}$) which receiving waters should not exceed.

5. Monitoring of Metals/Metalloids

Metals/metalloids have the potential to cause both acute and chronic toxic effects in the short-term and bioaccumulate to have similar effects in the long-term. The comments on measuring EC in receiving waters are also relevant to applying limits to metals/metalloids in receiving waters. There are few examples of where metals/metalloid limits have been applied end-of-pipe at this stage for coal mines and in most cases, further review of data is required for this to be done. Ascertaining end-of-pipe total and dissolved metal concentrations is recommended. Trigger values for receiving environment monitoring can be applied. Trigger values should be based on relevant environmental values. Conservative trigger values are shown in Tables 5 and 6. For aquatic ecosystem protection (Table 5), the default trigger values are for slightly-to-moderately disturbed (SMD) systems protecting 95% of species. For highly disturbed systems (HDS), ANZECC/ARMCANZ (2000) guidelines recommend adopting SMD levels in the first instance but if there are known high levels naturally occurring, lower lesser level of species protection (such as 90% or even 80%) can be adopted. In some situations such as may occur in highly mineralised mining catchments, natural or historical effects have resulted in even higher background levels for some specific metals/metalloids. Guideline adjustment for metals such as aluminium, copper, iron and zinc is sometimes required. If this is the case, relevant reference data should be assessed to develop locally-relevant guidelines. Where reference data is not available, the use of upstream background could be negotiated as a surrogate where it can be demonstrated that the site has not been influenced by upstream mine or other industry-

related activities that are likely to affect metal/metalloid concentrations. Guideline values for long-term medians can be developed from 80th percentiles of relevant reference data.

For aquatic ecosystems, the metals/metalloid limits could be applied to total (i.e. unfiltered) concentrations. If this is the case and the total concentration exceeds the trigger value, a hardness correction can be applied for some metals (cadmium, chromium III, copper, lead and nickel) up to a salinity of 2500 mg/L. See Table 3.4.3 of ANZECC/ARMCANZ (2000) Guidelines as to how to modify the trigger values for hardness for these metals. However, if exceedances still occur or are likely to occur then dissolved (i.e. filtered) metals/metalloid concentrations should also be measured and compared to the limits. Also note that speciation of some metals/metalloids is usually required for aquatic ecosystem protection (e.g. arsenic and chromium). For event-based sampling, measurement of dissolved metals/metalloids will be more problematic and logistically difficult. Samples need to be filtered, refrigerated and analysed within short time frames and this may not always be possible. However, at this stage it is proposed that for protection of aquatic ecosystem, metals are measured for dissolved metals/metalloids given the likelihood for exceedance of the guidelines. On the other hand, given the potential addition costs of speciated metals, it is proposed that all samples be analysed for dissolved total species (i.e. all species of the metal/metalloid, or 'total' species) for licensing. Where risks are identified, further assessment of speciated components may be required. For other environmental values, assessment of total metals/metalloids is needed to compare to guidelines but only for those that are specified in the guidelines. Where there is an absence of other information on potential sources or levels of metals/metalloids, a standard set of metals/metalloids is recommended until such information is made available. This might include characterising of the wastewater in dams or potential sources of wastewater (such as groundwater, waste characterisation or geological analysis).

6. Monitoring Receiving Waters

Water Quality Monitoring

Where data is available, background receiving water quality typically does not meet reference-based guidelines for all indicators. This may be due to both differences in natural conditions and from anthropogenic pressures. For this reason, application of guidelines to receiving waters as regulatory limits is likely to result in frequent non-compliance, regardless of whether the mine is discharging or not.

Therefore, receiving water assessments using water quality guidelines should only be used for triggering reporting (or investigation purposes) and not as a primary mechanism for regulation. This could include reporting of long-term medians of data (reference-based guidelines) or reporting against 95th percentiles (biological effect data). Maximum trigger values for certain indicators such as EC and pH may be adopted for some near-field monitoring sites as an additional trigger limit.

Reporting against guidelines for environmental values other than aquatic ecosystem protection should also be done where present. Monitoring should be done when the stream is flowing (this flow trigger would preferably be below the discharge flow trigger) and should ideally be done both when the discharge is and is not occurring. Reporting of the receiving environment monitoring program (REMP) could be done.

Water quality measurements of permanent water holes or other specific downstream environmental values are also appropriate where risks of potential impact are identified. For ephemeral streams, the current science suggests that the permanent and semi-permanent water holes need to be protected as a high priority. The concentrations of some water quality characteristics can increase significantly in water holes with time due to evaporation and no flow conditions whilst others decrease in concentration due to changes in water chemistry. Recent mine discharges have resulted in significant changes to salinity profiles within some downstream drinking water reservoirs and therefore impoundments, storages, weirs, dams, etc. should also be monitored given the potential for impacts.

Biological Monitoring

Biological monitoring (e.g. macroinvertebrate sampling) will generally only be required when the discharge quality and circumstances are such that they are considered to pose a significant risk to the affected receiving waters and associated habitat(s). For instance, this situation might arise when end-of-pipe EC levels are above 1000 $\mu\text{S}/\text{cm}$ and there is a potential for discharge during times of low flow when limited dilution will be occurring. Having said that, biological monitoring should generally be limited to permanent and semi-permanent water bodies that could be potentially impacted by the discharge (for example, within 50km of the discharge), although this will depend on the quantity and duration of discharge. Note that specific ecosystem-type considerations must be taken into account, for example, in some areas of the catchment even short-term wetting of stream beds can play an extremely important role in the ecological cycle of the system and therefore may warrant biological monitoring.

Monitoring of macroinvertebrates must be carefully designed and interpreted in accordance with (i) the Queensland Australian River Assessment System (AusRivAS) Sampling and Processing Manual (August, 2001) and (ii) Chessman (2003), SIGNAL 2 – A Scoring System for Macro-invertebrate ('Water Bugs') in Australian Rivers, Monitoring River Health Initiative Technical Report no. 31, Commonwealth of Australia, Canberra. Monitoring should be undertaken at both impact and control sites. (For further advice on this issue, contact Neil Tripodi on 3896 9241)

Sediment Sampling

Sediment sampling for toxicants such as metals and metalloids will generally only be required when the discharge quality and circumstances are such that they pose a significant risk to the receiving waters. This may be the case where end-of-pipe metals/metalloid concentrations are significantly above both background/guideline concentrations, discharge has occurred for extended periods of low flow and ANZECC/ARMCANZ (2000) water quality guideline values and background water quality concentrations are exceeded.

Sediment monitoring should be limited to permanent water bodies (such as weirs, water holes etc) that could be potentially impacted by the discharge and that possess the environment where muds (sediment) can accumulate. Sediment monitoring locations may be of similar nature to macroinvertebrate sampling sites (where required).

8. Setting End-of-pipe Limits and Links to Natural Flow

Discharging linked to natural flow in ephemeral streams is an essential mechanism for ensuring any discharge has reduced risk of impact on downstream environmental values. The specification of upstream monitoring sites and start/stop discharge triggers based in the environmental flow is also needed to ensure that this occurs. Large dilutions factors (e.g. 1 to 10 or 1 to 20) would generally result in reduced risk of both water quality and flow impacts, assuming the monitoring of the stream and discharge flow are closely linked and controlled.

The proponent should provide adequate data and modelling of the flow in their part of the catchment to determine the most suitable environmental flow trigger under which a discharge of certain maximum volume and flow rate should occur. The frequency or percentage of wet weather days that this will be possible should be assessed under a range of rainfall scenarios.

As part of the approval, the following will be required:

- A minimum natural receiving environment flow (m^3/s) should be defined at which wastewater discharge can take place – both commencement and cessation. It should be based on historical measurements of upstream natural flow and be designed to avoid times of poor mixing and permit significant post-discharge flushing (such as <20th percentile flow). Ongoing access to data from a suitably situated gauging station will be required.
- The maximum discharge rate should be set so that it does not exceed 20% of the minimum natural receiving environment flow rate (i.e. 1:4 – 1 part discharge wastewater : 4 parts natural flow).
- Daily discharge in cumecs (m^3/s) should be reliably measured and recorded.

An interim approach is required when no background receiving environment monitoring data is available. In this case, the dilution factors are not considered in setting limits as background water quality may exceed guidelines (i.e. there would be no assimilative capacity for any contaminant), although a 20 percent dilution with receiving waters will still be required.

Where discharge cannot be linked to sufficient natural flow, more detailed risk assessment should be undertaken for the waterways potentially affected by the discharge as the likelihood of impact is significantly increased. Any permanent water bodies (e.g. weirs or water holes) or locations of other environmental values potentially affected by the discharge should be identified. For such situations, more stringent water quality limits would typically be required such that it meets ambient or background water quality levels. Long-term continuous discharges in ephemeral streams should be generally discouraged. In the case of some mines in upper catchment areas, an interim approach may be adopted where discharge is permitted with flow measurements downstream. This will ensure that potential impacts are limited to near-field. Such an approach may be suitable for a transitional environmental program (TEP) or where the potential effects are considered low risk.

Monitoring of relevant physical chemical and toxicant indicators in Tables 1 to 6 should be undertaken end-of-pipe when a discharge is occurring, ideally coinciding with receiving environment monitoring. The limits/triggers are derived from ambient water quality data of permanent flowing streams in the Fitzroy and from drinking water guidelines. It is proposed that the EC discharge limit should vary depending on geographical location and whether a drinking water reservoir is located downstream of the discharge. Other issues that should be considered in setting end-of-pipe indicators and limits/triggers include laboratory detection limits and the relevance of the indicators to the activity and the risks involved.

End-of-pipe limits are required for EC and pH. The information is not currently available to set maximum values based on acute toxicity. A conservative approach would be to ensure discharge limits for EC end-of-pipe do not exceed 1500 $\mu\text{S}/\text{cm}$. Under certain circumstances, a higher end-of-pipe limit may be applicable where large mixing ratios are achieved and discharge is only for smaller durations/volumes. In these cases, the end-of-pipe limit may be increase up to 2250 $\mu\text{S}/\text{cm}$. The need for this would need to be demonstrated. The pH limits would ideally be between 6.5 and 8.5 when linked to 1:4 dilutions. Higher pH limits (say ≤ 9.0) end-of-pipe may be negotiated where appropriate dilution will be achieved. Limits for suspended solids concentrations can be negotiated with mines for sediment based on expected sediment removal from settling. Turbidity levels should be measured with the view of setting a relevant limit when sufficient background data is obtained.

In terms of metals/metalloid measurements end-of-pipe, it is recommended that no compliance limit be applied to this end-of-pipe monitoring unless adequate receiving environment data is collected and reviewed. However, trigger limits can be proposed for those metals/metalloids that currently have ANZECC/ARMCANZ (2000) trigger values for freshwater. Such trigger limits, if triggered, would firstly require a comparison of down stream water quality to trigger values, if exceeded, and then a comparison should be made to reference site data. If values are within local reference levels, no further action should be required.

There is a range of other indicators that may be monitored and regulated end-of-pipe (and in receiving waters). These include nutrients (ammonia, nitrate, total nitrogen, total phosphorus, filterable reactive phosphorus, phosphate, chlorophyll-a), sulphate, total hydrocarbons, fluoride and pathogens to mention only a few. Nutrients should be monitored where these are likely to be high in the discharge as a result of the activity, for example, where a sewage treatment plant is adopted or where there is a source of nutrients in the process. Ammonia and nitrate are potential toxicants (with toxicant trigger values) while total nitrogen, total phosphorus, ammonia, organic nitrogen, oxidised nitrogen, and filterable reactive phosphorus are indicators relating to potential eutrophication effects (and have related ambient water quality guidelines). Sulphate is currently regulated as a result of potential effects on drinking water (human and stock). Sulphate has no aquatic ecosystem trigger value although can change the interactions of other water quality contaminants. There are also no aquatic ecosystem guidelines for total petroleum hydrocarbons (TPHs) or polycyclic aromatic hydrocarbons (PAHs) other than naphthalene but this may be required to be monitored where mechanical workshops or petroleum-based chemicals/fuels are used on site.

9. Receiving Environment (RE) Monitoring and Triggers

Monitoring of all indicators listed for relevant environmental values in Tables 1 to 6 should be undertaken in the receiving waters at upstream and receiving environment monitoring points. Metals/metalloids as shown in Table 5 (and Table 6 if relevant) should also be monitored at upstream and downstream receiving environment monitoring points, at least until time where sufficient data is available to revise suitable monitoring indicators. Ideally, both total and dissolved metals should be monitored in the receiving environment relevant to the environmental value that the indicator relates to, e.g. total arsenic is required for assessment against drinking water guidelines.

Ideally, any associated local receiving environment monitoring program should include at least one far-field monitoring point situated much further downstream to represent post-mixing water quality. Note that the far-field monitoring point may be off the mining lease but should remain located within the nearest major flowing stream – this monitoring point should not be assessed for compliance purposes (or maximum triggers). A reference site un-impacted by mining activities (e.g. no mines within 20km upstream) should be identified and monitored for the sub-catchment. In situations where this is not possible, the least affected site, or unaffected site from another nearby sub-catchment should be identified for the purpose of collecting reference or “background” data. Collaborative monitoring programs involving more than one mining company may be applicable for monitoring such sites for local creek catchments.

Upstream and downstream receiving environment monitoring should occur during all flow events, not just during periods when discharges are taking place. This requirement is necessary for a number of reasons:

- To allow for condition assessment of these waterways
- To allow for potential assessing of impacts before and after discharge
- To allow assessment of background to assist with limit setting

Where end of pipe compliance limits apply for physical chemical indicators and are considered low risk, receiving environment monitoring and reporting should be based on long term assessment of consecutive measurements over a twelve month period and compared to ambient water quality objectives in the Queensland Water Quality Guidelines (2006) and background water quality.

Where end-of-pipe limits are considered to pose some potential risk to receiving waters, trigger values can be applied to sites immediately downstream from the discharge. The trigger values would generally be more stringent than end-of-pipe conditions but be achievable. For example, based on available information a receiving environment maximum trigger of 1000 $\mu\text{S/cm}$ EC is proposed for near-field monitoring sites. Trigger values for metals/metalloids would typically be ANZECC/ARMCANZ (2000) toxicant trigger values for slightly moderately disturbed systems until sufficient reference data becomes available to review these limits.

Exceedance of these trigger values during discharge should require an in accordance with the ANZECC and ARMCANZ 2000 methodology. Where downstream water quality is within reference data, no further action should be required.

10. Modifying Limits and Triggers

Changes to compliance limits and trigger values may be appropriate where adequate and relevant reference monitoring data is made available and assessed as per the allowance in ANZECC/ARMCANZ (2000) and additional information. A reference site can be defined as a site without mine impacts (e.g. no mines within 20km upstream) for the sub-catchment with other requirements as per Appendix C in the QWQG (2006). In some cases it may be the least impacted site, or an unaffected site from another adjacent sub-catchment. An adequate number of valid data points are required to provide a reasonable confidence limit around the percentile based trigger values/guidelines. For example to develop an 80th percentile guideline, a minimum of 18 samples is required to provide a 95% confidence level. Ideally,

samples should be taken from multiple (minimum 3) flow events over at least a one to two year period.

The objective of water sampling for meta/metalloid concentrations discussed above is to help form an acceptable data set to allow site specific license limits or trigger values to be set for end-of-pipe and receiving waters. Elevated background levels of some metals such as aluminium, zinc, iron and chromium have been observed in the Fitzroy Basin.

Where assimilative capacity has been identified as part of monitoring, additional allowance may be incorporated into discharge limits.

Definitions

Background – In terms of water quality, background would typically be obtained by sampling upstream of the mining activity in times of natural flow. Background should not include times of discharges from other mines upstream or times of no flow.

Reference - A reference site is a site whose condition is considered to be a suitable baseline or benchmark for assessment and management of sites in similar waterbodies. The condition of the site is reference condition and values of individual indicators at that site are the reference values. Most commonly, reference condition refers to sites that are subject to minimal/limited disturbance. The key criteria quoted in the Queensland Water Quality that is applicable for most mining areas in the Fitzroy is that there is no major extractive industry (current or historical) within 20km upstream. Monitoring must occur when the stream is flowing.

Adequate Data – The Queensland Guidelines recommend a minimum of 18 samples collected over at least 12 months for estimates of 20th or 80th percentiles at a site. For 50th percentiles a smaller minimum number of samples (~ 10–12) would generally be adequate. For ephemeral streams, more than one sample should be taken for each flow event and all flow events in the period should be sampled.

Table 1. Reference-based EC guidelines for the protection of aquatic ecosystems in the Fitzroy Catchment (Qld Guidelines 2007). Units in $\mu\text{S}/\text{cm}$.

Sub catchment	95 th Percentile Guideline	90 th Percentile Guideline	75 th Percentile Guideline*
Fitzroy North	1400	1250	720
Fitzroy South	650	510	340

* guideline should be compared to median of long term data set.

Table 2. Guideline Values for EC for other values

	TDS (mg/L)	EC* (µS/cm)
Drinking Water	500	750
Irrigation**		1100
Stockwater***	2400	3600

* using theoretical conversion mg/L TDS = 0.67 x µS/cm EC;

** most stringent field/grass croop trigger - for corn in clay (depends on crop and soil types);

*** for dairy cattle, poultry trigger of 2000mg/L TDS

Table 3. Aquatic Ecosystem Guideline Values (for comparison against long term medians of 10-12 data points)

Parameter	Guideline (lowland)	Guideline (upland)
Ammonia N (ug/L)	20	10
Oxidised N (ug/L)	60	15
Organic N (ug/L)	420	225
Total N (ug/L)	500	250
Filtered Reactive Phosphorus (ug/L)	20	15
Total P (ug/L)	30	10
Chlorophyll-a (ug/L)	5.0	-
Dissolved Oxygen (% saturation)	85 to 110	90 to 110
Turbidity (NTU)	50	25
Suspended Solids (mg/L)	10	-
pH	6.5 to 7.5	6.5 to 8.0

**Table 4. Selected Guideline Values for Stock, Crop and Drinking water
(units in mg/L).**

Parameter	Stock Drinking	Crop Irrigation	Drinking/ Household
Sulfate	1000		250
Chloride		350	
Calcium	1000		
Nitrate	400		
Nitrite	30		

Table 5. Aquatic Ecosystem Protection Toxicant Guideline Values

Parameter	ANZECC Guideline for slightly- moderately disturbed environ. (µg/L)	Comment
Aluminium	55	Trigger value for pH > 6.5
Ammonia	900	Based on a pH of 8
Antimony	9	Low reliability trigger
Arsenic (As III)	24	
Arsenic (As V)	13	
Beryllium	0.13	Low reliability trigger
Boron	370	See Note 1
Cadmium	0.2	
Chromium (Cr VI)	1	See Note 1
Copper	1.4	
Iron	300	Low reliability trigger
Lead	3.4	
Manganese	1900	See Note 1
Mercury (inorganic)	0.06	99% PL as can bioaccumulate
Molybdenum	34	Low reliability trigger.
Nickel	11	
Selenium (Total Speciated)	5	99% PL as can bioaccumulate
Silver	0.05	
Uranium	0.5	Low reliability trigger
Vanadium	6	Low reliability trigger
Zinc	8	See Note 1

Note 1: May not protect key species from chronic toxicity.

**Table 6. Metal Guideline Values for Stock, Crops and Drinking Water
 (units in mg/L)**

Parameter	Stock Drinking	Crop Irrigation	Drinking/ Household
Total Aluminium	5	200	0.2
Total Arsenic	0.5	0.1	0.007
Total Boron	5	0.5	4
Total Cadmium	0.01	0.01	0.002
Total Chromium (DW should be Cr (VI))	1	0.1	0.05
Total Cobalt	1		
Total Copper	1	200	1
Total Iron		0.2	0.3
Total Lead	0.1	2	0.01
Total Manganese		0.2	0.1
Total Mercury	0.002	0.001	0.001
Total Molybdenum	0.15	0.01	0.05
Total Nickel	1	0.2	0.02
Total Selenium	0.02	0.02	0.01
Total Zinc	20	2	3

Guideline

Protecting Environmental Values from Coal Seam Gas Water Discharged to Waters

Water and Ecosystem Outcomes Division, Water Quality and
Accounting

Version 1.4

28 October 2010

Guideline

Protecting Environmental Values from Coal Seam Gas Water Discharged to Waters

Version Number: 1.4

SIGN OFF BY DELEGATED OFFICER:

1. Operationally capable of being implemented Endorsed by: Position: Director, Healthy Waters Policy Date:	Signature:
2. Meets business policy and legislative needs Endorsed by: Position: General Manager, Water Quality and Accounting Date:	Signature:
3. Endorsed by: Position: DDG, Water Division Date:	Signature:
4. Endorsed by: Position: DG, DERM Date:	Signature:

Metadata

Item	Details
File No.	
WQA Subject leader	██████████, Principal Policy Officer
Location	
Review trigger	Annual: Next Scheduled Review Date:

Version History

Version Number	Date	Changed by	Nature of amendment
1.0	20/08/10	██████████	Document created following internal consultation
1.1	02/09/10	██████████	Document review to incorporate internal comments
1.2	24/09/10	██████████	Document review to incorporate internal comments
1.3	04/10/10	██████████	Title change as per EMG CSG Sub-Committee comments: Interim Policy to Guideline
1.4	28/10/10	██████████	Document review to incorporate UWP&M comments

1. Purpose

The purpose of this document is to provide guidance to decision makers and information on the existing legislative framework to ensure that the disposal of Coal Seam Gas (CSG) water to Queensland waters, including surface and ground waters, is managed to avoid or minimise environmental harm. This includes the scenarios where CSG water is:

- Considered as waste water and disposed of to Queensland waters (including surface waters, and groundwaters via aquifer re-injection or re-charge); or
- Approved for re-use and is being transported and/or stored in waters or returned to waters via overland flow or aquifer recharge.

CSG water under the EP Act s310D (7) means underground water brought to the surface of the earth or moved underground in connection with exploring for or producing coal seam gas. The 'Coal Seam Gas Water Management Policy' provides information on the activity and the department's position with regard to the preferred options for the management of CSG water. The options for disposal of CSG water currently include injection into natural underground reservoirs or aquifers of equal or lesser water quality, direct use of treated CSG water and/or discharge of CSG water to surface waters. The disposal of CSG water directly to surface waters is not a preferred management option. Where injection is technically and economically feasible, operators should inject treated water into aquifers that are under developmental stress and/or are at risk of adverse impact from CSG activity, as a first priority for the use of treated CSG water.

2. Scope

This document is a guideline which outlines, and provides some interpretation of the broad statutory requirements, guidelines and supporting documents as they are relevant to the management of CSG water to protect environmental values. Future versions of this guideline document will include additional reference to the following areas:

- Monitoring and reporting standards;
- Approach to cumulative impacts; and
- Mapping the Department of Environment and Resource Management's roles and responsibilities.

3. Statutory Requirements and Supporting Documents

The statutory bases for managing CSG water discharged to Queensland waters along with supporting documents linked to these statutes are primarily as follows:

State Legislation

- *Environmental Protection Act 1994* (EP Act). The object of the EP Act is to 'protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (*ecologically sustainable development- ESD*)'. Chapter 5A of the EP Act provides for environmental authorities for petroleum activities which includes CSG activities. The supporting documents include:
 - Coal Seam Gas Water Management Policy

- Guideline: Preparing an Environmental Management Plan for Coal Seam Gas activities
 - Guideline: Model conditions for level 1 environmental authorities for coal seam gas activities
 - Operational Policy: Waste water discharge to Queensland Waters
- *Environmental Protection Regulation 2008* (EP Reg). This is subordinate legislation made under the EP Act to regulate the protection of the environment.
 - *Environmental Protection (Water) Policy 2009* (EPP Water). The purpose of the EPP Water is to 'achieve the object of the EP Act in relation to Queensland waters'. Environmental values and water quality objectives are scheduled in this policy. The supporting documents include:
 - Monitoring and Sampling Manual 2009
 - Queensland Water Quality Guidelines 2009
 - *Environmental Protection (Waste Management) Policy 2000*. The object of this policy is to achieve the object of the EP Act in relation to waste management. The policy provides a waste management hierarchy to be applied to the management of CSG water, and principle for identifying environmental protection commitments, objectives and control strategies. The supporting documents include:
 - Guideline: Approval of coal seam gas water for beneficial use
 - *Water Act 2000*. To advance sustainable management and efficient use of water and other resources by establishing a system for the planning, allocation and use of water. Water Resource Plans (WRPs) and Resource Operation Plans (ROPs) are developed under the Act.

Commonwealth Legislation

- *Environmental Protection and Biodiversity Conservation Act 1999* (Cth). This Commonwealth Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places - matters of national environmental significance. DERM is not the administering authority for this legislation.
- Murray Darling Basin Agreement - Schedule 1 of the *Water Act 2007* (Cth). The purpose of the agreement is to 'promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water and other natural resources of the Murray-Darling Basin, including by implementing arrangements agreed between the Contracting Governments to give effect to the Basin Plan, the *Water Act* and State water entitlements.' DERM is not the administering authority for this legislation.

4. DERM as an Administering Authority

Proponents will be required to meet all relevant statutory requirements as identified in the State and Commonwealth legislation. However, DERM is the administering authority when assessing and conditioning an environmental authority (EA) under the EP Act for discharging CSG water to Queensland waters. The administering authority must comply with any relevant regulatory requirement; consider standard criteria; and any additional information. The EP Reg s5 establishes a range of matters to be considered for environmental management decisions. S51 (1) (a) states that:

- (1) *The administering authority must, for making an environmental management decision relating to an activity, consider the following matters—*
- (a) *each of the following under any relevant environmental protection policies—*
 - (i) *the management hierarchy;*
 - (ii) *environmental values;*
 - (iii) *quality objectives;*
 - (iv) *the management intent;*

Section 13 of the *Environmental Protection (Water) Policy 2009* (EPP Water 2009) states the management hierarchy for an activity that may affect a water. The release of waste water or contaminants must be dealt with according to the stated hierarchy of preferred procedures under section 13 (2) (a) to (d).

Environmental values and water quality objectives for waters are addressed under Part 5 of this Guideline.

Section 14 of the EPP Water 2009 states the management intent for waters subject to an activity that involves the release of waste water or contaminants to the waters. The management intent depends on the level of aquatic ecosystem protection for the waters.

In order to protect the environment it is necessary to define any related impact. Under the EP Act, environmental harm is defined as any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance (s14). CSG activities are classified as either Level 1 or 2 activities (defined in Schedule 5 of the EP Reg) based on the risk of environmental harm being caused by the activities. Assessment processes for Level 1 activities are more comprehensive and may require the completion of an environmental impact statement (EIS).

An EA application for a Level 1 CSG activity must be accompanied by an environmental management plan (EM Plan) to demonstrate that the applicant has considered all potential impacts of the proposed petroleum activities. EM Plans must be prepared in accordance with s310D of the EP Act. The department has developed the guideline 'Preparing an environmental management plan for coal seam gas activities' to provide information to proponents on EM Plan preparation. The EM Plan as it refers to environmental values must among other things:

- (b) *describe each of the following—*
 - (iv) *the environmental values likely to be affected by the activities;*
 - (v) *the potential adverse and beneficial impacts of the activities on the environmental values; and*
- (c) *state the environmental protection commitments the applicant proposes for the activities to protect or enhance the environmental values under best practice environmental management; and*
- (d) *contain enough other information to allow the administering authority to decide the application and conditions to be imposed on*

the environmental authority (chapter 5A activities); and

The guideline document 'Model conditions for level 1 environmental authorities for coal seam gas activities' provides a set of model conditions that can form the basis of environmental protection commitments given in the EM Plan and EA.

5. Environmental Values

Environmental values are defined in EP Act s9. For Queensland waters they are the aquatic ecosystem and human use values in s6 (2) of the EPP Water—

- (a) for high ecological value waters—the biological integrity of an aquatic ecosystem that is effectively unmodified or highly valued;*
- (b) for slightly disturbed waters—the biological integrity of an aquatic ecosystem that has effectively unmodified biological indicators, but slightly modified physical, chemical or other indicators;*
- (c) for moderately disturbed waters—the biological integrity of an aquatic ecosystem that is adversely affected by human activity to a relatively small but measurable degree;*
- (d) for highly disturbed waters—the biological integrity of an aquatic ecosystem that is measurably degraded and of lower ecological value than waters mentioned in paragraphs (a) to (c);*
- (e) for waters that may be used in primary industry or for agricultural purposes, the suitability of the water for—
 - (i) agricultural use; or*
 - (ii) aquacultural use; or*
 - (iii) producing aquatic foods for human consumption;**
- (f) for waters that may be used for recreation or aesthetic purposes, the suitability of the water for—
 - (i) primary recreational use; or*
 - (ii) secondary recreational use;**
- (g) for waters that may be used for drinking water—the suitability of the water for supply as drinking water;*
- (h) for waters that may be used for industrial purposes—the suitability of the water for industrial use;*
- (i) the cultural and spiritual values of the water.*

If an environmental value for particular water has not been scheduled in Schedule 1 of the EPP Water then s7 states the following:

- (3) For particular water, the indicators and water quality guidelines for an environmental value are—
 - (a) decided using the following documents—
 - (i) site specific documents for the water;*
 - (ii) the Queensland Water Quality guidelines;***

(iii) the Australian Water Quality guidelines;

(iv) other relevant documents published by a recognised entity;

For the management of ground waters, documents that would be identified under s(3) (iv) above include the National Water Quality Management Strategy (NWQMS) Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2): Managed Aquifer Recharge. While it is recognised that this guideline does not specifically deal with injection of CSG water, there are a number of elements that may apply to injection of brine and treated and untreated CSG water. Therefore wherever applicable, this NWQMS guideline may be considered the basis for assessment of injection proposals.

In establishing and scheduling environmental values (EVs) for waters in the EPP Water, and the subsequent derivation of water quality objectives (WQOs) to protect the values, the process is independent of any release to receiving waters. In other words the environmental values are determined before any release to waters is considered, and is a completely independent process. Under s 8 of the EPP Water, the environmental values for a particular water are protected if the measures for all indicators do not exceed the water quality guidelines stated for the indicators. This encompasses a commonly used range of some 20 water quality guidelines but also extends to all measures for all indicators to protect the environmental values. The EPP Water defines water quality guidelines as 'quantitative measures or statements for indicators, including contaminant concentration or sustainable load measures of water, that protect a stated environmental value'. If the environmental values for an area have not been scheduled the ecological assets included in WRPs, which are developed under the Water Act, may also provide information. WRPs are recognised as other relevant documents as per s7 (3) (iv) of the EP Act.

6. Environmental Authorities

There are two key areas of risk to aquatic ecosystem and human use environmental values from the discharge of CSG water to Queensland waters that require management to ensure their protection:

1. Changes to water quality (including physical, chemical and biological characteristics); and
2. Changes to in-stream and groundwater hydrology (including associated ecosystem impacts due to the volume and timing of discharges).

A precautionary and adaptive management approach is advocated to address these areas of risk, which is consistent with the objectives of the EP Act and the EPP Water.

EAs are required under chapter 5A of the EP Act for environmentally relevant activities, including for petroleum activities. The administering authority may impose the conditions on the environmental authority (chapter 5A activities) it considers are necessary or desirable (s309z). For an EA to discharge CSG water to waters conditions to meet specified water quality and hydrological requirements to protect environmental values would be included.

6.1 Water Quality

Background

CSG water at all stages of the process should be fully characterised, this includes the quantity and quality of the water before and after production and treatment and at the point of discharge. This is consistent with the risk-based approach adopted in the National Water Quality Management Strategy (NWQMS). The NWQMS Guidelines for Fresh and Marine Water Quality, EPP Water and the Qld Water Quality Guidelines 2009 state that locally applicable guidelines for indicators should be used in preference to less specific regional and national guidelines. This requires a detailed risk assessment to be undertaken, and indicators of concern to be identified. The indicator for an environmental value is a 'physical, chemical, biological or other property that can be measured or decided in a quantitative way' (EPP Water s7(1)). Indicators are then conditioned in the EA (EP Act Ch 5) for the activity. If detailed characterisation is not undertaken, conditioning in the EA will be necessarily more stringent. This is consistent with the precautionary approach.

The general characterisation of CSG water quality as reported in the literature has identified a range of possible risks to environmental values. These values for aquatic ecosystems and human use (including suitability of the waters used for primary industry or agricultural purposes, primary and secondary recreation, drinking water, industrial purposes and cultural and spiritual values) are enhanced or protected by maintaining the water quality objectives (WQOs) for the receiving waters. To provide for appropriate environmental management, WQOs are identified to protect environmental values and are then scheduled in the EPP Water. In the absence of scheduled WQOs, water quality guidelines for all indicators that will protect environmental values for the water are used. To achieve this legislative requirement, any release of CSG water to receiving waters must be conditioned in accordance with s51 (1) (a) of the EP Reg.

Implementation

The required water quality for CSG water discharged to Queensland waters will be conditioned through an EA issued under the EP Act and in accordance with section 51 of the EP Reg (see Attachment 1).

As previously stated, under the EPP Water, the environmental values (values for aquatic ecosystem and human use) for particular water are protected if the measures for all indicators do not exceed the water quality guidelines stated for the indicators. To achieve this outcome, any proposed release is required to be assessed, in part with s51 of the EP Reg. Monitoring, reporting and incident management requirements will also be identified in the EA. A detailed risk assessment is to be undertaken using appropriate CSG water characterisation data. This will allow for parameters of concern to be identified and then included in the EA conditions for the activity.

To protect environmental values the quality of CSG water discharged to waters will need to be within an acceptable upper and/or lower bounds to ensure the WQOs required to protect the aquatic ecosystem health and relevant human use environmental values are achieved. This is of particular importance in the likely scenario of CSG water being treated with reverse osmosis and then discharged to ephemeral systems where at times CSG water is likely to flush and / or fill natural waterholes and make-up 100% of the flow. Attachment 2 discusses potential issues associated with discharging large quantities of CSG water to waters.

If CSG water is to be reinjected to an aquifer there are some key components of the injection proposal risk assessment to protect the environmental values and the groundwater resource values associated with the water quality impact zone and hydraulic impact zone where fluid is proposed to be injected. These components include:

- a) the establishment of baseline data and hydrogeological conceptualisation of the aquifer;
- b) the identification of potential hazards of re-injection and related activities and their inherent risk; and
- c) the identification of injection standards (including proposed limits for contaminants of concern), requirements, preventative measures and residual risk.

Risk assessments of proposed discharges of CSG water to waters must be sufficient to demonstrate that the regulatory requirements of section 63(2) of the *Environmental Protection Regulation 2008* will be met. A guiding framework for risk assessments is provided in relevant NWQMS guidelines.

The requirements for monitoring programs and reporting should be included in the conditions of the EA for the activity. The monitoring programs and reporting should be designed to ensure EA conditions are being met and that strategic data collection to enhance the understanding of cumulative impacts is undertaken. The collection of this data will ensure that adaptive management to protect environmental values occurs. Specific monitoring programs include:

- Baseline conditions of the receiving environment: For surface waters ambient monitoring in accordance with the *Queensland Water Quality Guidelines (2009)*;
- Quality of the CSG water discharged; and
- Receiving environment impacts: This should include assessment of the impact of the release on the receiving waters with a requirement to implement a multiple before-after control impact design to assess changes as per the Australia New Zealand Guidelines for Fresh and Marine Water Quality (2000).

These requirements are further outlined in Schedule I of the guideline 'Model conditions for coal seam gas activities'. Specific requirements of the Receiving Environment Monitoring Program (REMP) are found in Appendix 1 (BA15-BA18) of the same document. Monitoring should be undertaken in line with the EPP Sampling Manual.

Implementation to align with Water Safety (Supply and Reliability) Act 2008 requirements

Legislative reforms to the *Water Safety (Supply and Reliability) Act 2008* (WS (S&R) Act) are proposed to provide purpose built rigorous requirements for CSG water which has a material impact on town drinking water supply sources, in order to protect public health. In the scenario where CSG water directly or in-directly augments a town drinking water supply source and there is a material impact on the supply source, the proposed reforms in the WS (S&R) Act will require the development of a Recycled Water Management Plan (RWMP). The regulated entity will be required to prove that the treatment process and supporting management arrangements will consistently deliver water of the quality required. Where there is direct supply of treated CSG water to a drinking water service provider for the use in a town drinking water supply source, then the drinking water service provider will also require a Drinking Water Quality Management Plan.

CSG water quality standards will be prescribed by Queensland Health (QH) under the *Public Health Regulation 2005*. This is currently being developed and in the interim, the regulator will set the water quality standard as part of the RWMP consistent with the standard prepared by QH.

If there is no material impact on a town's drinking water supply source, then there may be an exclusion from the requirement for a RWMP (for defined circumstances in a regulation for

discharges into an aquifer or if these are not applicable, then through a regulator's exclusion decision and attached conditions).

The process under the EP Act, EP Reg and EPP Water to protect environmental values (including the suitability of the water for supply as drinking water) through conditions in the EA for the activity will also apply. This means that there will be co-regulation of the activity – both under the EP Act and the WS (S&R) Act. Consequently standards may be imposed under the EP Act as well as under the WS (S&R) Act. If there are different values for a particular indicator, then the holder of the EA/RWMP will need to meet the most stringent of the requirements. To make certain that there are no inadvertent conflicts in the EA conditions and RWMP conditions, DERM Project Managers will ensure that a detailed risk assessment and adaptive management process is undertaken, and that through feedback processes any inconsistencies are identified early and addressed. See Attachment 2. for a discussion on these issues. Conditions in the EA and RWMP will require notification to the relevant administrator of each Act, if the particular values in the EA or RWMP are triggered.

Until the new regulatory framework under the *Water Supply (Safety and Reliability) Act 2008* commences, the regulatory requirements under the EP Act, will be used to regulate CSG water which impacts on town drinking water supply sources.

6.2 Hydrology

Background

Discharge of water to a watercourse is not by default an environmental benefit, as ephemeral streams naturally have periods of dryness as well as periods of wetness. WRPs, under the *Water Act 2000*, are fundamentally designed for sustainable allocation and management of the water resources in the catchment. The management rules in the plan are tailored to minimise the impact of water extraction on the flow patterns that are of most importance to a WRP's ecological assets.

The environmental flow indicators of the WRP are primarily designed to determine how much water could be extracted from the watercourse. In assessing for the protection of the environmental value for aquatic ecosystems, it is not enough to assess if Environmental Flow Objectives (EFO) in Water Resource Plans (WRP) are met. This is because the EFOs are designed as a reference check when allocating water for extraction (which is a 'drying' action) and are not designed as a reference check when approving a discharge (which is a 'wetting' action).

Releases to receiving surface waters need to be regulated to protect environmental values. A water's flow supplemented with CSG water may be at most equivalent to but not in excess of a DERM approved pre-development flow regime. An example of this would be that wetting of the flow regime beyond 'naturalness' for an ephemeral stream would not be acceptable. It is critical that key ecological assets and aquatic ecosystem values are protected from artificial discharges to waters.

The underlying intent of maintaining or moving towards the natural flow regime in surface waters is to:

- Avoid localised erosion of bed and banks (including re-suspension of sediments and riparian zone erosion) and impacts on riparian ecosystems;
- Maintain natural variability in the flow regime. A single release rate will reduce the small scale variability patterns which contribute to maintaining the biological integrity

- of a system such as stream habitat, wetting on macrophyte beds, inducing fish movement, entraining organic matter, scouring and primary production;
- Mimic natural seasonality (timing), frequency and duration of events of different magnitudes that support and trigger natural ecosystem processes (eg. nutrient cycling, migration and spawning cues, etc.); and
 - Follow natural attenuation patterns, avoid bank slumping, maintain macroinvertebrate communities and minimise fish stranding, etc.

Implementation

The discharge strategy for CSG water discharged to waterways will be conditioned through the EA issued under the EP Act.

If the CSG discharge proposal is part of a beneficial re-use (as defined in *Environmental Protection (Waste Management) Policy 2000*) scheme, an amendment to the applicable resource operations plan may be required (e.g. water sharing rules, dam operating rules) to ensure there are no impacts on other entitlements.

CSG water discharges need to be managed to mimic seasonal flow volumes and allow for periods of low and no flow. A simplified example of this would see the discharge of larger volumes of CSG water during periods of higher natural flow and lower or nil discharges during naturally low and no flow periods. CSG water discharges should meet these variable flow requirements with the conditions incorporated in the environmental authority. These conditions may include volumetric release limits over time periods including per day or season, with modelling of pre-development flows using the Integrated Quality and Quantity Model as a guide in their calculation, and including the key ecological assets identified in the WRP process for the waters.

When CSG water is discharged to waters as part of a Water Supply Scheme or beneficial use approval, it is still necessary that the environmental values are protected.

7.0 Adaptive Management and Cumulative Impacts

To ensure that the conditions included in the EA are appropriate to protect the environmental values of the receiving waters, proponents will be required to undertake adequate monitoring of the implementation and effectiveness of the EA conditions. This includes assessing the effectiveness and reliability of any water treatment process (i.e. reverse osmosis), monitoring for changes in receiving water quality and aquatic ecosystem health, and for any other impacts to environmental values. If new impacts to environmental values are identified, future EAs will include conditions to adequately manage them.

To effectively protect waters from the as-yet unquantified cumulative impacts of CSG water discharged to waters, an adaptive approach will be used. Through this process, information collected through both monitoring and research, can be used to inform both new EAs and future management frameworks.

8.0 Definitions

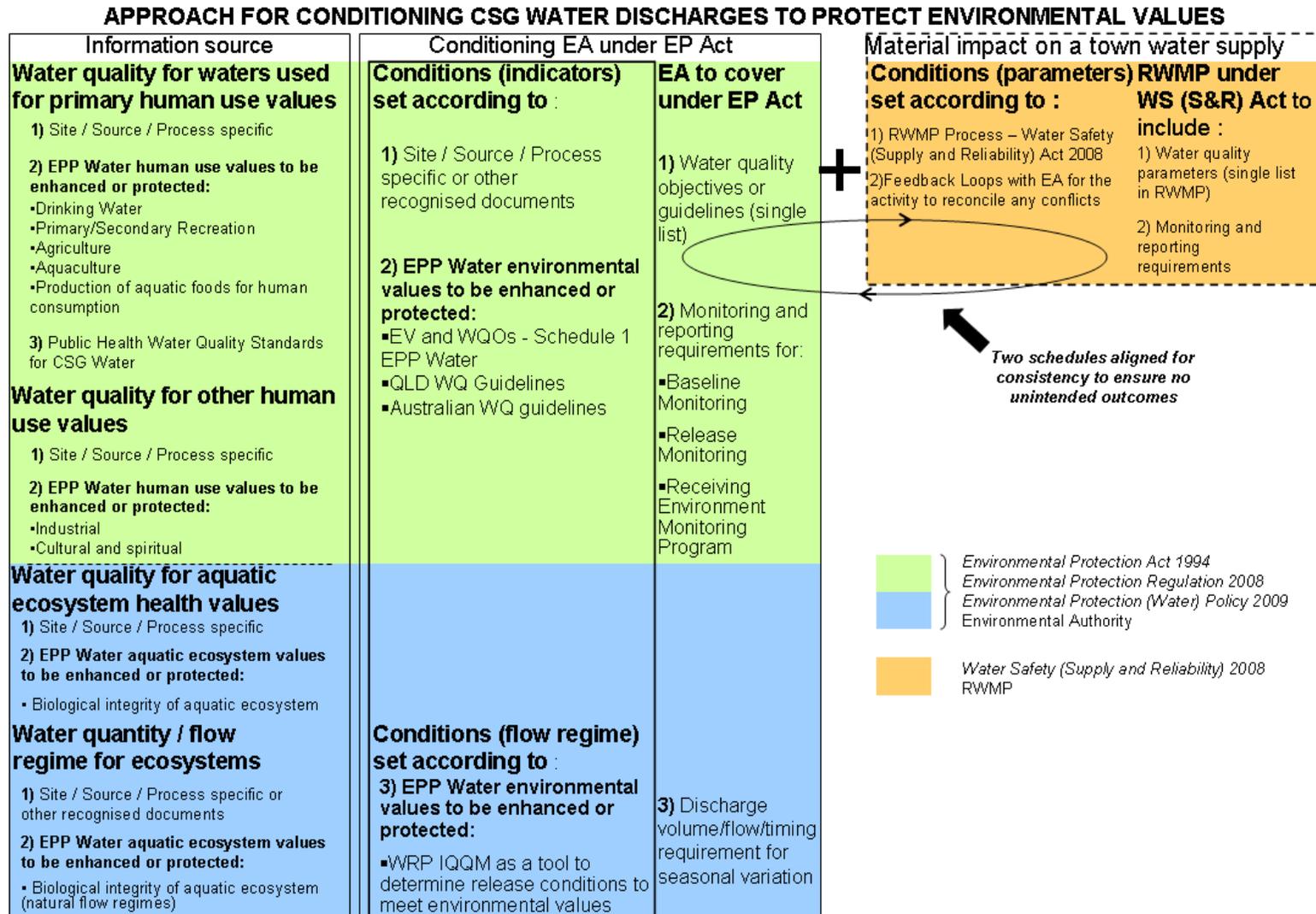
Note: Where a term is not defined in this guideline, the definition in the *Environmental Protection Act 1994*, its regulations and Environmental Protection Policies must be used.

Disclaimer:

While this document has been prepared with care it contains general information and does not profess to offer legal, professional or commercial advice. The Queensland Government accepts no liability for any external decisions or actions taken on the basis of this document. Persons external to the Department of Environment and Resource Management should satisfy themselves independently by consulting their own professional advisors before embarking on any proposed course of action.

Attachment 1.

Approach for Conditioning CSG Water Discharges to Protect Environmental Values



Attachment 2.

Review of Interim Public Health Water Quality Standards and Potential Impacts to Aquatic Ecosystem Values from Coal Seam Gas Water (CSG)

Acknowledgements: Water Quality & Aquatic Ecosystem Health Scientists, Environment & Resource Sciences Division

Background

Under the *Environmental Protection Act 1994* (EP Act), and its subordinate legislation, there is a process for identifying the environmental values of waters. In the scenario where a proponent is proposing to undertake an environmentally relevant activity in Queensland, including discharge of CSG water to waters, an environmental authority (EA) must be issued by the administrative authority - the Department of Environment and Resource Management (DERM). If an EA is issued, it must include conditions to manage any impacts to the identified environmental values of the waters from the activity. These conditions may include indicators for water quality with a set of guidelines / release limits for the discharge. The proposed regulatory reforms to the *Water Supply (Safety and Reliability) Act 2008* and the associated RWMP process will apply along with the process under the EP Act, EP Reg and EPP Water to protect environmental values (including the suitability of the water for supply as drinking water) through conditions in the EA for the activity. This means that there will be co-regulation of the activity – both under the EP Act and the WS (S&R) Act. Consequently standards may be imposed under the EP Act as well as under the WS (S&R) Act. If there are different values for a particular indicator, then the holder of the EA/RWMP will need to meet the most stringent of the requirements. To make certain that there are no inadvertent conflicts in the EA conditions and RWMP conditions, DERM Project Managers will ensure that a detailed risk assessment and adaptive management process is undertaken, and that through feedback processes any inconsistencies are identified early and addressed. This document aims to reconcile any potential conflicts. It also considers other issues for aquatic ecosystem health related to the discharge of CSG water to waters.

Interim Public Health Water Quality Standards under the WS (S&R) Act

Interim Public Health Water Quality Standards have been developed by Queensland Health for use where CSG water will impact on an urban community's drinking water supply source. These standards will be included in the Recycled Water Management Plan (RWMP) that will be required under the WS (S&R) Act. These standards will be prescribed under the *Public Health Regulation 2005*. The levels are set to allow for ingestion by humans of two litres per day for a lifetime. Existing water quality data for CSG water was examined, including Australian and overseas data, to inform the development of these standards. The standards are focused on coal associated compounds of health concern, or any hazards that may be added during treatment, storage or transport of the CSG water. The standards will be amended as more specific information on CSG source water quality in Queensland and associated treatment, storage and transport processes becomes available. It should be noted that this proposed schedule of standards is not intended to represent the ongoing monitoring program for CSG companies, it simply prescribes the health related standard if a particular compound is detected during monitoring.

Scientific Assessment

The following provides a comparison between the Interim Public Health Water Quality Standards (WQS) proposed for CSG and the toxicant trigger guidelines for protection of

aquatic ecosystems. The purpose of this review is to determine potential conflicts between the Interim Public Health WQS and other guidelines. Note that the aquatic ecosystem guidelines are based on biological effects data and are meant to be trigger values. Where exceeded in the environment, background levels should be assessed and the triggers modified to reflect the risk involved.

In general, the review indicates the following:

- There are no obvious conflicts between the list of Public Health WQS and other guidelines for CSG;
- The list of indicators is substantial and it is likely that it could be reduced through source characterisation and associated risk assessment processes;
- For Reverse Osmosis (RO) treated CSG water, many of the indicators are unlikely to be relevant, even in the source water – see the table below;
- Areas of potential conflict where Public Health WQS are listed in an approval (or required to be monitored) and the limit listed is significantly higher than guidelines for aquatic ecosystem health protection. This is shown for 17 indicators in the table below. The major problem here is that a false impression may be given to proponents in terms of satisfactory standard for discharge if the standards in the RWMP are less stringent than those required to meet environmental values. Where these contaminants are of concern, they should be listed with appropriate limits in the EA, with the proponent meeting the most stringent ; and
- Note that such a review could also be done for primary industry guidelines such as irrigation. Similar conclusions from the comparison with aquatic ecosystem guidelines are expected.

For the discharge of 'good quality' RO treated CSG water, the potential risks to receiving water should be relatively small. The major issues that should be assessed on a case by case basis include:

1. The potential deficiency of cations/anions such as calcium that could have a detrimental effect on aquatic ecosystem biota. The proposed management action would be to dose the water to achieve appropriate cation/anion concentrations. Release limits for Sodium Adsorption Ratio, calcium, magnesium etc would generally be applied.
2. The potential change to flow regimes. This risk is potentially greatest for significant continuous releases to ephemeral streams. In most cases, this requires an assessment of key aquatic habitats and the potential extent of effect from the release. In many cases, sandy substrates may mean the water may have a limited extent of effect on surface waters. Alternative discharge locations may need to be considered and ongoing monitoring may be required during operation where potential risks exist.
3. Boron is not generally removed from the RO process and is often elevated in the discharge water. An assessment should be carried out on the potential effect on all downstream environmental values including aquatic ecosystem and irrigation. The levels are not typically high enough to be of major concern and there are limited management actions available to address this issue.
4. Given the water is very clear and the systems receiving the water are generally very turbid, there is potential for the water to impact on aquatic environments. The action risk from this effect is currently unknown and needs further research. In general, management as per issue 2 will also address this issue if it exists.

Table 1. Comparison of the Public Health WQS to Aquatic Ecosystem Toxicant Triggers and typically levels found in CSG Water.

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
1,2 Dichloroethane (DI)	107-06-2	3	ID	EV	NNS	Industrial solvent - chlorination of water does not appear to contribute to 1,2-dichloroethane in drinking water - Ethane is a constituent in the paraffin fraction of crude oil and natural gas - may be produced inadvertently by chlorination reactions which take place during the disinfection of wastewater effluents or drinking water sources
1,1 Dichloroethene (DI)	75-35-4	30	-	EV	NNS	Used in polymers and organic synthesis - Ethene is a natural product emitted by fruits, flowers, leaves, roots, and tubers, and is released to the atmosphere from biomass combustion and volcanos, and photodegradation of dissolved organic material - may be produced inadvertently by chlorination reactions which take place during the disinfection of wastewater effluents or drinking water sources.
1,2 Dichloroethene	540-59-0	60	ID	NHTV	NNS	
1, 2 Dichlorobenzene (DI)	106-46-7	1500	160	EV	NNS	Used as a chemical intermediate for the manufacture of dyes - may be produced inadvertently by chlorination reactions which take place during the disinfection of wastewater effluents or drinking water sources
1,4 Dichlorobenzene (DI)	106-46-7	40	60	EV	NNS	
2,2 Dichloropropionic Acid (DPA) (DI)	75-99-0	500	-	EV	NNS	Herbicide

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments	
2,4,5-Trichlorophenol	95-95-4	350	ID	EV	NNS	Chlorophenols - used as a biocide, disinfectant for the home, hospital, and farm, an antiseptic, manufacture of the insecticide profenofos, in the synthesis of the fungicides dichlorophen and triadimefon, in the synthesis of the cholesterol-reducing drug, denaturant for alcohol, and selective solvent in refining mineral oil and in organic syntheses of dyes - may be produced inadvertently by chlorination reactions which take place during the disinfection of wastewater effluents or drinking water sources	
2,4,6-Trichlorophenol	88-06-2	20	3	EV	NNS		
2,4-Dichlorophenol (DI)	120-83-2	200	120	NHTV	NNS		
2-Chlorophenol (DI)	95-57-8	300	340	EV	NNS		
4-Chlorophenol (DI)	106-48-9	10	220	EV	NNS		
4-Methylphenol (p-cresol)	106-44-5	600	-	EV	NA		Cresols, including p-cresol, are a group of widely distributed natural compounds formed as metabolites of microbial activity and excreted in the urine of mammals. Cresols occur in various plant lipid constituents, including oils from jasmine, cassia and camphor. Oils from conifers, oaks, and sandalwood trees also contain cresols.
4-Nitrophenol	100-02-7	30	ID	EV	NNS		Used in the manufacture of pesticides, dyestuffs as well as a leather treatment agent. It is a photooxidation product of nitrobenzene in air and aromatic hydrocarbons such as benzene, toluene, and phenanthrene with nitric oxide in air. It is emitted in vehicular exhaust from both gasoline and diesel engines. 4-Nitrophenol is also a degradation product of parathion and an impurity in the parathion formulation Thiophos and, therefore, will be released

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						during the application of the insecticide
4-Nonylphenol	104-40-5	500	-	NHTV	NNS	Routinely used as a co-stabilizer with mixed-metal stabilizers for heat stabilization during plastic production; used as starting material for the production of phenolic resins.
Acenaphthene	83-32-9	20	SED	EV	Yes	A natural component of crude oil and coal tar, and is also a product of combustion and can be released to the environment via natural fires associated with lightning, volcanic activity, and spontaneous combustion.
Acenaphthylene	208-96-8	0.014	SED	NHTV	Yes	
Acrylamide	79-06-1	0.2	-	EV	Unlikely	
Aluminium		200	55			
Ammonia		500	900			
Anthracene	120-12-7	150	ID - SED	EV	Yes	Anthracene occurs in fossil fuels.
Antimony		3	ID - SED			
Arsenic		7	-			
Arsenic III			24			
Arsenic V			13			
Barium		700				
Benzene	71-43-2	1	950	EV	Yes	Benzene is found naturally in the environment from volcanoes, as a natural constituent of crude oil, from forest fires and as a plant volatile.
Benzo(a)pyrene	50-32-8	0.01	ID - SED	EV	Yes	Occurs naturally in crude oils, shale oils, and coal tars, and is emitted with gases and fly

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						ash from active volcanoes. There is some evidence for biosynthesis by plants, bacteria and algae. Emissions of polycyclic aromatic hydrocarbons, including benzo(a)pyrene, are a product of incomplete combustion of organic matter.
Bisphenol A	80-05-7	200	-	EV	NNS	Used as an intermediate in manufacture of epoxy, polycarbonate, phenoxy, polysulfone and certain polyester resins, rubber chemicals, flame retardants and in food packaging and coatings
Boron		4000	370			
Bromate	NA	20	-	EE	Unlikely	Bromate is a drinking water disinfection by-product formed during the ozonation of source water containing bromide.
Bromide	NA	7000	-			
Bromine	7726-95-6	7000	-	EV	Unlikely	Bromine does not exist in nature in its elemental state, molecular bromine (Br ₂).
Bromochloroacetic acid (DI)	5589-96-8	0.014	-	NHTE	NNS	Formed as a chemical by-product of chlorination and chloramination of drinking water.
Bromochloroacetonitrile (DI)	83463-62-1	0.7	-	NHTE	NNS	Formed during the chlorination of water. In experiments bromochloroacetonitrile was found in water treated with chlorine, chlorine with bromide, chlorine with ozone and chloramination with bromide.
Bromochloromethane (DI)	74-97-5	40	-	NHTV	Unlikely	Bromochloromethane was found in remote ocean areas along with other naturally occurring bromo or chloro methanes produced by algae. Although it is possible

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						that bromochloromethane was produced by this natural source, the author suggested that it may be due to long range transport from anthropogenic sources. Bromochloromethane was released from cultivated species of the brown algae, Phaeophyta. This may be a major source of biogenic emissions of bromochloromethane from oceans. Bromochloromethane's production and use as a fire extinguisher fluid, especially in aircraft and portable units.
Bromodichloromethane (DI)	75-27-4	6	-	EV	Unlikely	<p>Bromodichloromethane is biosynthesized and emitted to seawater (and eventually to the atmosphere) by various species of marine macroalgae which are abundant in the various locations of the world's oceans. Ice macroalgae from McMurdo Sound, Antarctic were found to contain and release to sea water bromodichloromethane.</p> <p>Bromodichloromethane's production and use in organic synthesis and as a solvent may result in its release to the environment through various waste streams. However, bromodichloromethane is not produced or used on a large commercial-scale indicating that large releases do not occur from these practices. The predominant environmental release of bromodichloromethane results from its inadvertent formation during chlorination treatment processes of drinking, waste, and cooling waters. The amount of bromodichloromethane which may</p>

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						be produced during chlorination processes depends upon a variety of parameters which include temperature, pH, bromide ion concentration of the water, fulvic and humic substance concentration, and actual chlorination treatment practices.
Bromoform (DI)	75-25-2	100		EV	Unlikely	Bromoform is produced by macroalgae and microalgae.
Cadmium		2	0.2			
Chlorate	NA	0.8mg/L	-	EV	Unlikely	The chlorite ion (ClO ₂ ⁻) is a major degradation product resulting from the reaction of chlorine dioxide with inorganic and organic constituents in the water. When free chlorine is used after the application of chlorine dioxide in the treatment process, chlorite is oxidized to chlorate. This conversion will continue over time as the water travels through the distribution system. Chlorate ion is also formed by photodecomposition of chlorine dioxide when treated water is exposed to bright sunlight in open basins. The rate at which chlorate forms affects the amount of chlorine dioxide or chlorite that remain in the finished drinking water.
Chlorine (DI)	7782-50-5	5 000	3	EV	Unlikely	The most important manmade emissions of chlorine are from processes involving the production, transportation, and use of chlorine.
Chlorine dioxide (DI)	10049-04-4	1000	-	EV	Unlikely	Chlorine dioxide is used as a disinfectant in water treatment plants in the USA.

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
Chlorite (DI)	NA	300	-	EE	Unlikely	Chlorite ion (ClO_2^-) is present in drinking water and there are two possible ways it ends up in the drinking water: 1) chlorine dioxide is produced via sodium chlorite used as a starting material and incomplete conversion of sodium chlorite into chlorine dioxide leaves residual chlorite ion in water and 2) the chlorite ion is a major degradation product resulting from the reaction of chlorine dioxide with inorganic and organic constituents in the water. When free chlorine is used after the application of chlorine dioxide in the treatment process, chlorite is oxidized to chlorate. This conversion will continue over time as the water travels through the distribution system. Chlorate ion is also formed by photodecomposition of chlorine dioxide when treated water is exposed to bright sunlight in open basins . The rate at which chlorate forms affects the amount of chlorine dioxide or chlorite that remain in the finished drinking water.
Chloroacetic acid (DI)	79-11-8	150	-	EV	Unlikely	Chloroacetic acid's formation as a chemical by-product of chlorination and chloramination of drinking water , and its use as a herbicide and in the manufacture of various dyes and other organic chemicals.
Chlorobenzene (DI)	108-90-7	300	ID	EV	Possible	Chlorobenzene's production and use as a chemical intermediate, solvent, and heat transfer medium.
Chloroform (Trichloromethane) (DI)	67-66-3	200	ID	EV		Chloroform is produced by tropical red algae, and by red seaweed and has been reported

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						<p>to be produced by micro algae, in peat bogs, was produced in spruce forest soil and was found in wood degrading areas.</p> <p>Chloroform's production and use in the synthesis of hydrochlorofluorocarbon 22 (HCFC-22), use as an extractant or solvent, chemical intermediate, dry cleaning agent, fumigant ingredient, synthetic rubber production. Its indirect production in the manufacture of ethylene dichloride and as a disinfection by-product in the chlorination of drinking water, municipal sewage, cooling water in electric power generating plants. Chloroform is produced during the atmospheric photodegradation of trichloroethylenes and is produced from auto exhaust.</p>
Chromium III			ID			
Chromium VI		50	1.0			
Copper		2000	1.4			
Cyanide		80	7			
Dibromoacetic acid (DI)	631-64-1	0.014	-	EV	Unlikely	Dibromoacetic acid's formation as a chemical by-product of chlorination and chloramination of drinking water .
Dibromochloromethane (DI)	124-48-1	100	-	EV	Unlikely	Chlorodibromomethane is produced naturally by various marine macroalgae and is present naturally in seawater.

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						Chlorodibromomethane's inadvertently formed during chlorination treatment processes of drinking, waste, and cooling waters ; it is also used as a chemical intermediate.
Dichloroacetic acid (DI)	79-43-6	100	-	EV	Unlikely	Dichloroacetic acid's formation as a chemical by-product of chlorination and chloramination of drinking water , and its production and use as a chemical intermediate, in pharmaceuticals and medicine.
Dichloroacetonitrile (DI)	3018-12-0	2	-	EV	Unlikely	Dichloroacetonitrile formation as a by-product of the chlorination of humic substances, algae and amino acids contained in drinking water and pulp bleaching processes. Dichloroacetonitrile is a by-product of the chlorination of humic substances, algae and amino acids, such as when humic and fulvic acids from natural waters are chlorinated with sodium hypochlorite.
Ethylbenzene	100-41-4	300	ID	EV	Yes	Ethylbenzene's production and use as an intermediate for the manufacture of styrene and use as a resin solvent, intermediate for the production of diethylbenzene and acetophenone, and its use as a component of automotive and aviation fuels. Ethylbenzene is present in coke-oven tars.
Fluoride		1500	-			
Hydrazine	302-01-2	10 (ng/L)	-	EV	Unlikely	Hydrazine has been found to be a primary product of nitrogen fixation by <i>Azotobacter</i>

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						<p><i>agile.</i></p> <p>Used as a chemical intermediate, reducing agent, as rocket fuel and as a boiler water treatment agent- may be produced inadvertently by chlorination reactions which take place during the disinfection of wastewater effluents or drinking water sources</p>
1,2-diphenylhydrazine	122-66-7		ID	EV	Unlikely	1,2-Diphenylhydrazine's production and use as a chemical intermediate. It also may be produced in wastewater receiving azobenzene where conditions are reducing. This drug is primarily used as a veterinary medication.
Iodide		100	-			
Iodine		60	-			
Iron		300	300**			
Lead		10	3.4			
Manganese		500	1900			
Mercury		1	0.06			
Molybdenum		50	34**			
Monochloramine (DI)	10599-90-3	3000	-	EV	NNS	Chloramine is used as a chemical intermediate in the synthesis of various amines and hydrazine and as a disinfectant in drinking water for systems in which free chlorine radicals are difficult to maintain. Chloramine can be formed in situ by the combination of ammonia and chlorine

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						containing agents under basic conditions.
Nickel		20	11			
Nitrate – as N		50000	7200			
Nitrite		3000	-			
N-Nitrosodiethylamine (NDEA) (DI)	55-18-5	0.01	-	NHTE	Unlikely	<p>Formed by the action of nitrate-reducing bacteria.</p> <p>N-Nitrosodiethylamine's production and use as a gasoline and lubricant additive, antioxidant and stabilizer may result in its release to the environment through various waste streams.</p>
N-Nitrosodimethylamine (NDMA) (DI)	62-75-9	0.01	-	EV	Unlikely	<p>Formation of DMN ... can occur by reaction of nitrites with dimethylamine produced by intestinal bacteria.</p> <p>Formed by the interaction of nitrite with dimethylamine and by the action of nitrate-reducing bacteria. One group that found N-nitrosodimethylamine in tap water concluded that the N-nitrosodimethylamine may have formed from the reaction of low concentrations of nitrite, an oxidizing agent (possibly chlorine), and secondary amines. Another researcher concluded that extensive nitrosamine formation in natural waters is not likely because of low nitrite concentrations, low levels of nitrosatable amines, and expected third order kinetics.</p>
Phenanthrene	85-01-8	150	ID	EV	Likely	Phenanthrene occurs in fossil fuels.

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						Phenanthrene was detected in spruce needles, tree leaves and grass and plants.
Phenol	108-95-2	150	320	EV	Yes	<p>Phenol is present in animal, leaf litter and other organic wastes as a result of decomposition. The level of phenol present in poultry manure has been shown to increase in time as degradation proceeds.</p> <p>Phenol is obtained from coal tar.</p> <p>Phenol's production and use as a chemical intermediate in the production of bisphenol-A, phenolic resins, caprolactam, aniline, alkylphenols and other chemicals, as well as its use as a disinfectant and antiseptic may result in phenol being released to the environment as emissions and in wastewater as a result of its production and use. Wood smoke from fireplaces and wood stoves contain high conc'ns of phenol. Phenol is found in gasoline and diesel engine exhaust, and emissions from refuse combustion, brewing, foundries, wood pulping, plastics mfg, lacquer mfg, and glass fibre mfg. Laboratory tests indicate that phenol would be found in leachate from tires. It is also released from some plastics when heated. Phenol is a photooxidation product of benzene, and would be produced in the atmosphere from benzene emissions.</p>
Pyrene	129-00-0	150	SED	EV	Yes	Pyrene has been isolated in crude oil, coal

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						tar and fossil fuels.
Radiological Compounds		0.5 mSv/year				
Selenium		10	5			
Silver		100	0.05			
Strontium (Stable)(Total)		4000	-			
Sulfate		500 000	-			
Thallium (Stable)(Total)		Detection limit	0.03**			
Titanium (Total)		Detection limit	-			
Toluene	108-88-3	800	ID	EV	Yes	<p>Toluene occurs in nature in natural gas deposits and has been detected in emissions from volcanos, forest fires and crude oil.</p> <p>Toluene is released into the atmosphere principally from the volatilization of petroleum fuels and toluene-based solvents and thinners and from motor vehicle exhaust. Toluene's production and use as an intermediate in the production of benzoic acid, benzaldehyde, explosives, dyes and many other organic compounds may also result in its release to the environment through various waste streams.</p>
Total Petroleum Hydrocarbons (reported as separate fractions)		(Total) 200	-			
Trichloroacetic acid (DI)	76-03-9	100	-	EV	Unlikely	Trichloroacetic acid is produced photoxidatively when chlorinated ethenes and ethanes are converted to trichloroacetylchloride and finally hydrolyzed

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
						to the acid ... can also be formed during anthropogenically induced combustion processes if chloride and redox-sensitive elements such as Fe or Cu are present, e.g. forest fires, wood burning, waste incineration, etc. ... also one of the main disinfection by-products during drinking water chlorination.
Uranium		20	0.5**			
Vanadium		50	6**			
Xylenes	1330-20-7	600	-	EV	Yes	Common naturally occurring sources of xylenes are petroleum, forest fires, and volatiles of plants. Mixed xylenes are present in petroleum stocks and natural gas in small quantities.
o-xylene	95-47-6		350	EV	Yes	Commercial xylene's production and use in petroleum products and as a chemical solvent and intermediate may result in its release to the environment through various waste streams. Xylene use as an aquatic herbicide will result in its direct release to the environment. Xylenes are components of gasoline. Xylenes may be released to the environment through emissions from petroleum refining, coal tar and coal gas distillation, through emissions from the transport and storage of gasoline and from carburetors, and through leaks and evaporation losses during the transport and storage of gasoline and other fuels.

Chemical Compounds/ Parameters of concern	CAS Number	Interim Release Limits (µg/L)	Aquatic Ecosystem TTV*	TOXNET Hazardous Substances Data Bank	Found in CSG source water?	Comments
Zinc		3000	8			

DI indicates the parameter is a disinfection by-product and is not included in monitoring of active wells.

* TTV – 95% species protection toxicant trigger values taken from ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

** low reliability trigger

SED Appears in ANZECC/ARMCANZ (2000) as a sediment trigger value only

EE Ecotoxicity Excerpts are available in the Hazardous Substances Data Bank

EV Ecotoxicological Values or data are available in the Hazardous Substances Data Bank

NHTE Non-human Toxicity Excerpts are available in the Hazardous Substances Data Bank

NHTV Non-human Toxicity Values are available in the Hazardous Substances Data Bank

NNS – No natural sources

ID – Insufficient Data

Highlighted values are significantly below Public Health WQS

Amendment History

Version	Date	Reviewed by	Comments
Draft_V1	16.5.09	MShaw	Contents drafted
Draft_V2	4.7.09	GMcGregor	Comments incorporated by MS
Draft_V2	6.8.09	SChoy	Comments incorporated by MS
Version 1	21.8.09	Project working group	Comments incorporated by MS
Version 2	17.11.09	AVeitch	Comments incorporated by MS

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Project team:



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January 2010

Coal Seam Gas Water Feasibility Study

About the study

In July 2008, the Council of Australian Governments signed an intergovernmental agreement on Murray-Darling Basin reform that establishes new governance arrangements for the Murray-Darling Basin. The Commonwealth also agreed in principle to provide around \$3.7 billion for significant water projects—called priority projects—in Murray-Darling Basin states.

Subject to agreement between the Commonwealth and Queensland governments, \$160 million will be provided over 10 years for Queensland's priority project, known as the Healthy HeadWaters Program. This program is being managed by the Queensland Department of Environment and Resource Management.

The Commonwealth has allocated five million dollars of the *Healthy HeadWaters Program* funding for a feasibility study to examine the use of coal seam gas (CSG) water in addressing water sustainability and adjustment issues in the Queensland section of the Murray Darling Basin (QMDB).

The Coal Seam Gas Water Feasibility Study will analyse the opportunities for, and the risks and practicability of, using CSG water to assist in achieving the long-term goals in the QMDB of transitioning irrigation communities to lower water use and securing viability of ecological assets.

Among other things, the study will consider the feasibility of using CSG water to relieve demand on groundwater for irrigation in heavily committed aquifer systems near the Condamine River.

Background to the study

CSG is a natural gas, consisting primarily of methane, which is adsorbed onto coal. Production of CSG is increasing rapidly in Queensland and is set to increase even more dramatically as CSG producers seek new markets for their product by establishing a liquefied natural gas (LNG) industry. CSG resources in Queensland are located primarily in the Surat and Bowen basins.

CSG is produced by dewatering coal seams to reduce the pressure that keeps the gas in place. This process brings significant quantities of saline water to the surface.

Salinity of CSG water is variable. Total dissolved solids (TDS) values vary from 200 to over 10 000 milligrams per

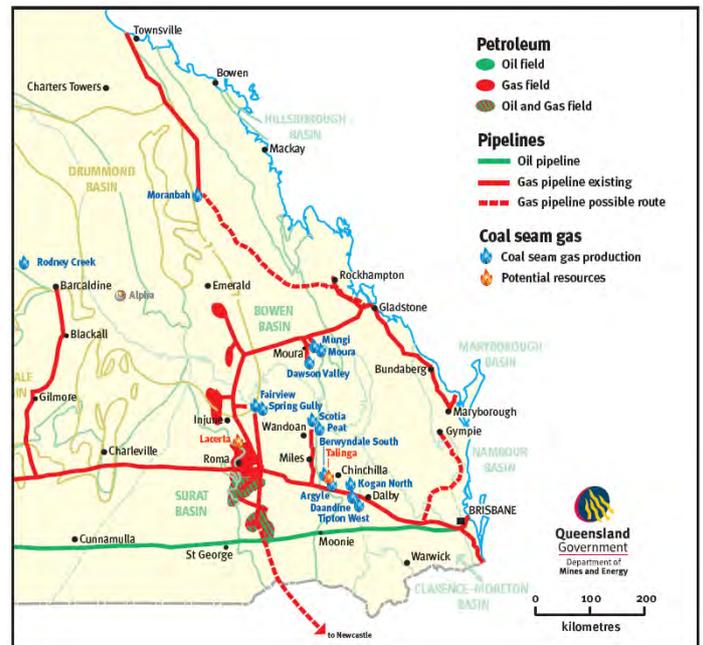
litre (mg/l), but are most commonly in the range of 1000–6000 mg/l. For comparison, good quality drinking water has TDS values of up to 500 mg/l; some plants are affected by water with TDS values as low as 1000 mg/l; and the TDS value of seawater is about 35 000 mg/l.

Queensland Government policy requires CSG producers to treat their CSG water unless it can be injected into suitable aquifers or used directly without treatment. This policy encourages beneficial use of the treated CSG water and minimises the ecological risks of CSG water disposal.

Notwithstanding this policy, there are ongoing concerns about the risks posed to surface streams and landscapes by the use and disposal of CSG water. In addition, there are concerns about the impacts that the extraction of CSG water from coal seams may have on groundwater resources, including reserves in the Great Artesian Basin and the Condamine River Alluvium.

There are also uncertainties surrounding the likely volumes and reliability of CSG water supply as well as the demand for water in the QMDB and nearby regions in the next few decades.

An improved understanding of these risks and uncertainties is needed in order to properly assess the feasibility of using CSG water to assist in addressing water sustainability issues in the QMDB.



Design of the study

The study is being undertaken as a series of activities as shown in the diagram below.

Activities 1 to 7 consist of investigations to fill knowledge gaps relating to the risks of both extracting and using CSG water, as well as analyses of the likely supply of, and demand for, CSG water. Subject to the risks of using CSG water being acceptable, and the availability of reliable supplies, Activities 8, 9 and further will assess specific opportunities for large-scale beneficial use to assist in achieving objectives of the Healthy HeadWaters Program.

While the primary aim of the study is to determine how CSG water may contribute to the objectives of the Healthy HeadWaters Program, the findings will be invaluable for managing the environmental and resource management risks associated with the rapidly expanding CSG industry both within and outside the QMDB.

The Department of Environment and Resource Management will use the expertise of internal staff and external consultants for the study. It will also consult with industry and the community throughout the study.

The study is due to be completed in June 2012, with several activities scheduled to finish before then.

Further information

For further details about the study, please email csgwaterstudy@derm.qld.gov.au or phone (07) 3330 5998

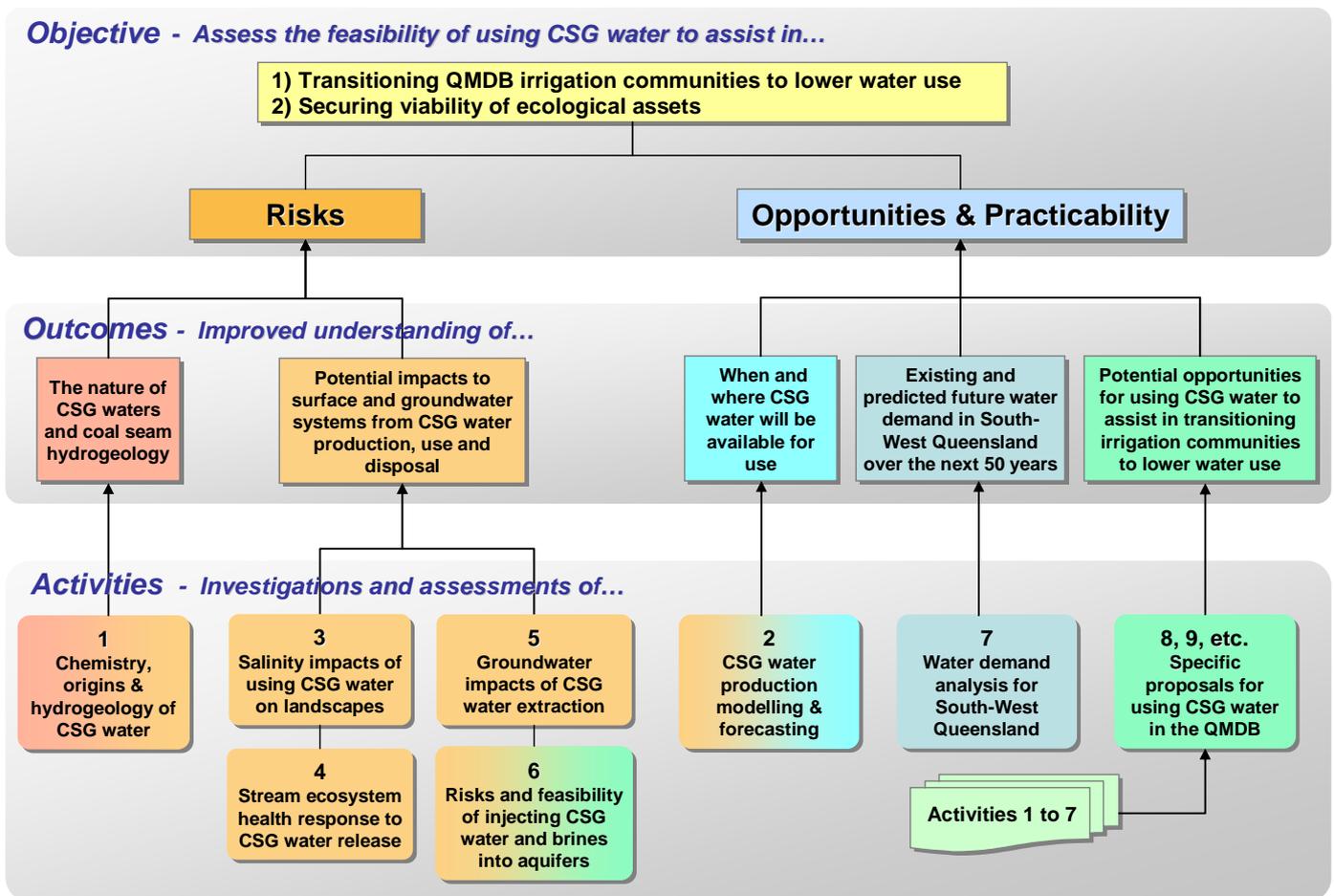
For more information about coal seam gas production in Queensland, visit www.dme.qld.gov.au/mines/coal_seam_gas.cfm.

For information about the Queensland Government's CSG Water Management Policy, visit www.dip.qld.gov.au/growth-strategies/management-of-coal-seam-gas-water.html.

For information about the Commonwealth Government's *Water for the Future* framework, visit www.environment.gov.au/water/policy-programs/water-for-the-future/index.html.

January 2010

CSG Water Feasibility Study - Project Design



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Definitions and abbreviations

ANZECC Guidelines – Australian and New Zealand Water Quality Guidelines (2000).

Associated water – underground water taken or interfered with, if the taking or interference happens during the course of, or results from, the carrying out of another authorised activity under a petroleum authority, such as a petroleum well, and includes waters also known as produced formation water. The term includes all contaminants suspended or dissolved within the water (EPA, 2007).

CSG – coal seam gas.

DO – dissolved oxygen

EVs – Environmental values.

Ephemeral streams – streams which periodically or seasonally do not contain surface water.

Permanent streams – streams which continuously contain surface water.

QMDB - Queensland Murray-Darling Basin (Figure 1).

QWQG – Queensland Water Quality Guidelines (2009).

Streams – riverine wetlands - wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or form a connecting link between two bodies of standing water. (Queensland Wetlands Program, <http://www.epa.qld.gov.au/wetlandinfo>).

WQOs – Water quality objectives.

1. Background

CSG is a natural gas, consisting primarily of methane, which is adsorbed onto coal. Production of CSG is increasing rapidly in Queensland and is set to increase even more dramatically as CSG producers seek new markets for their product by establishing a liquefied natural gas industry. CSG is produced by dewatering coal seams to reduce the pressure that keeps the gas in place. This process results in significant quantities of water being brought to the surface. Queensland Government policy requires CSG producers to desalinate their CSG water unless it can be injected into suitable aquifers or used directly without treatment. Once treated, CSG water may be supplied to other water users for beneficial use. Water in excess to that which can be injected or beneficially used is to be aggregated for disposal.

Demand for treated CSG water in beneficial uses is anticipated to fall short of production, resulting in surplus volumes requiring disposal. Release into existing surface streams is one option being considered for disposal of this water. Any release of associated water will require a discharge licence that stipulates flow and water quality criteria (Trigger Values) that must be met to protect the defined ecosystem values and water quality objectives.

CSG resources in Queensland are located primarily in the Surat and Bowen geological basins which underlie sections of the Queensland Murray-Darling Basin (QMDB) (Figure 1). The QMDB consists of the Border Rivers, Moonie, Balonne-Condamine, Warrego, Paroo and Bulloo drainage basins, and is located in the south west of the State. The majority of Queensland's CSG resource underlies the Balonne-Condamine drainage basin in the QMDB and the Fitzroy drainage basin which is located to the north of the QMDB.

Rivers in the QMDB support nationally significant wetlands with high conservation value. Surface waters in the region are also used for irrigation and feed into drinking water supplies. Locally relevant guidelines are therefore needed to assess the quality of CSG water that can be released into surface streams.

Many rivers in the QMDB exist as networks of ephemeral channels and waterholes that experience intermittent periods of high magnitude flooding. Untimely releases of CSG water could interrupt important natural cycles in aquatic ecosystems adapted to these conditions. Guidelines for the timing and quantities of CSG water released are therefore also needed to minimise environmental impacts of CSG water releases in the QMDB.

Under its *Water for the Future Program*, the Commonwealth Government has allocated \$5 million for a feasibility study to examine the use of CSG water in addressing water sustainability and adjustment issues in the QMDB. The *Coal Seam Gas Water Feasibility Study* will analyse the opportunities for, and the risks and practicability of, using CSG water to assist in achieving the long-term goals in the QMDB of:

- transitioning irrigation communities to lower long-term water availability; and
- securing viability of ecological assets.

Activity 4 of the coal seam gas feasibility study is investigating the stream ecosystem health response of CSG water releases and relates to securing the viability of assets. The current report represents Task 1 of Activity 4 and presents a conceptual understanding of the potential impacts of the release of CSG water into surface streams in the QMDB. The report collates existing data relevant to assessing the ecological risks posed to surface streams in the QMDB. This document is aimed at providing advice regarding the assessment of appropriate guidelines and should be considered preliminary as it will be updated throughout the life of Activity 4 of the coal seam gas water feasibility study (Figure 2).

2. Objectives

The key objectives of this report are:

1. To present a preliminary conceptual understanding of the potential benefits or risks posed to surface streams in the QMDB by the release of CSG water that will be further developed in Task 2 of this Activity;
2. To collate existing information that can be used to guide decisions regarding release of CSG water to surface streams in the QMDB; and
3. To construct an interim decision matrix describing the factors to be considered in assessing risks associated with the release of CSG water to surface streams in the QMDB.

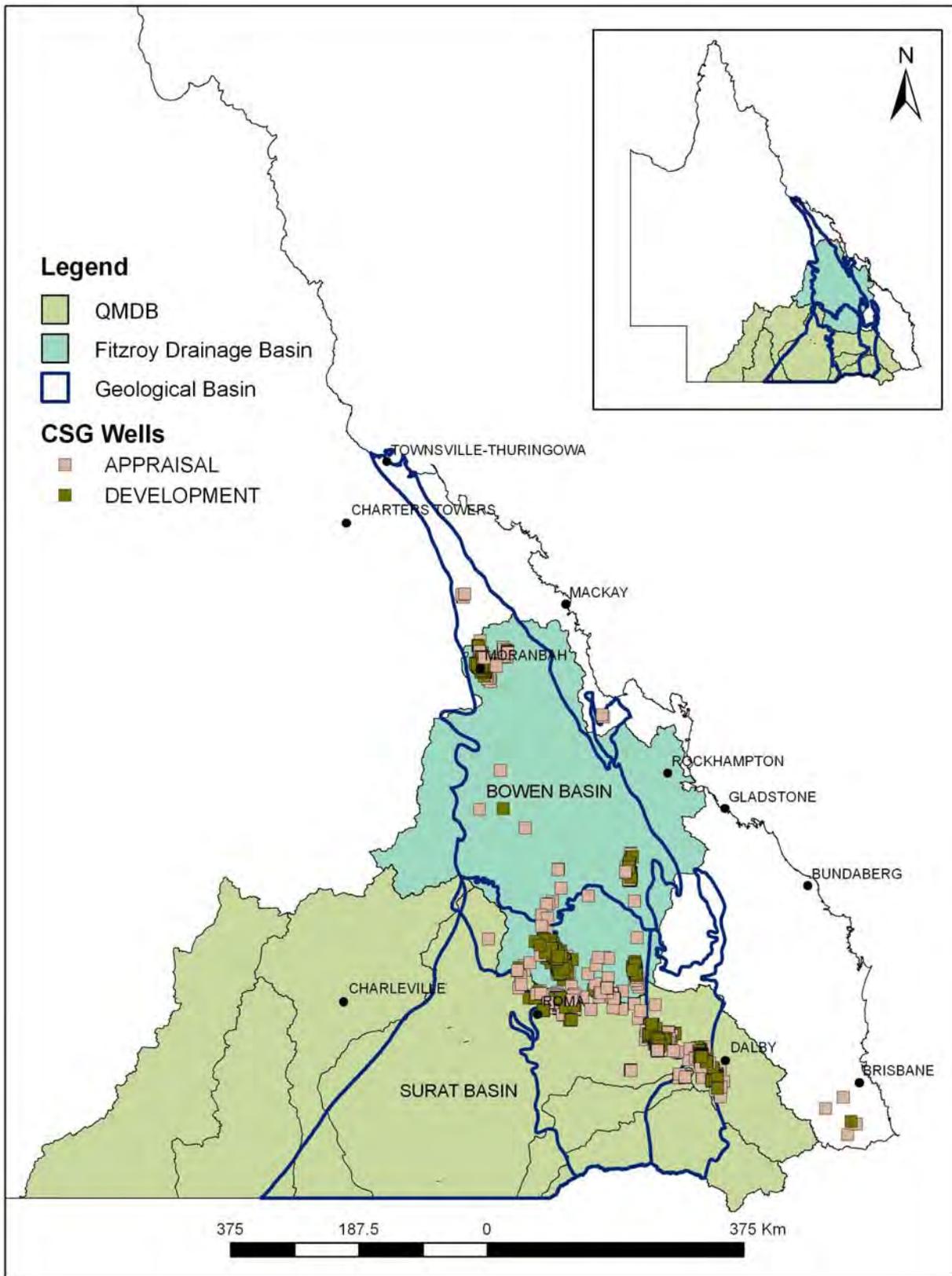


Figure 1. Coal seam gas wells under appraisal or in development in Queensland (DEEDI, 2009).

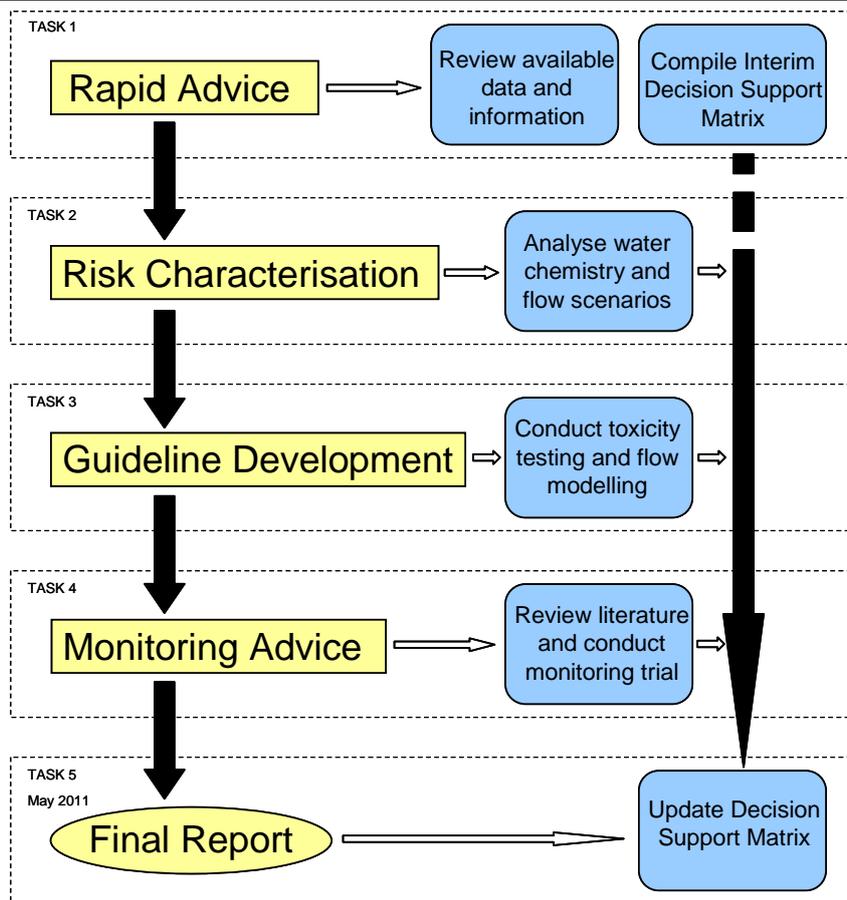


Figure 2. Coal seam gas beneficial reuse, Activity 4 (Stream Ecosystem Health response) study workflow.

3. Assessing environmental risk

3.1. Environmental risk assessment framework

The risks posed by the release of CSG water into surface streams are best assessed through application of an ecological risk assessment framework. A generalised risk assessment framework that can be applied to this scenario is outlined below. The risk assessment framework requires that conceptual models are developed to support a hazard identification phase. Tasks to be undertaken to apply this risk assessment framework to CSG water releases are outlined in the interim decision support matrix.

Ecological risk assessment is the process whereby risks posed by inherent hazards in processes or a particular situation are estimated either qualitatively or quantitatively. Risk assessment is a process that can be separated into the three major phases shown in the framework in Figure 3: problem formulation, risk analysis and risk characterisation. In the problem formulation phase the ecological issues and potential hazards are identified through the development of a conceptual understanding of the ecosystem of interest. The problem formulation phase should allow for identification of both potential detrimental and beneficial outcomes for aquatic ecosystems from a given process or situation. The current report is designed to inform the problem formulation phase of a risk assessment for the release of CSG water into surface streams in the QMDB. Data has been presented with a focus on the QMDB, however, the principles for assessing the risks posed to aquatic ecosystems by the release of CSG water may be applicable to all Queensland surface waters.

The second phase of the risk assessment process is risk analysis where data to characterise the likelihood of exposure to a hazard is collated/collected along with data on the potential consequences of exposure to that hazard. This data can be qualitative and based on expert judgement or, preferably, quantitative and based on modelled or measured values and as data is often limited, is often based on the available data. In the third phase of risk assessment the likelihood data is combined with the consequences data to provide a measure of risk. Quantitative risk assessment is favoured over a qualitative assessment as this reduces the level of potential subjective bias in the outcomes. It is important for all assumptions to be documented, regardless of whether a qualitative or quantitative assessment is conducted so that outputs can be revisited in an iterative process as new data becomes available. This risk assessment framework provides a structured and transparent process that can be used as a management tool in policy and regulatory decisions.

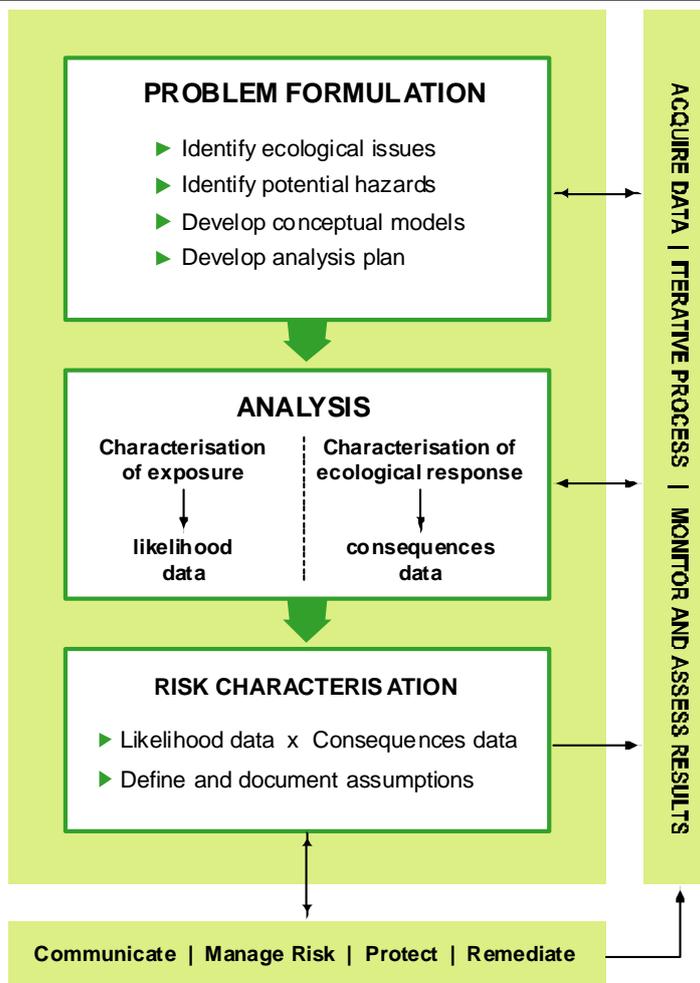


Figure 3. Environmental risk assessment framework (Dunlop et al. 2008).

3.2. Conceptual models

Conceptual models provide a representation of our current understanding of a system including its components and interactions. In the problem formulation phase of environmental risk assessment conceptual models are used to identify hazard sources, factors which mediate their distribution and effect, and the impact of their presence on ecological assets. Ecological assets include species, populations, ecosystem functions and locations (e.g. a wetland).

In Queensland, a causal chain or Pressure-Stressor-Response (PSR) framework has been used in the development of state-wide monitoring programs to model ecosystem interactions in an attempt to understand how ecosystem responses relate to the causative agents (Marshall et al. 2006). This approach has been adopted as the basis for monitoring in Queensland as outlined in the Integrated Waterways Monitoring Framework (Catchment Programs, 2009). The use of causal chain framework models also enables targeted management of specific impacts and aids in the selection of the most relevant indicators (Neimeijer & de Groot 2007, 2008). In a PSR framework *pressures* are defined as human activities that either directly or indirectly modify the biophysical conditions experienced by ecosystems and their constituents (i.e. release of CSG water releases to surface streams). *Stressors* are agents of the pressure which elicit the response by directly interacting with the ecosystem (i.e. physical-chemical properties of associated water, hydrological conditions etc.). Individual structural and functional components of ecosystems have both optimum (preference) and tolerance ranges for these biophysical attributes, and ecosystems respond to stressors because modification of these attributes either harm, benefit, or provide opportunities to ecosystem constituents. These *responses* can propagate through other ecosystem elements, e.g. via trophic cascade effects, and have the potential to significantly modify ecosystems.

Development of a whole ecosystem conceptual understanding of potential hazards posed by stressors and pressures requires the following steps to be followed:

- Classification of ecosystems by common characteristics
- Development of ecosystem models describing the important processes and linkages in each ecosystem type
- Development of individual stressor models that identify potential ecological consequences of a stressor and appropriate indicators of the pressures and/or condition.

The following three sections deal with each of these steps in turn.

3.2.1. Wetland classifications

The classification of wetlands into ecologically relevant groups that are more like each other than others is useful for the development of conceptual models as it enables identification of common processes and functions. Classifications allow reference or natural conditions to be inferred for wetlands of common types and can assist with identification of appropriate management actions. Wetlands can be classified according to a range of criteria including typology, flow regimes and water quality characteristics. The Queensland Wetlands Program has developed a typology building on the classification of wetlands into broad categories which include;

- Lacustrine (lakes and dams) wetlands
- Palustrine (marshes, swamps and bogs) wetlands
- Riverine (wetlands along rivers and streams) wetlands

Lacustrine and palustrine wetland types that have been identified through the Queensland Wetlands Program in the QMDB are shown in Table 1. Riverine wetlands in the QMDB have been classified through the Sustainable Rivers Audit (MDBC, 2001) into Upland (source), slope (transport) and lowland (deposition) regions.

Table 1. Lacustrine and palustrine wetland types present in the Queensland Murray-Darling Basin (Queensland Wetlands Program).

River Basin	Wetland Type
Border Rivers	Inland non-arid lakes
	Inland non-arid swamp wetlands
	Karst wetlands
Moonie	Inland non-arid swamp wetlands
Balonne-Condamine	Arid zone lakes
	Arid zone swamp wetlands
	Inland non-arid lakes
	Inland non-arid swamp wetlands
Warrego	Arid zone lakes
	Arid zone swamp wetlands
	Inland non-arid lakes
	Inland non-arid swamp wetlands
Paroo	Arid zone lakes
	Arid zone swamp wetlands
	Great artesian basin spring wetlands

3.2.2. Ecosystem models

Ecosystem models provide a mechanism for visualising the functions and processes important within an ecosystem and their interactions. Conceptual models for lacustrine and palustrine wetland types in the QMDB have been developed through the Queensland Wetlands Program (WetlandInfo, 2009). The conceptual model shown in Figure 4 represents a riverine or surface stream wetland with an adjacent floodplain in the QMDB. This model provides an example of the linkages that need to be understood within an ecosystem to develop an understanding of the potential impacts of a stressor on an ecosystem.

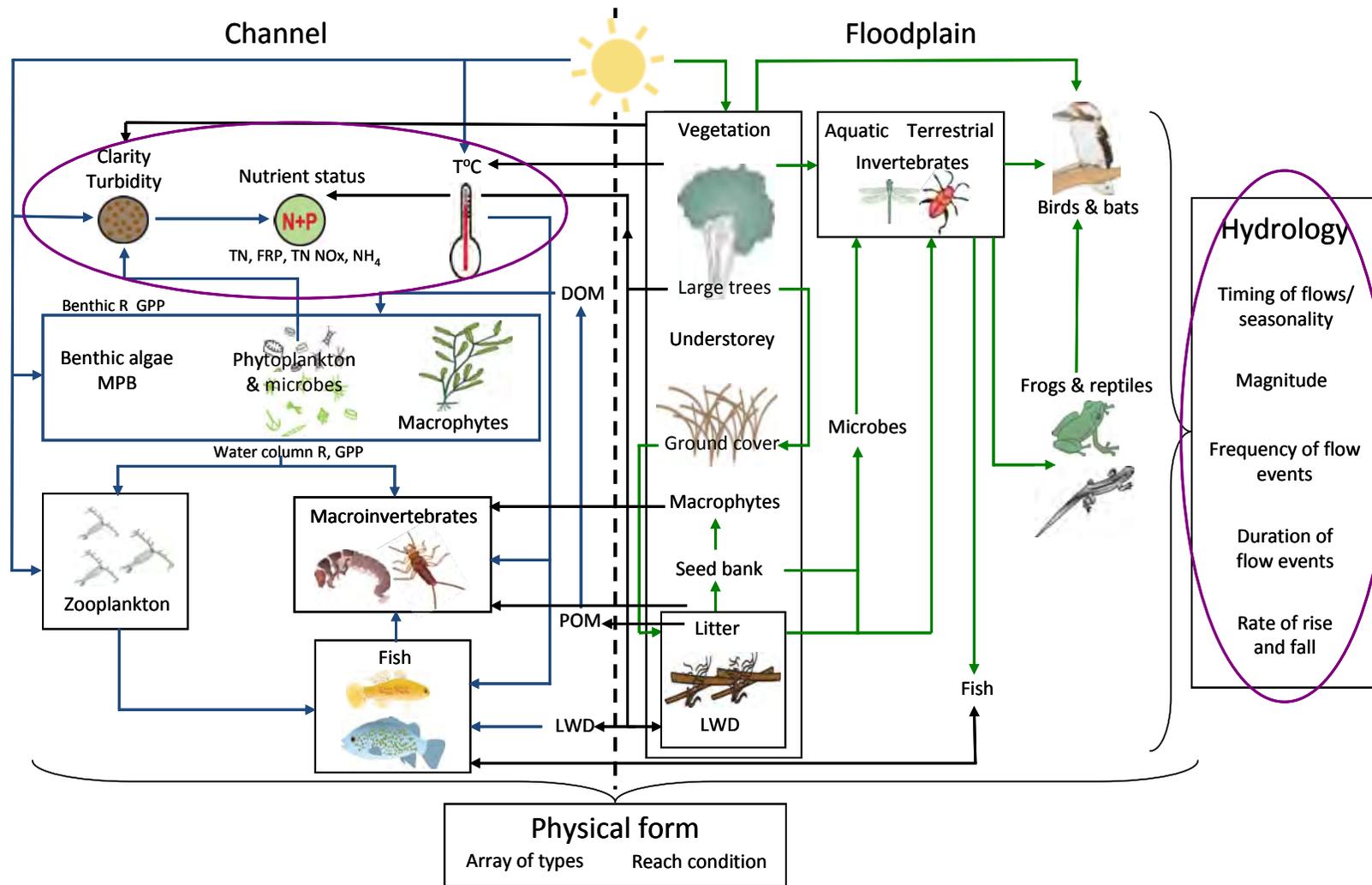


Figure 4. River ecosystem function model showing components and processes in a channel-floodplain ecosystem. Interactions between components are shown as arrows (modified from Davies et al. 2008). Purple circles indicate factors that may be directly affected by the release of CSG water into a surface stream. (DOM – dissolved organic matter, FRP – filterable reactive phosphorous, LWD – large woody debris, MPB – microphytobenthos, POM – particulate organic matter, TN – Total nitrogen).

Hydrology in QMDB riverine systems

The headwaters of the QMDB rise in the Great Dividing Range, and the rivers flow across the Queensland/New South Wales border, to form one of the largest catchments in the world. The rivers are flat and shallow over much of their courses with extensive floodplains. Prolonged periods of low or no flow are typical, as are unpredictable high flow events that inundate the floodplains, ephemeral lakes and wetlands. Much of the QMDB can be considered arid or semi-arid, experiencing infrequent rainfall (Marshall et al. 2005).

General characteristics of hydrological conditions in the QMDB include (Marshall et al. 2005):

- There is low base flow with 90% of flood flow from rainfall.
- Flow is seasonal with wet season January-May and dry season June-December.
- Seasonal patterns have low repeatability between years so it can be wet when it is on average dry and dry when it is on average wet.
- Flow is intermittent with characteristic long periods without flow.
- No-flow spells occur all year round including wet season.

An Australia-wide classification of the hydrology of streams has been conducted to assist with prescribing management of environmental flows (Kennard et al. 2008). The classification system, based on 120 metrics describing ecologically relevant characteristics of the natural hydrologic regime resulted in 12 distinct classes of flow regime. These varied according to the seasonal pattern to discharge, the degree of flow permanence, variations in flood magnitude and other aspects of flow predictability and variability. The results of this classification for streams in the QMDB and Bowen and Surat geological basins are shown in Figure 5 and the classes identified described in Table 2. Only one perennial stream was identified in the QMDB with the others being characterised by unpredictable and intermittent flows. Streams were only included in the analysis if they were considered to have experienced minimal anthropogenic disturbance so these classifications intend to represent the natural or reference condition for the catchment.

The classification of rivers by hydrology was based on the premise that rivers that share similar hydrological characteristics should also share similarities in assemblage composition, species traits and community functioning and that it should then follow that ecological responses to given anthropogenic change in flow regime should be similar in rivers of a similar initial natural flow regime (Kennard et al. 2008). Rivers within the one flow regime class should therefore represent an environmental flow management unit.

Table 2. Flow regime classes identified in the Queensland Murray-Darling basin (Kennard et al. 2008)

Flow regime class	Description
4. Unpredictable baseflow	Perennial. Less predictable flows than other perennial streams with discharge spread uniformly throughout the year (i.e. not seasonal).
7. Unpredictable intermittent	Intermittent, rarely cease to flow. Intermediate baseflow and intermediate runoff magnitude. Variable flows with very low predictability. More uniform flows throughout the year than Class 8.
8. Unpredictable winter intermittent	Intermittent, rarely cease to flow. Intermediate baseflow and intermediate runoff magnitude. Variable flows with very low predictability. Winter flows dominant.
9. Predictable winter highly intermittent	Intermittent, regularly cease to flow. Usually 100-200 zero flow days per year. Winter runoff flows dominant.
11. Unpredictable summer highly intermittent	Intermittent, regularly cease to flow. Usually 100-200 zero flow days per year. Minimum and maximum monthly flows showed low predictability and weak seasonality.
12. Variable summer extremely intermittent	Intermittent, regularly cease to flow. More than 250 no flow days per year. Dominated by infrequent, large floods which could occur at any time of year.

Geographic, climatic and some catchment topographic factors were generally strong discriminators of flow regime

classes (Kennard et al. 2008). Based on this outcome, a classification of streams using geographic data is currently being conducted for all streams across Australia (not only for streams considered to be at or near reference condition). The 30 group classification is based on a set of 48 attributes describing the climate, water balance, topography, substrate and vegetation cover of the reach and its catchment (Stein et al., 2008).

Hydrological conditions affect the physical habitat for aquatic and riparian biota, the availability of refuges, the distribution of food resources, opportunities for movement and migration, and conditions suitable for reproduction and recruitment (Naiman et al. 2008). Key ecological implications of the hydrological conditions in the QMDB include (Marshall et al. 2005);

- Many species have either flexible/opportunistic life histories or long life spans.
- Species may utilise annual cues for critical life history activities.
- Species utilize drought refugia, (especially water holes) and/or have traits for surviving drought, or rapidly recolonising afterwards.

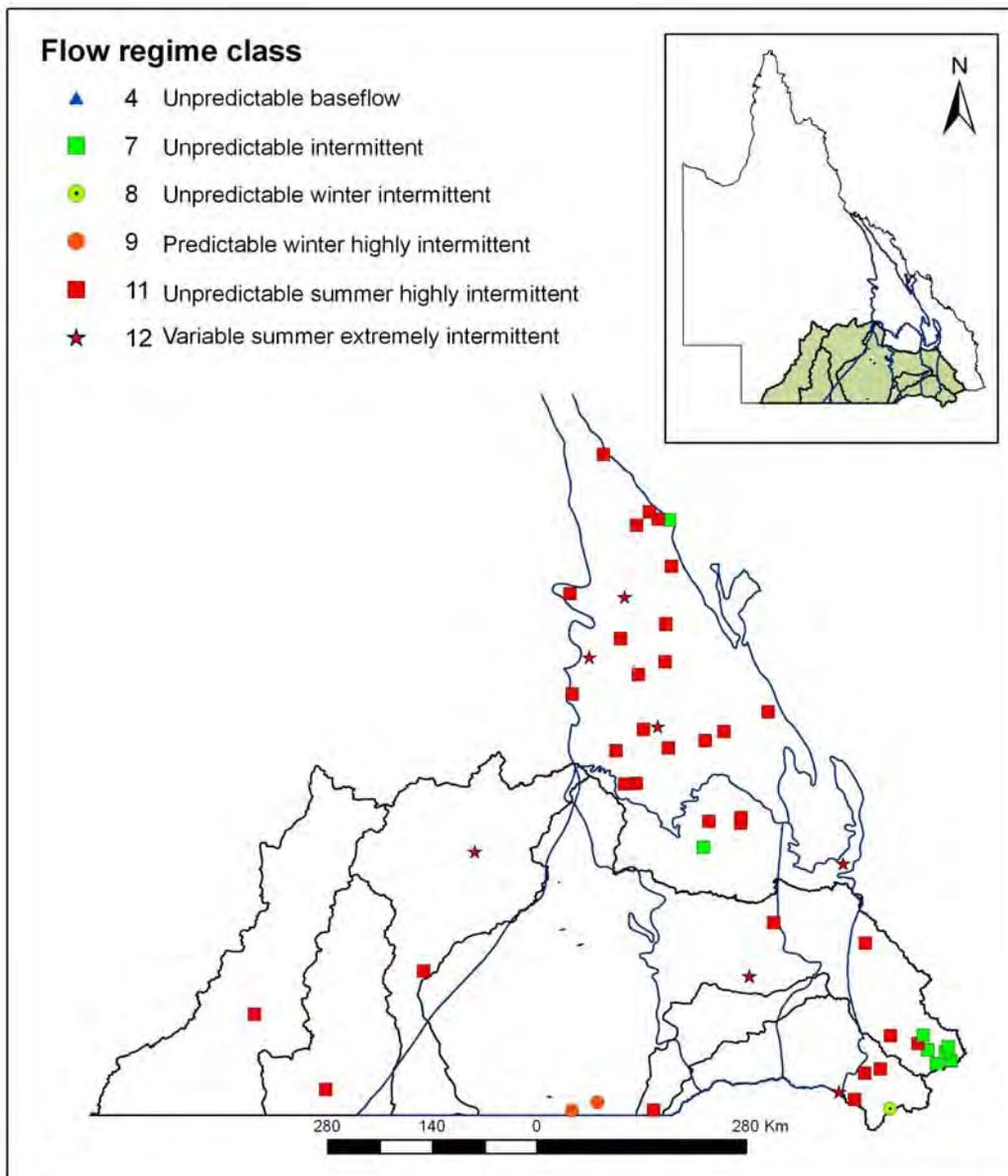


Figure 5. Hydrological classifications of streams in the Queensland Murray-Darling Basin and the Surat and Bowen coal basins (Kennard et al. 2008). Each point represents a gauging station with flows considered to have little or no hydrologic modifications due to human activities.

Water quality in QMDB riverine systems

Geologic and climatic patterns in Queensland determine water quality factors such as the proportions of major ions, although the stage of flow influences variability and overall concentration (McNeil et al 2005). General characteristics of water quality conditions in the QMDB include (Marshall et al. 2005);

- Cold minimum temperatures.
- Variable temperatures.
- Turbidity is generally high so light penetration is generally limited to <16 cm.
- pH values generally in the range of 6.8-8.5
- Dissolved oxygen levels range between 3.7-14.2 mg/L
- Salinity characteristics are summarised in Table 3 (Queensland water quality guidelines, 2006). Salinity in the Murray-Darling basin is managed through the Basin Salinity Management Strategy (MDBC, 2001).

Table 3. Salinity characteristics of water in surface streams of the Queensland Murray-Darling Basin (QWQG, 2009).

Area	Area description	Overall rating	Major cations	Major anions
Condamine Macintyre	Condamine River, excluding eastern tributaries between Warwick and Dalby, and Macintyre Brook	Moderate to high	Sodium Magnesium	Chloride Bicarbonate
Maranoa-Balonne-Border Rivers	Balonne-Maranoa-Culgoa to border, and border rivers excluding Macintyre Brook	Moderately low	All	Bicarbonate
Western Murray-Darling basin	MDB west of the Balonne-Culgoa, including the Mungallala Creek system, Warrego and Paroo	Appears to be low	Sodium Others	Bicarbonate Chloride Sulphate

Key ecological implications of the water quality conditions in the QMDB include (Marshall et al. 2005):

- Low diversity of aquatic macroinvertebrates due to fine substrates and low light penetration.
- Primary productivity limited to phytoplankton near water surface and shallow littoral benthic algal production.
- Food webs largely driven by littoral benthic production.
- Cold minimum temperatures limit productivity rates and may exclude some species.
- Diversity of temperatures may lead to high biodiversity.

3.2.3. Stressor models

Stressor models are used to outline the potential biological consequences of stressors present in the environment. These have been developed for a range of stressors under the Queensland Wetlands Program (WetlandInfo, 2009). In Figure 6, a stressor model has been developed to outline potential ecological impacts of releasing associated water to surface streams. The factors identified in the stressor model are discussed briefly below.

Altered hydrology

Altered hydrology could affect surface stream ecosystem health positively or negatively. Positive impacts may include:

- Beneficial flushing flows, if delivered at appropriate times
- Providing water to supplement environmental flows in areas where water resources are diverted from surface streams for human use. Environmental flows improve the persistence of waterholes as refugia during dry periods and could increase connectivity between refugia. Nationally significant wetlands in the QMDB identified as threatened due to limited natural flows are highlighted in Table 9 (Appendix I). However, it should be noted that CSG water availability (and therefore any potential positive impacts) will be temporary.

Negative impacts arising from altered hydrology may include:

- Increased flow rates leading to bank and/or bed erosion and subsequent loss of habitat.
- Increased flow rates selecting against species which inhabit low flow areas or boundary layers.
- Alteration of flow regime leading to changing cues of flow sensitive species (e.g. for migration and spawning).
- Increased water levels leading to water-logging of fringing and riparian vegetation which provide habitat for biota.
- Increased flow altering the suspended particle size distribution which could affect light penetration and subsequently affect productivity in the water body.
- Biota with critical life history links to flow having insufficient time to complete life cycles in an altered flow regime. Biota with identified critical links to flow in the QMDB and Fitzroy basin are listed in Table 11 (Appendix I).

Altered water quality

Release of CSG water to surface streams could alter water quality and affect surface stream ecosystem health through:

- Increasing temperatures and reducing natural variation. Increased temperatures can lead to higher productivity however less variable temperature regimes lead to reduced productivity.
- Salinity increases may cause local toxicity and also contribute to catchment salinity loads which are of concern in the QMDB.
- Toxicity of chemical toxicants in the water over acute or chronic exposures. In ephemeral systems, toxicants are likely to be concentrated in waterholes during dry periods. Toxicity may lead to biological responses such as altered reproductive success, growth inhibition, predatory effects, feeding inhibition, death of individuals and ultimately the loss of sensitive species. Toxic effects may also be a result of deficiencies in required compounds.

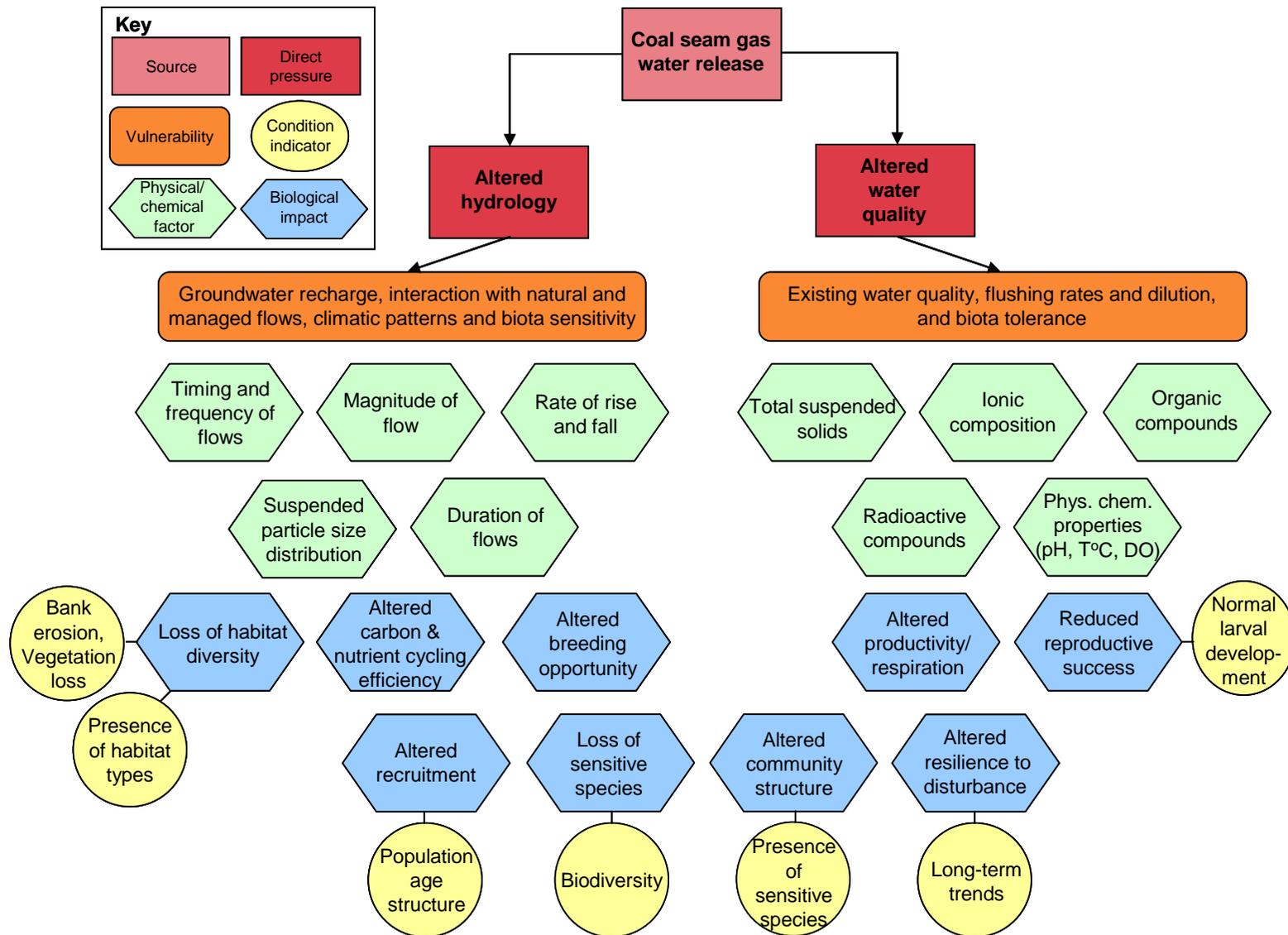


Figure 6. Stressor model for the release of coal seam gas water into surface streams (modified from WetlandInfo, 2009)

3.3. Ecological asset values

Environmental risk assessment requires the values provided by ecological assets to be identified. Ecological assets include species, populations, ecosystem functions and locations. Ecological assets that have been identified in the QMDB and other sources of this information are listed in Appendix I. The value of an asset is used to determine the level of risk that it is acceptable to expose the asset to. There are a number of approaches that assign ‘value’ to an asset and each should be considered when assessing risks posed to an asset. These include:

- “Environmental values” (EVs) and “water quality objectives” (WQOs) as defined in the Environmental Protection Policy (Water) (2009) and QWQG (2009);
- Identification of ecosystem benefits associated with the ecological assets;
- The degree of “naturalness” or existing degree of anthropogenic disturbance as defined in the ANZECC Guidelines (2000); and
- The conservation significance of an ecological asset.

The following four sections deal with each of these approaches to assigning value in turn.

3.3.1. Environmental values and water quality objectives

Environmental values scheduled under the EPP Water are listed below. Each of these values may be relevant to the QMDB although all values would not apply to specific sites within the basin. The development of EVs and WQOs and the role of guidelines in this process are detailed in the Queensland EPA procedural guideline “Establishing draft environmental values and water quality objectives”, available at: <http://www.epa.qld.gov.au/register/p01551aa.pdf>.

- Aquatic ecosystems ✓
- Irrigating crops ✓
- Farm use ✓
- Stock watering ✓
- Aquaculture
- Human consumption ✓
- Primary recreation ✓
- Secondary recreation ✓
- Visual appreciation ✓
- Raw drinking water ✓
- Industrial use ✓
- Cultural and spiritual values ✓

3.3.2. Ecological benefits

Benefits associated with aquatic ecosystems have been listed by the Queensland Wetlands Program (WetlandInfo, 2009) and include:

- Provisioning services – such as primary production
- Regulating services – including sediment and nutrient retention
- Supporting services – such as breeding/nursery habitat for waterbirds and fish, providing a source of water for other wildlife.

3.3.3. Naturalness

A commonly adopted approach for assigning conservation significance to an ecological asset is to determine the degree of “naturalness”. The Australian water quality guidelines define three levels of protection for aquatic ecosystems based on the degree of disturbance experienced at a site (Table 4).

Table 4. Australian water quality guideline “levels of protection” for waterways (ANZECC, 2000)

High conservation value aquatic ecosystems	Largely unmodified or have gone little change due to human activities and are often found within national parks, conservation reserves or inaccessible locations.
Slightly to moderately disturbed aquatic ecosystems	Have experienced some change from human activities but are not considered highly disturbed (see below). Aquatic biological diversity may have been affected to some degree but the natural communities are still largely intact and functioning.
Highly disturbed aquatic ecosystems	Degraded systems likely to have lower levels of naturalness but may still retain some ecological or conservation value.

The sustainable rivers audit collects information on several indicators of aquatic ecosystem condition which could be used as an indication of the “naturalness” of rivers in the QMDB. Table 5 lists ratings for each of the measured indicators for river basins in the QMDB in 2008. These assessments indicate that hydrology in QMDB rivers is largely in natural condition while fish and macro-invertebrate populations appear to be impacted by anthropogenic factors. Local assessment of condition would be required at sites potentially impacted by the release of CSG water.

Table 5. Condition of streams in the Queensland Murray-Darling Basin (MDBC, 2008).

River Valley	Fish	Macro invertebrates	Hydrology	Ecological health
Paroo	Moderate	Moderate	Good	Good
Warrego	Poor	Poor	Good	Poor
Condamine Balonne	Moderate	Poor	Good-Moderate	Moderate
Border Rivers	Moderate	Moderate	Good	Moderate

3.3.4. Conservation significance

Other criteria used to assign conservation significance are listed in Table 6. Some assets in the QMDB that have been assigned conservation significance under these criteria are highlighted in Appendix I.

Table 6. Criteria applied to determine the conservation significance of ecological assets (WetlandInfo, 2009).

Criteria	In the QMDB
Biodiversity	Biota that have been observed in the QMDB are listed in Appendix I.
Special features	
Distinct or unique species	Many fauna and flora species found the QMDB do not occur elsewhere in Queensland.
Representativeness and/or unique habitat	
Threatened species and ecosystems	Threatened species can be identified through the EPBC Act and through regional ecosystem mapping
Priority species and ecosystems	Priority species identified through Water Resource Planning in the QMDB are listed in Appendix II
Ecological connectivity	

4. Interim decision support matrix

The process that needs to be followed to assess the risk posed to surface stream ecosystems by the release of CSG water are outlined below in Figure 7 and the associated tasks are detailed with explanatory notes in Table 7.

This process begins with an assessment of the hazard or benefit posed by the CSG water discharge which requires detailed characterisation of the water quality and flow parameters of the CSG water discharge and modelling of the water quality and flow parameters of the receiving stream pre-development and following discharge.

Ecological assets that are likely to be impacted by the release of CSG water to a stream need to be identified and a conceptual understanding of the ecosystem in which the asset occurs and the assets water quality and hydrological requirements developed. Ecological assets identified as potentially affected by the release of CSG water to a stream need to be prioritised through consideration of the asset values. Prioritised, high value assets potentially impacted by CSG water releases require a detailed assessment to be conducted. Low priority assets require a less detailed assessment.

A stressor model would then need to be constructed which identifies potential interactions between stressors associated with CSG water releases (altered hydrology and altered water quality) and biological responses of the ecological assets. The conceptual understanding developed for the identified ecological assets is intended to inform the development of the stressor model by highlighting asset requirements and dependencies and interactions within an ecosystem.

The risk posed by the release of CSG water to a stream can be calculated by combining of the likelihood of exposure to a stressor and the consequences of that exposure. Knowledge of the critical links to both flow and water quality allows thresholds to be established for these parameters which, if exceeded, could be expected to represent a hazard/benefit to the ecological asset. Comparison of modelled pre-development conditions and conditions following CSG water discharge allows calculation of the increased likelihood of such a threshold being exceeded as a result of the discharge. Risk can then be estimated either quantitatively or qualitatively by combining this measure of likelihood with an assessment of the consequences of that hazard occurring. A detailed description of this approach to assessing risk which has been applied in water resource planning is provided in Cockayne et al (unpublished draft).

Both water quality and hydrological stressors should be incorporated in the risk assessment. In the absence of a conceptual understanding of the interactions between individual stressors, it is recommended that each stressor be considered additive so that the final risk estimate represents the sum of the risk posed by each stressor. Consideration of interactions between water quality and hydrology in terms of characterising risk will be further addressed in Task 2 of this Activity.

Once an estimate of risk has been derived, consideration needs to be given as to whether this risk is acceptable for the asset and management strategies to reduce the risk to an acceptable level identified. The level of risk that is considered acceptable for a given asset will be influenced by the value of the asset.

Key knowledge gaps that limit estimation of risks posed by CSG water releases into surface streams in the QMDB have been identified in the following section. It is intended that this decision support matrix will be updated throughout the life of this project as additional information becomes available.

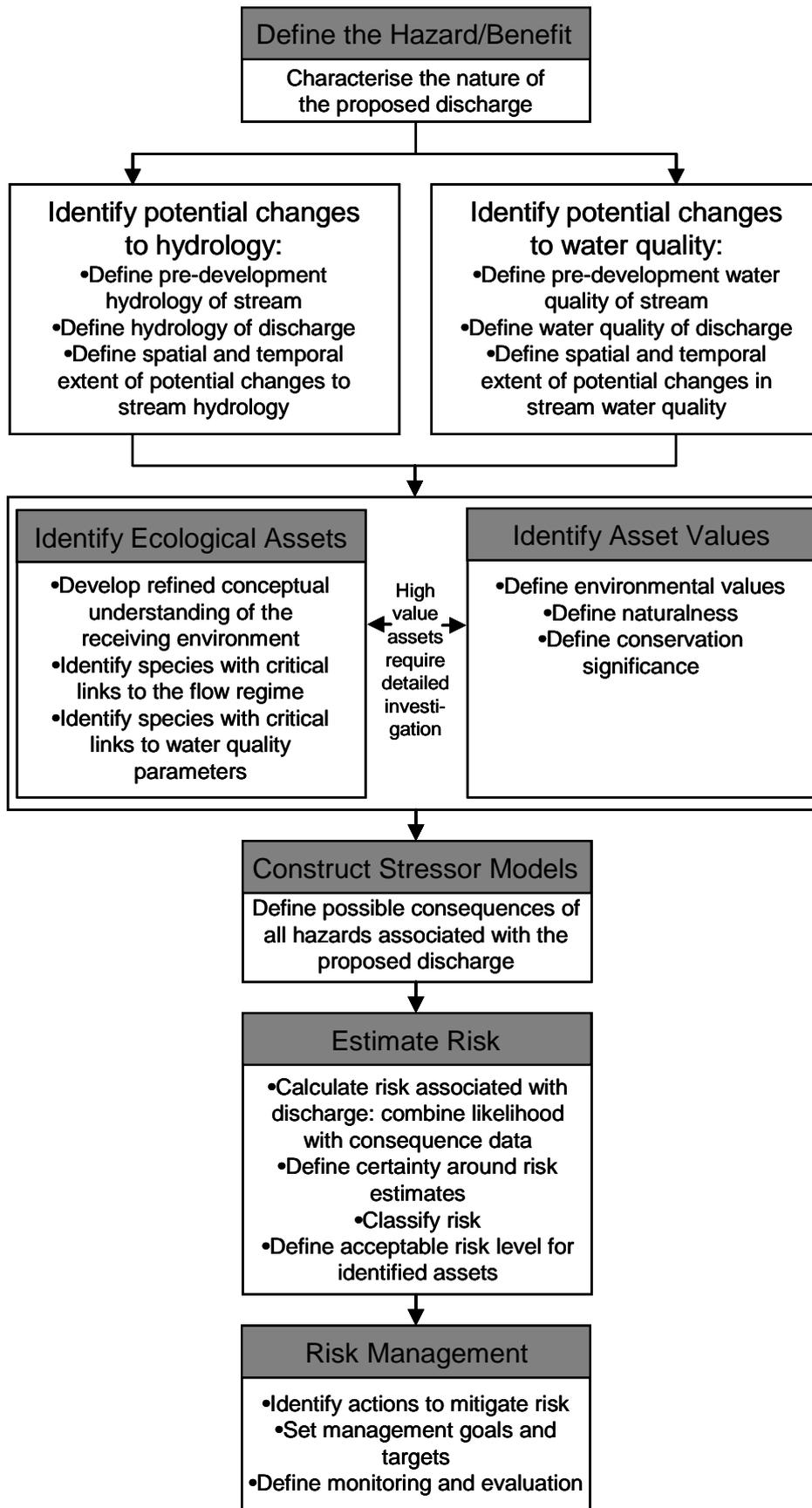


Figure 7. Interim Decision Support Matrix

Table 7. Explanatory table for the Interim Decision Support Matrix.

Process	Tasks	Notes
Defining hazard: Altered hydrology	Define pre-development conditions	Define background hydrological conditions at proposed discharge site. This will require modelling using available hydrological data. Table 2 lists ecologically relevant classifications of flow regime.
	Define flow parameters of the discharge relevant to stream ecosystems including: <ul style="list-style-type: none"> ▪ Timing of flows ▪ Frequency of flows ▪ Duration of flows ▪ Magnitude of flows ▪ Rate of rise and fall of flows 	The DERM operational policy regarding waste water discharge to Queensland waters states that; “As a general guide, modelling of flow characteristics should be considered where the waste water flow would exceed 10 percent of the natural minimum flow of the waterway.” In ephemeral streams all discharges will exceed 10 percent of the natural minimum flow. Discharge of water to temporary streams requires special consideration due to their unique hydrological and ecological characteristics.
	Define the spatial and temporal extent of discharge impacts to the stream flow regime	Flow parameters need to be managed in accordance with existing Water Resource Plan (WRP) Resource Operation Plans. Details of WRPs relevant to the QMDB and Fitzroy Basins are available at http://www.nrw.qld.gov.au/wrp/catchments.html
Defining hazard: Altered water quality	Define pre-development water quality of the receiving environment	Define background water quality conditions at proposed discharge site
	Define water quality of the discharge including: <ul style="list-style-type: none"> ▪ Total suspended solids ▪ Ionic composition ▪ Metals and metalloids ▪ Organic compounds ▪ Radioactive compounds ▪ Physical chemical parameters 	Refer to Appendix II for water quality parameters of relevance to CSG waters and the existing water quality concentration guideline values of relevance. Both lower and upper limits of water quality parameters need to be defined. The load of each water quality parameter that will be discharged through the life of a project, and in particular salts, needs to be defined.
	Define the spatial and temporal extent of discharge impacts to stream water quality	
Identifying water quality and flow requirements of ecological assets	Develop refined conceptual understanding of receiving environment	A generalised conceptual understanding of a riverine environment is presented in the current report that can be used to provide a basis for adaptation to locally specific conditions. Specific conceptual models for wetlands in the QMDB are being developed through the Queensland Wetlands Program (WetlandInfo, 2009). Ecological assets likely to be impacted by CSG water release at a specific location need to be carefully identified. Assets with a high conservation value (see below) will require a detailed assessment of their ecological requirements.

Process	Tasks	Notes
	Identify species with critical links to the flow regime	Refer to Appendix I for flow dependencies identified through DERM water resource planning. Species may be grouped into guilds with common flow requirements when constructing stressor models.
	Identify species with specific water quality sensitivities	Limited information currently available for toxicants other than salinity.
Identifying asset values	Define environmental values	Characterise Environmental Values and Water Quality Objectives as defined in the Environmental Protection Policy (Water) (2009) and the Queensland Water Quality Guidelines (2006) for receiving waters.
	Define naturalness	Assess existing degree of anthropogenic disturbance in receiving waters as defined in the ANZECC Water Quality Guidelines (2000).
	Define conservation significance	Refer to Table 6 for criteria and Appendix I for ecological assets with conservation significance identified in the QMDB.
Stressor models	Construct stressor models	Identify potential consequences of hazard exposure to ecological assets in the receiving environment. This step integrates the information collected through the “Defining hazard” and “Identifying ecological assets” processes described above. Stressor models may need to be constructed for a number of discharge scenarios.
Estimating risk	Calculate risk associated with identified potential outcomes	Risk can be calculated either quantitatively or qualitatively by combining information on the likelihood of a hazard occurring (identified through the “defining hazard” phase) and the potential consequences of the hazard (identified through the stressor models).
	Analyse risk	Classify risk as high, medium or low.
	Set acceptable risk level	Determine the acceptable level of risk for the ecological assets identified.
	Define certainty around risk estimates	Uncertainty around asset information and guidelines increases risk. Certainty can be improved through research and data gathering.
Risk management	Mitigate risk	Determine management actions that can mitigate the risk posed to ecological assets.
	Set management goals and targets	Based on acceptable level of risk for identified assets.
	Monitoring and evaluation	Identify indicators of ecosystem impact and design a monitoring program that provides data on which to base ongoing management decisions.

5. Knowledge gaps

While the Murray-Darling is a relatively well studied system and industry involved in the production of coal seam gas in Queensland has directed considerable effort into local data collection, there remain a number of important knowledge gaps which impede assessment of the environmental risk of coal seam gas water releases to surface streams. Major knowledge gaps are described in Table 8 with aspects intended to be addressed through the current study highlighted.

Table 8. Data required for assessment of environmental risks posed by the release of coal seam gas water to surface streams in the Queensland Murray-Darling Basin.

Topic	Data required
Water Quality	Radionuclide concentrations in Queensland CSG water.
	Organic pollutant concentrations in Queensland CSG water. (Hydrocarbons have been reported for some discharges).
	Local species tolerance to toxicants and physical-chemical properties of CSG water. (DERM has also collected salinity toxicity data some species collected from the QMDB with some additional data on the effects ionic composition from four typical water types in Queensland. This data will be used to create species sensitivity distributions to derive locally relevant salinity guidelines).
	Water quality guidelines derived using local reference condition data or local toxicity data.
	Potential for concentration of toxicants through evaporation in refuge waterholes during low-zero flow events and application of water quality guidelines in low flow streams.
	Guidelines for acceptable whole of catchment toxicant loads resulting from CSG water releases. This will be particularly relevant for salinity due to its importance for downstream catchments in the Murray-Darling.
	Potential for CSG water discharges to result in stratification of water quality in the receiving water bodies.
	Potential for contamination of shallow aquifers.
Hydrology	Hydrological classification for non-reference streams. Classification of streams will improve prediction of ecological risks posed by altered hydrological conditions. (Being addressed through the research of Janet Stein).
	Biota with critical links to flow. (Being addressed through water resource planning).
	Potential risks/benefits posed to biota with critical links to flow from CSG water releases, particularly with reference to surface waters with intermittent flow.
	Potential for increased flows to cause bed/bank erosion and to alter the particle size distribution of suspended sediments.
	Habitat changes that would result from increased flow and water logging due to CSG water releases.
	Potential benefits of utilising CSG water to supplement environmental flows and increase connectivity in wetlands.
Monitoring and Evaluation	Indicators of stream ecosystem health that respond to the stressors introduced by CSG water need to be identified for streams in the QMDB.

6. References

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Appendix I: Ecological assets identified in the QMDB and Fitzroy Basin

In addition to the assets listed in Tables 9-14, ecological assets in the QMDB can be identified through;

- WildNet database (DERM)
- Referable wetlands (DERM)
- Regional ecosystem mapping (DERM)
- AquaBAMM assessments, available at:
<http://www.epa.qld.gov.au/wetlandinfo/site/SupportTools/AssessmentMethods/AquaBAMM/CondamineRivercatchmentriverineandnonriverine.html>

Priority Assets in the QMDB

Table 9. Nationally and internationally important wetlands in the Queensland Murray-Darling Basin. Maps showing the location of the listed wetlands are available online through the Queensland Wetlands Program (<http://www.epa.qld.gov.au/wetlandinfo/site/MappingFandD.html>). Wetlands identified as being threatened due to limited natural flows are shaded (Davis et al. 2001)

River Basin	Wetland	Importance, Convention listing
Condamine Balonne	Murrawondah Lakes	Nationally important, DIWA
	Myola-Mulga Downs Salt Lake and Claypans	Nationally important, DIWA
	Balonne River Floodplain	Nationally important, DIWA
	Dalrymple and Blackfellows Creek	Nationally important, DIWA
	Lake Broadwater	Nationally important, DIWA
	The Gums Lagoon	Nationally important, DIWA
	Wyandra – Cunamulla Claypans Aggregation	Nationally important, DIWA
Warrego	“Old Bando” Swamp	Nationally important, DIWA
	Lake Dartmouth Area	Nationally important, DIWA
	Warrego River Distributary System	Nationally important, DIWA
	Warrego River Waterholes (Charleville-Wyandra)	Nationally important, DIWA
Paroo	Currawinya Lakes	Internationally important, Ramsar
	Eulo Artesian Springs Supergroup	Nationally important, DIWA
	Lake Numalla Aggregation	Nationally important, DIWA
	Lake Wombah – Kingie Lake Group	Nationally important, DIWA
	Lake Wyara	Nationally important, DIWA
	Lake Bindegolly and Toomaroo	Nationally important, DIWA
	Paroo River Waterholes (“Ciawarro” Area)	Nationally important, DIWA

Table 10. Priority ecological assets identified in water resource plan areas of the Queensland Murray-Darling Basin (provided by Water Accounting, DERM).

Top 10 priority assets for each WRP Area						
Asset	Priority					
	Moonie	Warrego	Border Rivers	Upper Condamine	Middle Condamine	Lower Balonne
Golden perch <i>Macquaria ambigua</i>	1	1	1	1 & 2	1	1 & 2
Permanent waterholes	1	1	1	1 & 2	1	1 & 2
River red gum <i>Eucalyptus camaldulensis</i>	2	2	3	3 & 4	2	3 & 4
Painted snipe <i>Rostratula benghalensis</i>	2		2			3 & 4
Freckled Duck <i>Stictonetta naevosa</i>	3		3			4 & 5
Purple spotted gudgeon <i>Mogurnda adspersa</i>	3			5		
Murray cod <i>Maccullochella peelii peelii</i>	4	3		5 & 6	3	
Hyrtil's tandan <i>Neosilurus hyrtlii</i>	4	3		5 & 6	3	
Black box <i>Eucalyptus largiflorens</i>	4	3		5 & 6	3	
Coolibah <i>Eucalyptus coolibah</i>	4	3		5 & 6	3	
Murrawondah Lakes: Vegetation		3				
Warrego Distributary System: Vegetation		3				
Spangled perch <i>Leiopotherapon unicolour</i>		4			4	
River blackfish <i>Gadopsis marmoratus</i>			3	4	2	
Sundown National Park: Vegetation			3			
Inundation of floodplain and benches			3 & 6		4	
Black Swan <i>Cygnus atratus</i>			4			
Brolga <i>Grus rubicundus</i>			4			
Lake Broadwater: Vegetation				4		
Narran Lakes: Vegetation & Waterbirds						3veg & 5wb

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Culgoa River Floodplain: Vegetation & Waterbirds						3veg & 5wb
Culgoa Floodplain Nation Park: Vegetation & Waterbirds						3veg & 5wb
Culgoa National Park: Vegetation & Waterbirds						3veg & 5wb
Balonne River floodplain wetlands: Vegetation						4

* Numbers represent the rank of the asset within the catchment. Similar scoring assets are ranked equally within a catchment. Shaded sections represent either those assets which do not occur in a catchment or those assets which score outside the top 10 assets in the catchment.

Biota in the QMDB with identified critical links to flow

Table 11. Assets in Border Rivers Basin with critical links to flow identified through water resource planning (DERM, 2009).

Asset -scientific name	Asset - common name/ description	Current distribution in WRP area	Critical link to flow	Level of knowledge
Birds				
<i>Cygnus altratus</i>	Black swan	Reported from the Border Rivers WRP area.	Seasonal flooding acts as breeding cue	Moderate
<i>Ephippiorhynchus asiaticus</i>	Black-necked stork	Reported from the Border Rivers WRP area.	Breeding in wetlands but unknown links	Poor
<i>Anas castanea</i>	Chestnut teal	Reported from the Border Rivers WRP area.	Successful breeding related to wetlands remaining full for 3 to 6 months	Poor
<i>Stictonetta naevosa</i>	Freckled duck	Reported from the Border Rivers WRP area.	Successful breeding related to wetland filling and maintaining water for 4 months	Moderate
<i>Ardea alba</i>	Great egret	Reported from the Border Rivers WRP area.	Successful breeding related to inundation	Moderate
<i>Anas gracilis</i>	Grey teal	Reported from the Border Rivers WRP area.	Successful breeding related to wetlands remain filled for 3-6 months	Low
<i>Phalacrocorax sulcirostris</i>	Little black cormorant	Reported from the Border Rivers WRP area.	Successful breeding related to wetland inundation	Moderate
<i>Chenonetta jubata</i>	Maned duck	Reported from the Border Rivers WRP area.	Wetland inundation stimulates breeding	Moderate
<i>Anas superciliosa</i>	Pacific black duck	Reported from the Border Rivers WRP area.	Requires permanent water or wetland inundation	Poor
<i>Pelecanus conspicillatus</i>	Australian pelican	Reported from the Border Rivers WRP area.	Flooding acts as breeding stimuli	Poor
<i>Threskiornis molucca</i>	Australian white ibis	Reported from the Border Rivers WRP area.	Flooding acts as breeding stimuli	Poor
<i>Oxyura australis</i>	Blue-billed duck	Reported from the Border Rivers WRP area.	Flooding drives movement and later breeding	Poor
<i>Grus rubicundus</i>	Brolga	Reported from the Border Rivers WRP area.	Flooding is required as breeding stimuli	Moderate
<i>Plegadis falcinellus</i>	Glossy ibis	Reported from the Border Rivers WRP area.	Flooding is required as breeding stimuli	Poor

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<i>Ardea intermedia</i>	Intermediate egret	Reported from the Border Rivers WRP area.	Breeding is usually dictated by flooding	Moderate?
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	Reported from the Border Rivers WRP area.	Flooding induces breeding	Moderate
<i>Rostratula benghalensis</i>	Painted snipe	Reported from the Border Rivers WRP area.	Breeding in wetlands but unknown links	Moderate
<i>Malacorhynchus membranaceus</i>	Pink-eared duck	Reported from the Border Rivers WRP area.	Flooding acts as breeding stimuli	Poor
<i>Platalea regia</i>	Royal Spoonbill	Reported from the Border Rivers WRP area.	Breeding is influenced by flooding	Moderate
<i>Nycticorax caledonicus</i>	Rufous Night Heron	Reported from the Border Rivers WRP area.	Breeding is usually dictated by flooding	Moderate
<i>Threskiornis spinicollis</i>	Straw-necked ibis	Reported from the Border Rivers WRP area.	Breeding is usually dictated by flooding	Moderate
<i>Chlidonias hybrida</i>	Whiskered tern	Reported from the Border Rivers WRP area.	Breeding depends on rainfall and flooding	Poor
<i>Biziura lobata</i>	Musk duck	Reported from the Border Rivers WRP area.	Season, rain and rising water act as breeding cues	Poor

Fish

<i>Macquaria ambigua</i>	Golden perch	Reported from the Border Rivers WRP area.	Any major rise in river level induces spawning	Good
<i>Maccullochella peelii peelii</i>	Murray cod	Reported from the Border Rivers WRP area.	Onset of upstream migration coincides with elevated water levels	Poor
<i>Bidyanus bidyanus</i>	Silver perch	Reported from the Border Rivers WRP area.	Assumed to require flooding to initiate spawning	Poor
<i>Leiopotherapon unicolour</i>	Spangled perch	Reported from the Border Rivers WRP area.	Flooding important stimuli for movement	Moderate
<i>Hypseleotris</i> spp.	Carp gudgeon	Reported from the Border Rivers WRP area.	Peak spawning coincides with low and stable flows	Low
<i>Melanotaenia fluviatilis</i>	Rainbowfish	Reported from the Border Rivers WRP area.	Likely to spawn during low flows	Low
<i>Galaxias olidus</i>	Mountain galaxias	Reported from the Border Rivers WRP area.	Adults of mountain galaxias move upstream into shallow riffle areas for spawning	Moderate
<i>Gadopsis marmoratus</i>	River blackfish	Reported from the Border Rivers	River blackfish requires slow flowing waters for spawning	Good

		WRP area.		
<i>Mogurnda adspersa</i>	Purple spotted gudgeon	Reported from the Border Rivers WRP area.	Sensitive to high current velocities	Good
Amphibian				
<i>Litoria wilcoxii</i>	Stony Creek Frog	Reported from the Border Rivers WRP area.	Stable low flows required during spawning	Moderate
Vegetation				
<i>Eucalyptus largiflorens</i>	Black box	Reported from the Border Rivers WRP area.	Flooding is important for maintenance and recruitment	Moderate
<i>Eucalyptus coolabah</i>	Coolibah	Reported from the Border Rivers WRP area.	Flooding is essential for maintenance	Moderate
<i>Muehlenbeckia florulenta</i>	Lignum	Reported from the Border Rivers WRP area.	Inundation is essential for maintenance	Moderate
<i>Eucalyptus camaldulensis</i>	River red gum	Reported from the Border Rivers WRP area.	Inundation is critical for maintenance and recruitment of seedlings	Moderate
Waterholes				
N/A	Permanent waterholes	Present in Border Rivers WRP area.	Important refugia during dry times	Good
Wetland				
N/A	Sundown National Park (Waterbirds, Vegetation)	Located within Stanthorpe shire boundary of the Border Rivers	Flows from the Severn River through the park provide important habitat for range of flora and fauna	Moderate
Processes				
N/A	Inundation of floodplain and benches	Occurs in Border Rivers WRP area on the floodplain and benches within river channel.	Inundation facilitates transport of sediments and nutrients	Moderate

Table 12. Assets in the Moonie Basin with critical links to flow identified through water resource planning (DERM, 2009).

Asset -scientific name	Asset – common name/ description	Current distribution in WRP area	Critical link to flow	Level of knowledge
Waterbirds				
<i>Cygnus altratus</i>	Black swan	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Seasonal flooding acts as breeding cue	Moderate
<i>Ephippiorhynchus asiaticus</i>	Black-necked stork	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Breeding in wetlands but unknown links	Poor
<i>Anas castanea</i>	Chestnut teal	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Successful breeding related to wetlands remaining full for 3-6 months	Poor
<i>Stictonetta naevosa</i>	Freckled duck	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Successful breeding related to wetland filling and maintaining water for 4 months	Moderate?
<i>Ardea alba</i>	Great egret	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Successful breeding related to inundation	Moderate
<i>Anas gracilis</i>	Grey teal	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Successful breeding related to wetlands remain filled for 3-6 months	Low
<i>Phalacrocorax sulcirostris</i>	Little black cormorant	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Successful breeding related to wetland inundation	Moderate
<i>Chenonetta jubata</i>	Maned duck	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Wetland inundation stimulates breeding	Moderate

<i>Anas superciliosa</i>	Pacific black duck	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Requires permanent water or wetland inundation	Poor
<i>Pelecanus conspicillatus</i>	Australian pelican	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Flooding acts as breeding stimuli	Poor
<i>Threskiornis molucca</i>	Australian white ibis	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Flooding acts as breeding stimuli	Poor
<i>Oxyura australis</i>	Blue-billed duck	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Flooding drives movement and later breeding	Poor
<i>Grus rubicundus</i>	Brolga	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Flooding is required as breeding stimuli	Moderate
<i>Plegadis falcinellus</i>	Glossy ibis	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Flooding is required as breeding stimuli	Poor
<i>Ardea intermedia</i>	Intermediate egret	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Breeding is usually dictated by flooding	Moderate
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Flooding induces breeding	Moderate
<i>Biziura lobata</i>	Musk duck	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Rising water can trigger breeding	Poor
<i>Rostratula benghalensis</i>	Painted snipe	Reported from the Moonie WRP area	Breeding in wetlands but unknown links	Moderate

		but breeding is likely to occur in Thallon wetland only.		
<i>Malacorhynchus membranaceus</i>	Pink-eared duck	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Flooding acts as breeding stimuli	Poor
<i>Platalea regia</i>	Royal Spoonbill	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Breeding is influenced by flooding.*	Moderate
<i>Nycticorax caledonicus</i>	Rufous Night Heron	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Breeding is usually dictated by flooding	Moderate
<i>Threskiornis spinicollis</i>	Straw-necked ibis	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Breeding is usually dictated by flooding	Moderate
<i>Chlidonias hybrida</i>	Whiskered tern	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Breeding depends on rainfall and flooding	Poor
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	Reported from the Moonie WRP area but breeding is likely to occur in Thallon wetland only.	Unknown	Poor

Fish

<i>Macquaria ambigua</i>	Golden perch	Reported from the Moonie WRP area.	Any major rise in river level induces spawning	Good
<i>Neosilurus hyrtl</i>	Hyrtl's tandan	Reported from the Moonie WRP area.	Rising water level stimulates spawning	Moderate
<i>Maccullochella peelii peelii</i>	Murray cod	Reported from the Moonie WRP area.	Onset of upstream migration coincides with elevated water levels	Poor
<i>Bidyanus bidyanus</i>	Silver perch	Reported from the Moonie WRP area.	Assumed to require flooding to initiate spawning	Poor
<i>Leiopotherapon unicolor</i>	Spangled perch	Reported from the Moonie WRP area.	Flooding important stimuli for movement	Moderate

		area.		
<i>Hypseleotris</i> spp.	Carp gudgeon	Reported from the Moonie WRP area.	Peak spawning coincides with low and stable flows	Low
<i>Mogurnda adspersa</i>	Purple spotted gudgeon	Reported from the Moonie WRP area.	Sensitive to high current velocities	Good
<i>Melanotaenia fluviatilis</i>	Rainbowfish	Reported from the Moonie WRP area.	Likely to spawn during low flows	Low
Vegetation				
<i>Eucalyptus largiflorens</i>	Black box	Reported from the Moonie WRP area.	Flooding is important for maintenance and recruitment	Moderate
<i>Eucalyptus coolabah</i>	Coolibah	Reported from the Moonie WRP area.	Flooding is essential for maintenance	Moderate
<i>Muehlenbeckia florulenta</i>	Lignum	Reported from the Moonie WRP area.	Inundation is essential for maintenance	Moderate
<i>Eucalyptus camaldulensis</i>	River red gum	Reported from the Moonie WRP area.	Inundation is critical for maintenance and recruitment of seedlings	Moderate
Waterholes				
N/A	Permanent waterholes	Present in Moonie WRP area.	Important refugia during dry times	Good
Wetland				
N/A	Thallon wetland	Present in Moonie WRP area (Thallon).	Magnitude, frequency and duration of inundation is important	Low
Processes				
N/A	Inundation of floodplain and benches	Occurs in Moonie WRP area on the floodplain and benches within river channel.	Inundation facilitates transport of sediments and nutrients	Moderate

Table 13. Preliminary draft list of assets in the Upper Condamine (Condamine and Balonne Basin) with critical links to flow identified through water resource planning (DERM, 2009).

Asset - scientific name	Asset - common name/ description	Current distribution in WRP area	Critical link to flow	Level of knowledge
Birds				
<i>Cygnus altratus</i>	Black swan	Reported from the Upper Condamine WRP area.	Seasonal flooding acts as breeding cue.	Moderate
<i>Ephippiorhynchus asiaticus</i>	Black-necked stork	Reported from the Upper Condamine WRP area.	Breeding in wetlands but unknown links.	Poor
<i>Anas castanea</i>	Chestnut teal	Reported from the Upper Condamine WRP area.	Successful breeding related to wetlands remaining full for 3 to 6 months.	Poor
<i>Stictonetta naevosa</i>	Freckled duck	Reported from the Upper Condamine WRP area.	Successful breeding related to wetland filling and maintaining water for 4 months.	Moderate?
<i>Ardea alba</i>	Great egret	Reported from the Upper Condamine WRP area.	Successful breeding related to inundation.	Moderate
<i>Anas gracilis</i>	Grey teal	Reported from the Upper Condamine WRP area.	Successful breeding related to wetlands remain filled for 3-6 months.	Low
<i>Phalacrocorax sulcirostris</i>	Little black cormorant	Reported from the Upper Condamine WRP area.	Successful breeding related to wetland inundation.	Moderate
<i>Chenonetta jubata</i>	Maned/wood duck	Reported from the Upper Condamine WRP area.	Wetland inundation stimulates breeding.	Moderate
<i>Anas superciliosa</i>	Pacific black duck	Reported from the Upper Condamine WRP area.	Requires permanent water or wetland inundation.	Poor
<i>Pelecanus conspicillatus</i>	Australian pelican	Reported from the Upper Condamine WRP area.	Flooding acts as breeding stimuli.	Poor
<i>Threskiornis molucca</i>	Australian white ibis	Reported from the Upper Condamine WRP area.	Flooding acts as breeding stimuli.	Poor
<i>Oxyura australis</i>	Blue-billed duck	Reported from the Upper Condamine WRP area.	Flooding drives movement and later breeding.	Poor
<i>Grus rubicundus</i>	Brolga	Reported from the Upper Condamine WRP area.	Flooding is required as breeding stimuli.	Moderate
<i>Plegadis falcinellus</i>	Glossy ibis	Reported from the Upper Condamine WRP area.	Flooding is required as breeding stimuli.	Poor
<i>Ardea intermedia</i>	Intermediate egret	Reported from the Upper Condamine	Breeding is usually dictated by flooding.	Moderate?

		WRP area.		
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	Reported from the Upper Condamine WRP area.	Flooding induces breeding.	Moderate
<i>Rostratula benghalensis</i>	Painted snipe	Reported from the Upper Condamine WRP area.	Breeding in wetlands but unknown links.	Moderate
<i>Malacorhynchus membranaceus</i>	Pink-eared duck	Reported from the Upper Condamine WRP area.	Flooding acts as breeding stimuli.	Poor
<i>Platalea regia</i>	Royal Spoonbill	Reported from the Upper Condamine WRP area.	Breeding is influenced by flooding.	Moderate
<i>Nycticorax caledonicus</i>	Nankeen/Rufous Night Heron	Reported from the Upper Condamine WRP area.	Breeding is usually dictated by flooding.	Moderate
<i>Threskiornis spinicollis</i>	Straw-necked ibis	Reported from the Upper Condamine WRP area.	Breeding is usually dictated by flooding.	Moderate
<i>Chlidonias hybrida</i>	Whiskered tern	Reported from the Upper Condamine WRP area.	Breeding depends on rainfall and flooding.	Poor
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	Reported from the Upper Condamine WRP area.		Poor
<i>Biziura lobata</i>	Musk duck	Reported from the Upper Condamine WRP area.	Season, rain and rising water act as breeding cues.	Poor

Fish

<i>Macquaria ambigua</i>	Golden perch	Reported from the Upper Condamine WRP area.	Any major rise in river level induces spawning.	Good
<i>Maccullochella peelii peelii</i>	Murray cod	Reported from the Upper Condamine WRP area.	Onset of upstream migration coincides with elevated water levels	Poor
<i>Bidyanus bidyanus</i>	Silver perch	Reported from the Upper Condamine WRP area.	Assumed to require flooding to initiate spawning.	Poor
<i>Neosilurus hyrtlii</i>	Hyrtl's tandan	Reported from the Upper Condamine WRP area.	Rising water level stimulates spawning.	Moderate
<i>Leiopotherapon unicolor</i>	Spangled perch	Reported from the Upper Condamine WRP area.	Flooding important stimuli for movement.	Moderate
<i>Hypseleotris</i> spp.	Carp gudgeon	Reported from the Upper Condamine WRP area.	Peak spawning coincides with low and stable flows.	Low
<i>Melanotaenia fluviatilis</i>	Rainbowfish	Reported from the Upper Condamine WRP area.	Likely to spawn during low flows.	Low

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<i>Galaxias olidus</i>	Mountain galaxias	Reported from the Upper Condamine WRP area.	Adults of mountain galaxias move upstream into shallow riffle areas for spawning.	Moderate
<i>Gadopsis marmoratus</i>	River blackfish	Reported from the Upper Condamine WRP area.	River blackfish requires slow flowing waters for spawning.	Good
<i>Mogurnda adspersa</i>	Purple spotted gudgeon	Reported from the Upper Condamine WRP area.	Sensitive to high current velocities..	Good
Amphibian				
<i>Litoria wilcoxii</i>	Stony Creek Frog	Reported from the Upper Condamine WRP area.	Stable low flows required during spawning.	Moderate
Vegetation				
<i>Eucalyptus largiflorens</i>	Black box	Reported from the Upper Condamine WRP area.	Flooding is important for maintenance and recruitment.	Moderate
<i>Eucalyptus coolabah</i>	Coolibah	Reported from the Upper Condamine WRP area.	Flooding is essential for maintenance.	Moderate
<i>Muehlenbeckia florulenta</i>	Lignum	Reported from the Upper Condamine WRP area.	Inundation is essential for maintenance.	Moderate
<i>Eucalyptus camaldulensis</i>	River red gum	Reported from the Upper Condamine WRP area.	Inundation is critical for maintenance and recruitment of seedlings.	Moderate
Waterholes				
N/A	Permanent waterholes	Present in Upper Condamine WRP area.	Important refugia during dry times.	Good
Wetland				
N/A	Lake Broadwater Conservation Park Qld 015	Approximately 25 km southwest of Dalby.	Timing, duration magnitude and frequency of inundation is important.	Low
Processes				
N/A	Inundation of floodplain and benches	Occurs in Upper Condamine WRP area on the floodplain and benches within river channel.	Inundation facilitates transport of sediments and nutrients.	Moderate

Table 14. Preliminary draft list of assets in the Middle Condamine (Condamine and Balonne Basin) with critical links to flow identified through water resource planning (DERM, 2009).

Asset - scientific name	Asset - common name/ description	Current distribution in WRP area	Critical link to flow	Level of knowledge
Birds				
<i>Cygnus altratus</i>	Black swan	Reported from the Middle Condamine WRP area.	Seasonal flooding acts as breeding cue.	Moderate
<i>Ephippiorhynchus asiaticus</i>	Black-necked stork	Reported from the Middle Condamine WRP area.	Breeding in wetlands but unknown links.	Poor
<i>Anas castanea</i>	Chestnut teal	Reported from the Middle Condamine WRP area.	Successful breeding related to wetlands remaining full for 3 to 6 months.	Poor
<i>Stictonetta naevosa</i>	Freckled duck	Reported from the Middle Condamine WRP area.	Successful breeding related to wetland filling and maintaining water for 4 months.	Moderate?
<i>Ardea alba</i>	Great egret	Reported from the Middle Condamine WRP area.	Successful breeding related to inundation.	Moderate
<i>Anas gracilis</i>	Grey teal	Reported from the Middle Condamine WRP area.	Successful breeding related to wetlands remain filled for 3-6 months.	Low
<i>Phalacrocorax sulcirostris</i>	Little black cormorant	Reported from the Middle Condamine WRP area.	Successful breeding related to wetland inundation.	Moderate
<i>Chenonetta jubata</i>	Maned duck	Reported from the Middle Condamine WRP area.	Wetland inundation stimulates breeding.	Moderate
<i>Anas superciliosa</i>	Pacific black duck	Reported from the Middle Condamine WRP area.	Requires permanent water or wetland inundation.	Poor
<i>Pelecanus conspicillatus</i>	Australian pelican	Reported from the Middle Condamine WRP area.	Flooding acts as breeding stimuli.	Poor
<i>Threskiornis molucca</i>	Australian white ibis	Reported from the Middle Condamine WRP area.	Flooding acts as breeding stimuli.	Poor
<i>Oxyura australis</i>	Blue-billed duck	Reported from the Middle Condamine WRP area.	Flooding drives movement and later breeding.	Poor

		area.		
<i>Grus rubicundus</i>	Brolga	Reported from the Middle Condamine WRP area.	Flooding is required as breeding stimuli.	Moderate
<i>Plegadis falcinellus</i>	Glossy ibis	Reported from the Middle Condamine WRP area.	Flooding is required as breeding stimuli.	Poor
<i>Ardea intermedia</i>	Intermediate egret	Reported from the Middle Condamine WRP area.	Breeding is usually dictated by flooding.	Moderate?
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	Reported from the Middle Condamine WRP area.	Flooding induces breeding.	Moderate
<i>Rostratula benghalensis</i>	Painted snipe	Reported from the Middle Condamine WRP area.	Breeding in wetlands but unknown links.	Moderate
<i>Malacorhynchus membranaceus</i>	Pink-eared duck	Reported from the Middle Condamine WRP area.	Flooding acts as breeding stimuli.	Poor
<i>Platalea regia</i>	Royal Spoonbill	Reported from the Middle Condamine WRP area.	Breeding is influenced by flooding.	Moderate
<i>Nycticorax caledonicus</i>	Rufous Night Heron	Reported from the Middle Condamine WRP area.	Breeding is usually dictated by flooding.	Moderate
<i>Threskiornis spinicollis</i>	Straw-necked ibis	Reported from the Middle Condamine WRP area.	Breeding is usually dictated by flooding.	Moderate
<i>Chlidonias hybrida</i>	Whiskered tern	Reported from the Middle Condamine WRP area.	Breeding depends on rainfall and flooding.	Poor
<i>Platalea flavipes</i>	Yellow-billed Spoonbill	Reported from the Middle Condamine WRP area.		Poor
<i>Biziura lobata</i>	Musk duck	Reported from the Middle Condamine WRP area.	Season, rain and rising water act as breeding cues.	Poor

Fish

<i>Macquaria ambigua</i>	Golden perch	Reported from the Middle Condamine WRP area.	Any major rise in river level induces spawning.	Good
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Task 1: Interim decision support matrix – Release of water produced in association with CSG activities to surface waterways

<i>Maccullochella peelii peelii</i>	Murray cod	Reported from the Middle Condamine WRP area.	Onset of upstream migration coincides with elevated water levels	Poor
<i>Bidyanus bidyanus</i>	Silver perch	Reported from the Middle Condamine WRP area.	Assumed to require flooding to initiate spawning.	Poor
<i>Leiopotherapon unicolour</i>	Spangled perch	Reported from the Middle Condamine WRP area.	Flooding important stimuli for movement.	Moderate
<i>Hypseleotris</i> spp.	Carp gudgeon	Reported from the Middle Condamine WRP area.	Peak spawning coincides with low and stable flows.	Low
<i>Melanotaenia fluviatilis</i>	Rainbowfish	Reported from the Middle Condamine WRP area.	Likely to spawn during low flows.	Low
<i>Gadopsis marmoratus</i>	River blackfish	Reported from the Middle Condamine WRP area.	River blackfish requires slow flowing waters for spawning.	Good
<i>Neosilurus hyrtl</i>	Hyrtl's tandan	Reported from the Middle Condamine WRP area.	Rising water level stimulates spawning.	Moderate
Vegetation				
<i>Eucalyptus largiflorens</i>	Black box	Reported from the Middle Condamine WRP area.	Flooding is important for maintenance and recruitment.	Moderate
<i>Eucalyptus coolabah</i>	Coolibah	Reported from the Middle Condamine WRP area.	Flooding is essential for maintenance.	Moderate
<i>Muehlenbeckia florulenta</i>	Lignum	Reported from the Middle Condamine WRP area.	Inundation is essential for maintenance.	Moderate
<i>Eucalyptus camaldulensis</i>	River red gum	Reported from the Middle Condamine WRP area.	Inundation is critical for maintenance and recruitment of seedlings.	Moderate
Waterholes				
N/A	Permanent waterholes	Present in Middle Condamine WRP area.	Important refugia during dry times.	Good
Processes				
N/A	Inundation of floodplain and	Occurs in Middle Condamine WRP	Inundation facilitates transport of sediments and nutrients.	Moderate

benches

area on the
floodplain and
benches within
river channel.

Table 15. Assets in the Fitzroy Basin with critical links to flow identified through water resource plans (Cockayne, 2007; DERM, 2009).

Asset-Scientific Name	Asset-Common name/description	Current distribution in WRP area	Critical link to flow	Level of knowledge
<i>Ambassis agassizii</i>	Olive perchlet	Widespread	Requires stable low flows for spawning	Low
<i>Amniataba percoides</i>	Barred grunter	Widespread	Low flow spawning fish which requires longitudinal and lateral connectivity for access to habitat	Low-moderate
<i>Anguilla obscura and reinhardtii</i>	Glass eels		Changes to natural flow regime may impact possible cues for upstream recruitment	
<i>Bidyanus bidyanus</i>	Silver perch	Widespread	Migrate and spawn on high flows	Very good
<i>Eucalyptus camaldulensis</i>	Red river gum	Widespread but low abundance	Floods promote growth and benefit seedling establishment	Very good
<i>Eucalyptus coolabah</i>	Coolabah	Widespread	Floods promote growth and benefit seedling establishment	Low
<i>Hephaestus fuliginosus</i>	Sooty grunter	Widespread	Requires longitudinal connectivity for spawning migration, and riffle habitats for oxygenation of eggs. Flooding enhances recruitment	Low-moderate
<i>Lates calcarifer</i>	Barramundi	Mid to lower Fitzroy basin	1. Floods required for migration, growth and recruitment 2. Lateral connectivity required for upstream migrations of juvenile fish to freshwater habitats during migration period (Oct-Dec)	Moderate
<i>Macquaria ambigua</i>	Golden Perch	Widespread	Migrate and spawn on high flows	Very good
<i>Melanotaenia splendida splendida</i>	Eastern rainbowfish	Widespread	Low spawning fish	Good
<i>Mogurnda adspersa</i>	Purple spotted gudgeon	Widespread	Vulnerable to fluctuations in water levels that may impact on reproduction and recruitment by exposing fish eggs (Sept-Nov)	Moderate-good
<i>Mugil cephalus</i>	Striped mullet/sea mullet	Lower Fitzroy	Flows required for spawning migration (downstream_ and re-colonisation/dispersal (upstream))	Moderate
<i>Neosilurus ater</i>	Black catfish/black tandan	Limited	High flow events during the spawning period required for spawning migration and spawning.	Moderate-good
<i>Neosilurus hyrtlilii</i>	Hyrtls tandan/Hyrtl's catfish	Widespread	Migrate and spawn on medium to high flows	Moderate
<i>Notesthes robusta</i>	Bullrout	Limited to lower	Migrate on low winter	Low

Asset-Scientific Name	Asset-Common name/description	Current distribution in WRP area	Critical link to flow	Level of knowledge
<i>Rheodytes leukops</i>	Fitzroy River turtle	Fitzroy	flows Affinity for well-oxygenated riffles implies that river regulation would potentially affect this species via dietary ecology and respiratory physiology	
<i>Riffles as habitats</i>			Riffles are generally the most productive habitats and support a high diversity of plants and animals.	
<i>Scortum hillii</i>	Leathery grunter	Widespread	Migrate and spawn on high flows	Good
<i>Tandanus tandanus</i>	Eel tail catfish/freshwater catfish	Widespread	Stable low flows facilitate next construction, spawning and larval development during spring/early summer	Moderate
Waterholes as refugia	Waterholes	Widespread	Flows for persistence and connectivity	Good
Wetlands as water bird nesting sites	Wetlands	-Boggomoss springs (QLD010) -Fitzroy River Delta (QLD012) -Fitzroy River Floodplain (QLD013) -Callide - Lake Pleasant/Victoria -Callide - Tee Holes (approx. AMTD 27-Callide) -Dawson - Bears Lagoon (AMTD 152-Dawson) -Mackenzie - 10 Mile and associated floodplain (AMTD 335-383) -Lake Mary and Associated Flood Plain (AMTD 400-409.5-Mackenzie)	Flood flows for water bird nesting sites and connectivity for fish migration	Low

Macroinvertebrate families present in the QMDB and Fitzroy Basin

Table 16. Macroinvertebrate families reported in Queensland Murray-Darling Basin and Fitzroy sites through DERM monitoring.

Family	Family	Family
Aeshnidae	Gerridae	Planorbidae
Ancylidae	Glossiphoniidae	Pleidae
Atriplectidae	Glossosomatidae	Protoneuridae
Aytidae	Gomphidae	Psephenidae
Baetidae	Gyrinidae	Ptilodactylidae
Belostomatidae	Haliplidae	Pyralidae
Bithyniidae	Hebridae	Sciomyzidae
Caenidae	Heteroceridae	Scirtidae
Calamoceratidae	Hydraenidae	Simuliidae
Carabidae	Hydridae	Sisyridae
Chaoboridae	Hydrobiidae	Sphaeriidae
Ceratopogonidae	Hydrobiosidae	Staphlinidae
Chironomidae (Tanypodinae)	Hydrometridae	Stratiomyidae
Chironomidae (Orthoclaadiinae)	Hydrophilidae	Tabanidae
Chironomidae (Chironominae)	Hydropsychidae	Temnocephalidae
Chyrosmelidae	Hydroptilidae	Thiaridae
Clavidae	Hygrobiidae	Tipulidae
Coenagrionidae	Hyriidae	Veliidae
Conoesucidae	Isostictidae	Viviparidae
Corallanidae	Leptoceridae	
Corbiculidae	Leptophlebiidae	
Corduliidae	Libellulidae	
Corixidae	Lymnaeidae	
Culicidae	Mesoveliidae	
Curculionidae	Naucoridae	
Dolichopodidae	Nepidae	
Dugesiiidae	Noteridae	
Dytiscidae	Notonectidae	
Ecnomidae	Ochteridae	
Elmidae	Ornithobdellidae	
Empididae	Palaemonidae	
Ephydridae	Parasthiacidae	
Erobdellidae	Physidae	

Appendix II: Water quality guidelines

Water quality guidelines in Australia are intended to be applied in the following order of preference:

- Locally derived guidelines
- Queensland Water Quality Guidelines
- Australian Water Quality Guidelines

With the exception of salinity values, the Queensland Water Quality Guidelines (QWQG, 2009) have stated that although there is some information available for the Murray-Darling basin there is insufficient data to set reliable Queensland guidelines. The default guidelines in this case are the Australian ANZECC Guidelines (ANZECC, 2000) although it is noted that these are unlikely to be appropriate for the flood-plain reaches of the Murray-Darling rivers and local guidelines are needed. Water quality data collected through various monitoring programs in the QMDB is currently being collated by the Activity 4 project team with a view to assessing suitability for deriving locally relevant water quality guidelines.

Table 15 lists the water quality parameters that have been identified as of potential concern in CSG water. This includes parameters that have been reported for CSG waters in Australia as well as parameters identified through literature from CSG operations in the United States and New Zealand. The most appropriate water quality guidelines that are currently available are also listed. Due to fact that these guidelines have not been derived locally, and the uncertainty around applying these to QMDB, the guideline values presented here should be consulted conservatively, until locally derived guidelines can be set.

Table 17. Existing water quality guidelines for surface waters in the Queensland Murray-Darling Basin.

Water Quality Parameter	Available Guideline	Guideline Level	Comments
Non-Metallic Inorganics			
Arsenic	ANZECC	24 µg/L (ASIII) 13 µg/L (AsV)	Aquatic ecosystems, 95% protection
Bicarbonate	-		
Bromine	-		
Calcium	ANZECC	1000 mg/L	Stockwater
Carbonate	-		
Chloride	ANZECC	175 mg/L	Irrigation of sensitive crops
Fluoride	ANZECC	1 mg/L	Irrigation
Hydrogen Sulphide	-		
Hydroxide	-		
Nitrite	-		
Nitrate	ANZECC	700 µg/L	Aquatic ecosystems, moderate reliability, 95% protection
Potassium	-		
Selenium	-		
Silica	-		
Sodium	ANZECC	115 mg/L	Irrigation
Sulphate	ANZECC	400 mg/L	Recreation
Sulphide	-		
Metals and Metalloids			
Aluminium	ANZECC	55 µg/L, 0.8 µg/L if	Aquatic ecosystems, low reliability,

Water Quality Parameter	Available Guideline	Guideline Level	Comments
		pH<6.5	95% protection
Barium	-		
Boron	ANZECC	370 µg/L	Aquatic ecosystems, high reliability, 95% protection
Cadmium	ANZECC	0.2 µg/L 0.06 µg/L	Aquatic ecosystems, high reliability, 95% protection 99% protection
Chromium (III)	ANZECC	3.3 µg/L	Aquatic ecosystems, low reliability, 95% protection
Chromium (IV)	ANZECC	1 µg/L	Aquatic ecosystems, high reliability, 95% protection
Copper	ANZECC	1.4 µg/L	Aquatic ecosystems, high reliability, 95% protection
Iron	Canadian Guideline in ANZECC	300 µg/L	Aquatic ecosystems, low reliability
Lead	ANZECC	3.4 µg/L	Aquatic ecosystems, high reliability, 95% protection
Mercury (inorganic)	ANZECC	0.6 µg/L	Aquatic ecosystems, high reliability, 95% protection for slightly-moderately disturbed systems
Manganese	ANZECC	1700 µg/L	Aquatic ecosystems, moderate reliability, 95% protection
Magnesium	-		
Molybdenum	ANZECC	34 µg/L	Aquatic ecosystems, low reliability, 95% protection
Nickel	ANZECC	11 µg/L	Aquatic ecosystems, high reliability, 95% protection
Phosphorus	-		
Silver	ANZECC	0.05 µg/L	Aquatic ecosystems, high reliability, 95% protection
Strontium	-		
Tin	ANZECC	3 µg/L	Aquatic ecosystems, low reliability
Zinc	ANZECC	8 µg/L	Aquatic ecosystems, high reliability, 95% protection
Radionuclides			
Gross alpha and beta activity	ADWG	0.5 Bq/L	Recommended ‘screening’ level.
Potassium K40	ADWG		Refer to ADWG for dose response criteria. These guidelines have low applicability to current situation.
Radium Ra 228, Ra226	ADWG		
Radon Ra 222	ADWG		
Lead Pb-210	ADWG		
Polonium Pb-210	ADWG		
Phenolic Compounds			

Water Quality Parameter	Available Guideline	Guideline Level	Comments
Phenol	ANZECC	320 µg/L	Aquatic ecosystems, moderate reliability, 95% protection
2,4-dimethylphenol	ANZECC	2 µg/L	Aquatic ecosystems, low reliability, 95% protection
Aromatic Hydrocarbons			
Napthalene	ANZECC	16 µg/L	Aquatic ecosystems, moderate reliability, 95% protection
Anthracene	ANZECC	0.4 µg/L	Aquatic ecosystems, low reliability, 95% protection
Phenanthrene	ANZECC	2 µg/L	Aquatic ecosystems, low reliability, 95% protection
Fluoranthene	ANZECC	1.4 µg/L	Aquatic ecosystems, low reliability, 95% protection
Benzo(a)pyrene	ANZECC	0.2 µg/L	Aquatic ecosystems, low reliability, 95% protection
Benzene	ANZECC	950 µg/L	Aquatic ecosystems, low reliability, 95% protection
Toluene	ANZECC	180 µg/L	Aquatic ecosystems, low reliability, 95% protection
Total petroleum hydrocarbons	ANZECC	700 µg/L	Aquatic ecosystems, low reliability
Treating Chemicals			
Unknown	-		Any chemicals utilised in the extraction or treatment of the CSG water to treat or prevent operational problems
Other Properties			
Electrical Conductivity	QWQG	492 µS/cm	75 th percentile, Condamine-Macintyre River Basin
	QWQG	325 µS/cm	75 th percentile, Maranoa-Balonne-Border Rivers Basin
	QWQG	169 µS/cm	75 th percentile, Western Murray Darling Basin
Total Dissolved Solids	-		
Total Suspended Solids	QWQG	6 mg/L	Lowland streams
	QWQG	6 mg/L	Upland streams
	QWQG	nd	Freshwater lakes/ reservoirs
	QWQG	nd	Wetlands
Total Organic Carbon	-		
Total Nitrogen	ANZECC	lowland 500 µg/L	Aquatic ecosystems, 95% protection
		upland 250 µg/L	
Dissolved Oxygen	ANZECC	lowland 85-100%	Aquatic ecosystems, 95% protection
		upland 90-110% sat	

Water Quality Parameter	Available Guideline	Guideline Level	Comments
pH	ANZECC	lowland 6.5-8 upland 6.5-7.5	Aquatic ecosystems, 95% protection
Temperature	ANZECC	20 th -80 th percentile	Aquatic ecosystems, 95% protection

Question 12- Details of any of the following that DERM is aware of occurring during the period 1 October 2010 and 23 August 2011 relating to the discharge of water from any mine site.

ID number	Non-compliance/Incident - Title	Non Compliance /Incident Date (approx.)	Environmental Authority/ TEP number	Project Name	Name of operator (at time of non-compliance)	Adverse Effect					Additional Comments
						Drinking Water	Any plant or animal species	Any Industry or Agriculture	On the environm	On public health	
1	Accidental Discharge of Pit water	8-Jul-11	MIN1005551907	New Oakleigh	New Hope - New Oakleigh	Nil	Nil	Nil	Nil	Nil	Investigation ongoing
1	1	16-17/10/2010: Discharge from sed dam 1	MIN100395406	Commodore Coal Mine	Downer EDI/ Millmerran Power Partners				no evidence of harm		Discharged water to Back Creek from Sed dam 1 exceeded the EA Total Suspended Solids limits
2	2	26/12/2010: Discharge from sed dam 1	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		TEP Program notice submitted at this time and accepted by DERM
3	3	03/01/2011: Discharge from sed dam 2, A pit and Env Dam 1	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
4	4	04/02/2011: Discharge from Sed dam 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
5	5	06/01/2011: Discharge from Sed dam 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
6	6	07/01/2011: Discharge from Sed dam 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
7	7	08/01/2011: Discharge from Sed dam 2 and A pit	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
8	8	09/01/2011: Discharge from Sed dam 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
9	9	10/01/2011: Discharge from Sed dam 2 and A pit	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
10	10	11/01/2011: Discharge from sed dam 1 & 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
11	11	19/01/2011: Discharge from Env Dam 1 & Sed Dam 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
12	12	20/01/2011: Discharge from Env Dam 1 & Sed Dam 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
13	13	21/10/2011: Discharge from Env Dam 1 & Sed Dam 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids

14	14	22/01/2011: Discharge from Env Dam 1 & Sed Dam 2	MIN100395406	Commodore Coal Mine	Downer EDI/Millmerran Power Partners				no evidence of harm		Discharge water to Back Creek exceeded the EA limits for Total Suspended Solids
15	15	26-27/06/2011: Discharge from A pit to Wilkie Creek	MIN100580907	Wilkie Creek Coal Mine	Peabody (Wilkie Creek) Pty Limited				no evidence of harm		Discharge water to Wilkie Creek exceeded the EA limits for Total Suspended Solids. BN is recommending a PIN
16	16	13/07/2011: Monitoring of EC and Oil and Grease not conducted in accordance with EA conditions	MIN100580907	Wilkie Creek Coal Mine	Peabody (Wilkie Creek) Pty Limited				no evidence of harm		Warning notice will be issued when final decision on PIN is returned
17	17	16/05/2011: Failure to notify commencement of discharge under TEP	TEP- MAN12619	Wilkie Creek Coal Mine	Peabody (Wilkie Creek) Pty Limited				no evidence of harm		
18	18	19/01/2011: Discharge from A pit to Wilkie Creek	MIN100580907	Wilkie Creek Coal Mine	Peabody (Wilkie Creek) Pty Limited				no evidence of harm		Discharge water exceeded the EA limits for Total suspended solids
19	19	20/12/2010: Discharge from sed dam 2 to Lagoon Creek	MIN10050507	New Acland Coal Mine	New Acland Coal Pty Ltd				no evidence of harm		Evidence provided appears to support that no environmental harm was caused due to the release of water which was above the EA limit for total suspended solids
20	20	15-18/10/2010: Discharge of water from sed dam 3 to Lagoon Creek	MIN10050507	New Acland Coal Mine	New Acland Coal Pty Ltd				no evidence of harm		Evidence provided appears to support that no environmental harm was caused due to the release of water which was above the EA limit for total suspended solids
21	21	09/03/2011: Discharge of water from sed dam 3 to Lagoon Creek	MIN10050507	New Acland Coal Mine	New Acland Coal Pty Ltd				no evidence of harm		Warning notice issued for non compliance with EA release limits for EC
22	22	01/12/2010-01/02/2011: Waning Notice - non-compliance of Environmental Authority conditions	MIN100568007	Cameby Downs Coal Mine	Syntech Resources				no evidence of harm		exceedences and not making notification of exceedences of EA conditions for pH, TDS, and TSS
23	23	11/01/2011: Release of mine water at Kogan Creek Coal Mine	MIN100878709 / MAN11459	Kogan Creek Coal Mine	Aberdare Collieries Pty Ltd				no evidence of harm		TEP allowed the release of mine affected water above current EA release limits as a result of receiving major rainfall events leading to local and regional flooding.
24	24	24/01/2011: Release of mine water from Texas Silver Mine	MIM800395806	Texas Silver Mine	Texas Silver Mines Pty Ltd				no evidence of harm		Release of water from the Stormwater Dam (which had partially filled due to overflow of Barren Ponds) to allow construction and lining of dam to be completed.
25	CR50739: Fairview/Roma/ Arcadia	24/01/2011	Multiple	Multiple	Santos						Discharge: TEP - Refused 2/2/11. Proposal to discharge from 100 associated water dams into flood flows to maintain storage capacity for future water management

26	CR51018/MAN1 2439: Mt Kingsley/Arcadia	7/09/2010	PEN200039307/P EN200361209	ATP635P & PL235	Santos			under assessment. 50x50m exclusion of cattle		Discharge: TEP - Approved 21/3/11. Proposal to undertake assessment as to the reasons behind overtopping of mud and water dams at three sites in November 2010. Reports submitted 29 April 11. DERM response issued 17 May 11. Further TEP objective reports submitted 30 June 2011. DERM response issued 5 July 11. 29 Jul 11 - TEP objective report submitted. 4 Aug 11 - Compliance inspection conducted. Final report to be submitted by 20/8/11. Met with landholder Chris & David Benn. 24 Aug 11 - Further site inspection undertaken to confirm compliance with TEP. Assessing final report.
27	CR51096: Fairview	21/03/2011	PEN100178208	Fairview 129	Santos				no evidence of harm	Spills: FV 129 - 85,000L spill of associated water from coal seam gas well pump failure, in Hallet state forest. A spill of 85,000L of associated water was release to land (Hallet State Forest). Santos have advised that release was authorised by TEP (MAN10839). DERM samples indicate elevated levels of contaminants compared to background. DERM is of the view that this incident is not authorised by TEP (MAN10839). On 30 May 11, DERM issued Santos with a letter requesting Santos amend TEP. On 1 June 11, Santos advised that "they do not see it necessary to amend the TEP" as the FV129 has been identified as a lease requiring corrective action, which will be achieved as part of the TEP objectives. DERM is satisfied that Santos with proposed corrective actions and rehabilitation. On 11 July 11, DERM issued Santos with a letter advising that failing to amend the TEP will result in Santos still being liable for enforcement action at this site. DERM will inspect the site as part of the 2011/12 Annual Compliance Plan to ensure TEP objectives are met but will take no further enforcement action at this time. Nio further a
28	CR51317/MAN1 2700: Scotia	16/03/2011	PEN100046407	PL176	Santos					Discharge: TEP - Approved 28 April 2011. Amendment approved - 5 JUL 11. Proposal to discharge from site dam to avoid overtopping. Santos submitted an amendment to the current TEP as the contractor has not been able to supply an RO Plant within the required timeframe. No significant change to the objectives of the original TEP, other than extending the timeframe by 4 months to allow commissioning of the RO plant. First milestone in TEP: RO Plant to be commissioned on 8 SEP 11. 3 Aug 11 - TEP compliance inspection conducted. Santos appears to be progressing well in planning to manage the high salinity dam. Needs further inspections as possible to ensure company stays on track.
29	CR51400: Fairview	24/03/2011	PEN100178208	Adjacent to Fairview 163	Santos				no evidence of harm	Spills: FV163 - Truck Spill - Approximately 28000 litres of associated water was released The truck was bogged and tipping to one side so the operator assessed the situation and realising the safety concern decided to release the water to grade. Santos advised that no Environmental harm is expected as the water was approximately 2000 µs/cm to 3000 µs/cm and was localised. Santos conducted hand sampling of the water after the incident. The road was repaired to ensure that no other vehicles were bogged in the same area. Drivers were notified of soft edges and avoid getting close to the edges. No further action taken. Close out letter sent 11/7/11

30	CR51400: Fairview	24/03/2011	PEN100178208	Fairview 163	Santos					no evidence of harm	Discharge: FV163 - Cavitation sump failed and released to Hutton Creek. Approximately 81000 litres of associated water was released from the sump and a 450mm tunnel through the wall of the sump. Water from this spill potentially reached Hutton Creek. Water quality was reported at approximately 2000µs/cm. On 20 May 11, Santos lodged monitoring results but have failed to provide interpretation or outcomes of action taken, in accordance with EA conditions. On 23 May 11, DERM informally requested this information but was not provided until 7 June 11. DERM has reviewed monitoring results and EC levels of the water pooled outside of the sump are not extreme (1090uS/cm) and there is no significant difference in water quality between upstream and downstream at Hutton Creek. DERM issued a Warning Notice for failing to comply with notification conditions (11/7/11) and will issue a PIN for breach of discharge conditions. Show cause and updated Incident Alert has been prepared prior to issuing PIN and is being reviewed. 29 Aug 11 - Show cause notice issued to Santos. PIN briefing Note drafted for approval.
31	CR50532: Daandine	13/01/2011	PEN100070507	PL230	Arrow	reports to Condamine river. High quality discharge					TEP MAN11540 Approved 18/1/11 Expired 28/2/11. Final report submitted on 21/04/2011. Discharge of RO permeate to flood flows – Wilkie Ck
32	CR51207/MAN1 2639: Daandine	15/02/2011	PEN100449509	PL230	Arrow						Discharge: Draft TEP submitted. Request for further information sent – response due 7 March. Response received from Arrow on 11 March. Assessment completed but not yet granted as Arrow requested DERM extends its decision making period to allow Arrow time to comply with requests from OWSR. s555 notice to extend decision making period issued on 1 April 2011. New decision date is 30 April 2011. Second extension to decision date as requested by Arrow. New decision date is 17 May 2011. Third extension granted - new decision date is 16 June 2011. No approval was given before 16 June 2011 meaning that the TEP is considered refused. No further action required.
33	CR51431: Tipton	15/02/2011	PEN100449509	PL198	Arrow					no evidence of harm	Spills: Oil/Water Dam. Further information requested due 31 March 2011. Time extended to 29 April 2011. 3 May : Arrow verbally advised that a formal report will be submitted by end of week. Any changes to the operation of the oil water dam must consider the DXP approval which is currently in a review process by DERM. It is anticipated that a new dam will be constructed and the bunding which trapped water during the Jan flood period will be removed during construction of the new dam. 27/5 Arrow reminded that final report has not been submitted and expectation is that this should be finalised. Letter received from Arrow 6/6 indicating that bunding had been removed. LN spoke with Graham Cordingley regarding size of pond. Graham to investigate further re this matter. Letter sent on 16 June requesting additional information on the oily water dam, focus on undersized capacity and poor management practices. Report is due 31 July 2011. Received on 2 August 2011. All questions raised in the initial DERM letter have now been answered. Arrow intend to upgrade the management of the d

34	CR51424: Tipton	15/02/2011	PEN100449509	PL198	Arrow				no evidence of harm	Spill: HCl spill. Further information requested due 31 March 2011. Time extended to 29 April 2011. 3 May; Arrow verbally advised formal report will be submitted by end of week. A consultant is currently undertaking a flood study which will be used to identify future chem storage sites. In the interim, chemical storage at the Tipton RO site has been relocated to higher ground at the Daandine ROP plant. 27/5 Arrow reminded that final report has not been submitted and expectation is that this should be finalised.
35	CR51240: Tipton	28/03/2011	PEN100449509	PL198	Arrow				no evidence of harm	Spill: Spill of approximately 25,800L of CSG associated water from Tipton Production Water Pipeline. Incident alert prepared. Further information received. Warning notice and PIN may be issued. Additional lab results received - backs up in-situ sampling. Warning notice issued, no further action required.
36	CR52129: Peat	1/01/2011	PEN100389309	Peat Evaporation Pond	APLNG				no evidence of harm	Discharge: TEP - Emergency release during flood events. 15 July 11 - Origin submitted draft TEP for comment. TEP offered little reduction in environmental harm. 29 July 11 - DERM emailed comments to APLNG. 3 Aug 11 - Site inspection conducted at Peat. No further response has been submitted by Origin. Site Inspection report and response letter being reviewed.
37	CR52127: Ramyard	1/01/2011	PEN100395209	Ramyard	APLNG				no evidence of harm	Spills: Origin advised DERM that there may have been minor flooding of dams at their Ramyard Field site. DERM has identified that flooding occurred at Ramyard 4 well lease. Site inspection proposed for July 2011 to investigate compliance with EA conditions. DERM has been trying to organise a site inspection for several months but due to wet weather and the landholder access issues a site inspection has not occurred. DERM requested an inspection in June but due to the landholder not allowing Origin on the site, the inspection was postponed. 3 Aug 11 - DERM conducted site inspection without Origin present at the request of landholder. Contact landholder to discuss concerns before issuing post inspection letter.
38	Denison	1/01/2011	PEN100240608 (previously EA150036)	Denison Evaporation Pond	APLNG					Discharge: TEP - Emergency release during flood events. 15 July 11 - Origin submitted draft TEP for comment. TEP offered little reduction in environmental harm. 29 July 11 - DERM emailed comments to APLNG.
39	CR50981: Lauren 4	9/03/2011	PEN100020207	PL180	QGC				no evidence of harm	Spill: Estimated 800 – 1000L of associated water spilt to ground via flare line on a CSG well, on QGC land. Incident alert prepared. Currently assessing further action and QGC report. Warning letter sent 5 April 2011.
40	CR51025: Glen Eden	13/03/2011	PEN100020207	PL247	QGC				no evidence of harm	Spill: 2000L associated water spilt to land owned by QGC via faulty pump. Incident alert prepared. Warning letter sent 5 April 2011
41	CR51150: Various	10/01/2011	PEN100020207		QGC				no evidence of harm	Spill: Overtopping of 4 trac ponds from incident rainfall. Report received by DERM 31/1/11. Further information requested due 25 March 2011. Received, no further action required. Letter sent to QGC on 19 April 2011 detailing breach of conditions and NFA.
42	CR51279: JenBroadwater Field Gathering System	24/03/2011	PEN100020207	ATP648	QGC				no evidence of harm	Discharge: Incident - Pumping from bell holes to land adjacent to the Moonie Highway. Incident Alert prepared. Letter issued to QGC requesting erosion protection measures be out in place. Written response from QGC received on 29 March 2011 outlining remedial actions taken. Louisa drove past site on 30 March 2011, verified that stormwater exclusion measures will in place.

43	CR51360: Taloona	22/04/2011	PEN100070307	Taloona Gas Plant	APLNG				no evidence of harm	Spills: Over 200L of emulsion and water from the oily water separator was released due to a pump failure at Taloona. Further enforcement action considered once sample results received; however, unlikely to result in further action. On 27 May 11, DERM issued APLNG a Warning Notice for not meeting notification conditions. On 3 June 11, APLNG submitted an incident report and water and soil sample analysis. Metals were above NEPM Investigation levels, so APLNG has indicated that further sampling will be undertaken and submitted to DERM once available. DERM is satisfied with the response and corrective measures. Follow up background monitoring results have been received 11/7/11 with further report to follow from APLNG
44	CR51373: Talinga Gas Plant	29/04/2011	PEN100067807	PL226	APLNG	high quality discharge			minimal env impact	Exceedance of Release limits: Results of monitoring conducted on 12/04/2011 for Talinga RO permeate releases to the condamine river showed exceedances for two parameters. Incident Report identifies analysis methodologies and an unidentified plant issue resulting in a decline in plant performance, as the cause of the exceedances. Warning Notice issued 27-May-11 for not meeting notification conditions. Water Sciences advised minimal impact to Environmental Values. On 25-May-11, issued letter requesting further monitoring data and results of investigations. On 30 June 11, APLNG held a meeting with DERM to resolve the matter. APLNG advised that they would amend EA to address the matter. 13/7/11 - Emailed APLNG to advise a timeframe for lodgement. 18/7/11 - DERM have given APLNG until 29/7/11 to lodge amendment application. 1 Aug 11 - APLNG have requested an administrative amendment to Sulphate limits in EA. P&G Unit considering application.
45	CR51394: Fairview	30/04/2011	PEN100178208	Fairview 186	Santos				no evidence of harm	Spills: FV186 - Approximately 500,000L of rain water, potentially mixed with cavitation water, was released to ground from two Turkey's Nest dams. Santos stated to DERM that no water has reached Hutton Creek, however Santos are undertaking both upstream and downstream monitoring when weather permits. On 26 May 11, Santos submitted monitoring results and a report on the incident. DERM has reviewed the investigation report and there is no evidence to suggest surrounding waters have been impacted. Preparing a PIN for breach of EA condition, Show cause and updated incident alert will be prepared prior to issuing PIN. 5 Aug 11 - Compliance inspection conducted. No visible adverse effects on impacted soil and vegetation. 29 Aug 11 - Show cause notice issued to Santos. PIN briefing Note drafted for approval.

46	CR51530: Daandine #80 Well	22/05/2011	PEN100449509	PL230	Arrow					potential low level salt issue	no enduring harm.	Spills: Lot 122 SP204689. During routine operations to install pump on well, the well unexpectedly kicked in causing an uncontrolled release of CSG and CSG water to flow. From the time the incident occurred at 8:15am 22/5/11, the well flowed uncontrollably. Approx 400L/min of CSG water may have been released during the event. The discharge occurred on a well pad and was located adjacent to a paddock sown with Rhodes grass. The Pollution Hotline was notified at 5:30pm 22/5. Written notification was sent to Louisa nicolson 8:33am 23/5. Arrow activated their Emergency Response Unit and commenced plans to cap the well and stop the flow. A number of initial attempts to cap the well failed. The well was closed at 11:35am 23/5 by placement of a dense KCl/Water solution and the installation of a check valve which allowed the well to be closed. ES staff attended the site at 11:15am 23/5 and collected soil and wate samples. In-situ monitoring of pooled water was undertaken by Arrow on 23/5 pm and submitted to DERM. Arrow collected soil and water samples. 2:30pm DERM directed Arrow to install bundir
47	CR51539: Fairview	22/05/2011	PEN100178208	Fairview #77	Santos						under investigati on	Discharge: Santos lodged Program Notice regarding holes in sump liner - potential environmental harm. Refused prog notice. On 30 May 11, DERM issued refusal of Program Notice because 'act or omission' had not yet occurred. On 30 May 2011, letter issued to Santos requesting dam be decommissioned in accordance with EA conditions.
48	CR51549: Pipeline WO3	24/05/2011	PEN100020207	PL247	QGC						no evidence of harm	Spills: Spill of approx 500 L of assoc water from pipeline. Spoke with Brad Kitchen. Incident happened along WO3 pipeline at a point close to the Condamine Power Station end. A breather valve on pipe was blocked (maybe some HDPE) and caused a flow of water to be forced out at pressure through the blocked valve. No ponding or runoff was identified. Workers noticed the leak and isolated the pipeline straight away. Valve has been replaced. incident occurred on QGC land. A wet patch of ground was noted under the pipeline. Rain has fallen on-site since incident. Written report was received on 7 June 2011. Close out letter senton 7 June 2011. Letter requested QGC communicate any final outcomes following internal review of the design of high point breather valves.
49	CR51616: Lauren 48	6/06/2011	PEN100020207	PL180	QGC						no evidence of harm	Spills: Spill of approximately 2,000L of associated water when the braided line b/w the well head and the separator split with a small hole. The water was contained to the well pad. Spoke to Brad Kitchen. Line has since been replaced and testing of the water from the well has been undertaken. Preliminary tests indicate a TDS of 2100mg/L and a pH of 6.2. The release limits of water to roads for dust suppression are between 6 and 8.5 pH and <2000mg/L. Minimal impacts are expected. QGC will send in updated report within 14 days. Information received on 30/6 (dated 17/6) concerning this incident. Recommend no further action due to quality of the water.

50	CR51699: Kogan North	20/06/2011		PL194	Arrow				no evidence of harm	Spills: Contacted Kate Jackson of Arrow regarding the spill. Faulty rubber valve is to blame. Observed at approx 7pm on 20 June 2011, valve replaced that night. Additional observations on 21 June indicated about 20KL associated water was released. Pooling in a nearby gully - this water to be pumped out into water trucks. Initial testing indicates EC of 7.89mS/cm. Incident notification completed. Letter sent to Graham Cordingley (Arrow) requesting info. Arrow's Report should be completed by 22 July 2011. Discussions with Graham on 12 July revealed that all information has been collated and that a report will be forthcoming before the due date. The statement that water had been released during repairs was not accurate. The pipeline was backtracked to the nearest well where it was emptied into an existing flarepit. The water was then able to be removed from the pit. Repairs were undertaken on the valve and no additional water was released from this point. Photos will be supplied by Arrow in the final report. Report received on 22 July 2011. Letter sent to Arrow on 1 August stating no further action req
51	CR49728: Fairview	18/06/2011	PEN100178208	Fairview 179	Santos					Discharge: FV 179 - Approx., 52,000L of CSG water, with an electrical conductivity of approx 2700µS/cm and a pH 8.7, overflowed from the water transfer tank on FV179. DERM has approved a Transitional Environmental Program (TEP) MAN10839, authorising the release of water from this well (see attached TEP – Certificate of Approval). It should be noted that DERM has issued a new environmental authority on 2 June 2011, for the Fairview Project Area, which does not correlate with the conditions mentioned in the certificate of approval. An increase in pressure within the water gathering system prevented the transfer pump operating and allowed water to accumulate within the tank. The tank discharged via the emergency overflow discharge line. The release was to ground directly adjacent to the cleared CSG Well lease. Vegetation in the area consists of sparse scrubby buffel grass. The release appeared to cause some minor water logging. However, the CSG water did not appear to reach the closest waterway (approximately 300m east of the incident area.) Operator first discovered the incident Sunday
52	CR51677: Hopeland #1	14/06/2011	PEN100052007	ATP676	Arrow				no evidence of harm	Spill: Minor spill, primarily gas, resulted during drilling works at this exploratory well. The small amount of water that was spilled was captured in the nearby flare pit. Primarily a safety issue - DEEDI. Minimal if any environmental impact. No further action required from DERM.
53	CA23064: Daandine	17/06/2011	PEN100449590	PL230	Arrow			high quality discharge		Discharge: TEP MAN13080 for release of 8ML/day to Wilkie Creek in order to meet DSA reporting levels by November 1 2011. Information request issued on 29 June 2011. The new application date (and due date for request) was been agreed upon with Arrow to be 18 July 2011. An inspection of the East Theten BUA site on Wednesday indicated significant progress. TEP may not be warranted but this will depend on timeframes for completion of works at Theten and pumping limit of 10ML/day to the Theten site. Info request provided on 18 July, decision to be made based on what has been received. Extension provided to 19 August for decision. Decision to approve the TEP subject to conditions.

54	CR51829: Talinga	7/07/2011	PEN100067807	Talinga Gathering System (Lot 7 on SP109131)	APLNG					Spills: Origin have advised that due to the flooding of a separator a low point drain has released 500 litres of associated water to land. Initial field measurements indicate that the water has a pH 8.8 and an electrical conductivity on 3570µS/cm. The EA authorises the extraction of associated water from low point drains; however, it must meet release limits, including electrical conductivity 2000µS/cm (Maximum) and a pH 6.5 – 8.5 (range). Water was contained within an area 18 square metres. Origin believes that the incident occurred within or near the boundary of PL226. Origin has shut in the well and adjusted level control to stop any more spills. DERM has required Origin submit further information in accordance with EA conditions, which has been supplied by origin 11/7/11. DERM is proposing to conduct an investigation commencing with a site inspection. 13/7/11- Emailed APLNG to provide monitoring and operational plans for low point drains. Further written notice required by 22 July 11. 28 Jul 11 - Site inspection conducted of LPD discharges. APLNG advised that they were finalising report. 1
55	CR51831: Talinga	8/07/2011	PEN100067807	Talinga Water Treatment Facility	APLNG	minor exceedence of high quality discharge				Exceedance of Release Limits: Brad O'Reiley of Origin advised that the on-site monitoring results of the Reverse Osmosis permeate from the Talinga Wastewater Treatment Plant (WTF) was outside Environmental Authority (EA) release limits for chloride. The EA states that the chloride concentration of the discharge from the Talinga WTF must be within 22-120 mg/L. The actual chloride concentration measured at the facility was 136 mg/L. Origin has advised that the plant has ceased discharging to the Condamine River and will not resume discharging until the chloride exceedence issue has been resolved. Under Investigation. UPDATE: Origin advised that the likely cause of the Chloride exceedence was due to a membrane failure. Full report due 13/7/11. 18/7/11 - APLNG have advised RO membranes will be replaced. 28 Jul 11 - Site inspection conducted. APLNG advised that membrane installation had been delayed until 6 Aug 11. 1 Aug 11 - Letter issued to APLNG requesting status update of corrective measures by 13 Aug 11.
56	CR51844: McNulty	6/07/2011		ATP676 McNulty Pond, Lot 67 on BWR96	QGC					Discharge: 6/7/11 - During a site inspection (for a different matter) Ryan Wagner was asked to view a QGC pond which has a torn lining. Ryan viewed one large tear in the lining and three smaller holes near the bottom of the pond. The water level was lower than the tears and no water was discharging through the lining during the inspection. The western dam wall was affected by significant erosion issues. The landholder (MR Ian Kerr, 4689191, 0429 658 188) was not present during the inspection - he had asked a third party to show Ryan the pond on his behalf. Photos of the lining and erosion were taken, they are stored in the electronic file. 11/7/11 - Contacted Brad Kitchen (Ph 3024 7889). QGC has recently attended the site at the request of Mr Kerr and viewed the pond. The torn lining was noted. QGC do not know when the lining was torn and if any water had discharged through the tears. The pond is old and contains associated water mainly from exploration and appraisal works. A water tanker was used to pump water from the pond to allow repairs to the lining. Enough water was retained

57	CR51748: Codie	27/06/2011	PEN100020207	Codie 2 Well, Lauren Gathering System, Lot 15 RG36	QGC				no evidence of harm	Spills: Approx 1000L of associated water released on to the ROW from the Lauren gathering system. The water was contained in the pipeline after being isolated in the system due to the failure to remove the cap from a high point valve during construction. The isolated water was released on to the ROW while the valve cap was being removed. Codie #2 well water has been previously sampled - pH 8.2 and TDS 2500mg/L. The spill occurred on QGC property. Weather at time of incident was fine. QGC assessment is that no significant env harm has occurred. Written notification received on 11 July 2011. Close out letter to be sent.
58	CR51735: Cam	27/06/2011	PEN100020207	Cam #1 Well, PLA277 Lot 56 on FT264	QGC				no evidence of harm	Spills: Discharge of approx 11,200L of associated water via flare line and pressure safety valve on to well pad. Incident caused by coal fines blocking the metering system on the separator. Spill appears to have been contained to lease pad, where water ponded. Weather conditions at time of incident were fine. Landholders were notified. Remote monitoring of well assisted in prompt identification and action by QGC to address the incident. QGC notified pollution hotline on 27 June. Incident alert prepared 27/6 and updated 28/6. DERM contacted QGC on 28 June 2011. Written report submitted to DERM on 11 July 2011. QGC advise that meter unit was replaced with larger unit and blockage removed. Close out letter to be sent. ES spoke with landholder who advised that he was informed of incident and had no concerns.
59	CR51937: Spring Gully	16/07/2011	PEN100070307	Strathblane Gas Plant	APLNG				no evidence of harm	Spills: Due to a pipeline collar weld failure at the Spring Gully production water pipeline tie-in point, associated water was released to land. Based on an estimated discharge rate of 90-100L/hour once the pipe was exposed, it is estimated approx 3300 litres of production water leaked from the pipeline. Approximately 1/3 of this water has been recovered from the open bell hole. It is believed the discharge commenced on the 14 July 11. However, Origin operations staff only identified the discharge at approximately 8:00am on the 16 July 2011 during routine maintenance duties. The pipeline is located 1.5m below ground. The leak saturated the surrounding soil and eventually reached the surface and seeped to the shoulder drain of the unsealed access track where it was absorbed into the soil within 25m. The discharge was contained to the access track and drain. Since the leak was identified, water collecting in the open excavation has been removed by sucker truck. The pipeline is likely to take several days to repair. APLNG have advised that there was no evidence of any immediate environmental c
60	CR51976: Kenya	25/07/2011	PEN100020207	Between Turners pond and Kenya Well 124	QGC				no evidence of harm	Spills: Contractor delivering water to Kenya Well #124 from Turners pond failed to disconnect pipe from the dam to the truck. Contractor drove away from the dam, tearing the pipe from the dam connection and travelled several kms with CSG water discharging from truck via pipe. CSG water was spilt to land on QGC property and along Van Renans Road. Incident occurred late at night. Approximately 10,000L (1/2 of truck load) was discharged. This value was increased to approx 12,000L in subsequent notification. Truck travelled for approx 6.5kms while associated water was discharged. TDS levels between 2800 - 3000ppm (4375 - 4688 uS/cm). Upon inspection next morning, QGC could not identify any areas where water had left road where it was spilt. Further info regarding water quality is to be provided to DERM. Written notification from QGC was provided on 9 Aug 2011. Letter 18/8 - DERM NFA action required

61	CR52063: Daandine	6/08/2011	PEN100449509	Kumbarilla Lane	Arrow				no evidence of harm	<p>personnel observed water on the ground surface which was flowing from a ruptured HDPE pipe weld located approx 2m below ground surface. Prior to this, treated water (RO permeate) had been introduced to the pipeline in preparation for pressure testing. Pressure testing was not undertaken prior to the spill being observed. The pipeline transfers water from the Daandine Treated Water Dam to the Theten Irrigation Dam. Arrow field staff initially reported (internally) that the 2500L of permeate discharged. Consequently, Arrow did not notify DERM (in accordance with Condition K3). Water flowed from the Arrow landholding on to Kumbarilla Lane and then to a neighbouring property. A DERM employee observed the incident and reported that a significant amount of water was bubbling to the surface and travelling along Kumbarilla Lane and on to an adjacent property. 8 Aug 11: Arrow contacted Env Services - SW to advise that an incident had occurred on Sat and that it did not trigger notification requirements. Later on the same day, Arrow management identified that the discharge was much la</p>
62	CR51360: Spring Gully - Talooa	22/04/2011	PEN100070307	PL195	APLNG					<p>Spills: On 22nd of April 2011, the humeceptor (an oil separation unit) at the Talooa Gas Plant had overtopped. Hydrocarbon contaminated water was observed for 200 m. The volume of the hydrocarbon emulsion released was estimated ~50-100L. 29 Apr 2011: DERM Requested photos and further information on spill. 3 May 2011: Received photos and further information on spill. 18 May 2011: received interim update on spill with the sampling results and summary report from APLNG. 3 Jun 2011: received report with the corrective actions from APLNG. Remediation by APLNG involved the removal of oil contaminated material, deployment of hale bales and application of a commercial bioremediation treatment to the affected soils for a period of 4 weeks. 5 Aug 2011: received final close out report from APLNG. 24 Aug 2011: DERM reviewed all the results and reports and sent letter to APLNG requesting further sampling should carried out before 22 October 2011. continuing investigation</p>
63	CR52122: Fairview - Strathblane between Injune & Taroom	17/08/2011	PEN200911210	Spring Gully	APLNG					<p>Spills: 20 000 litres of associated water spilt, with an area size of 10m x 150 m. Release was due to a weld break on a steel pipe, the pipe was 10 years old and had not been wrapped in geo mesh this would have prevented it from corroding. Spill occurred on land owned by Origin. Water is understood to have been contained, by erosion barriers. The spill was stopped 100m away from a local creek. The pipeline will be fixed and is non- operation until then . A field water sample has been taken and results indicate Ph was 8.3 and EC is 8081uS/cm. Soil Samples of the effected area have been taken; pending these results in 2 weeks Origin will undertake rehabilitation once results are received. Origin to undertake rehabilitation pending soil test in 2 weeks</p>
64	East Evaporation Pond Discharge	3-Dec-10	MIN101352510	Thalanga Mine	Kagara Copper Pty Ltd				X	<p>Discharges intermittent Dec-Jan. Attachments: EEP Discharge - 3 December 2010.pdf; EEP Discharge - Dec 2010 Monitoring Results.pdf; EEP Discharge - Reason and Results - 27 Jan 2011; EEP Discharge - KCPL Letter - 10 Dec 2010.pdf; EEP Discharge - DERM Results - 6 Dec 2010.pdf</p>

65	East Evaporation Pond Discharge	3-Feb-11	MIN101352510	Thalanga Mine	Kagara Copper Pty Ltd				X		Ceased 10/03/10. Attachment: EEP Discharge - February Recommencement - 7 Feb 2011.pdf; EEP Discharge - Feb-March 2011 - Results 2.pdf.
66	East Evaporation Pond Discharge	12-Mar-11	MIN101352510	Thalanga Mine	Kagara Copper Pty Ltd				X		Ceased 15/03/10. Attachment: EEP Discharge - Quality of Discharges - 12 March 2011.pdf; EEP Discharge - Feb-March 2011 - Results 1.pdf; EEP Discharge - Feb-March 2011 - Results 2; EEP Discharge - Cease of Discharge - 1 March 2011.
67	Abandoned Mine Discharge	22-Mar-10	Not applicable	Mount Oxide Mine	Queensland Government - Queensland Mines and Energy (as part of the Department of Employment, Economic Development and Innovation)	X	X				Compliance Inspection Report attached.
68	Abandoned Mine Discharge	1-Mar-11	Not applicable	Mount Oxide Mine	Queensland Government - Queensland Mines and Energy (as part of the Department of Employment, Economic Development and Innovation)		X				Copper exceeded livestock drinking water guidelines. Briefing note 89 attached.
69	Balcooma/Surveyor waste rock dump - seepage interception dam discharge	21-Jan-11 & 1-Mar-11	M2128	Mt Garnet	Kagara Ltd		X	X	X		Attachments include notification of incident, statutory document (EPO) and some water quality information.
70	Discharge from Main Dam	23-Dec-10	MIN100380305	Wolfram Camp	Wolfram Camp Mining Pty Ltd	X	X	X	X	X	Attachments include notification of incident, statutory document (EE) and some water quality information.
71	Mount Watson surface water	Jan-11 & Feb-11	MIN100548707	Leichhardt Operation	Cape Lambert Leichhardt Pty Ltd		X	X	X		Attachment of non-compliance notification.
72	NC / South WRD Seep	16-Mar-11	MIN100610207	Mungana	Mungana Pty Ltd		X				Note: EA compliance sites were below limits. Selenium above stock water limits at wetland release point (WS Wetland DS). Release has ceased. DERM to decide enforcement. Environmental investigation revealed no impact on environment. (attachment - water quality data provided). Adverse effect on cattle.
73	NC / Page Creek release	15-Mar-11	MIN100737008	Century Mine	MMG Century Ltd		X				EC levels exceed EA limits (attached is MMG notification). Adverse effect on fish. Currently under investigation for adverse impacts.

74	Sulphuric Acid Spill Incident	8-Feb-11	MIN100703108	Phosphate Hill	Incitec Pivot Ltd	X	X		X		Copy of EE attached; Water quality analysis results attached.
75	Non-compliance with Receiving Water Quality Limits - Railway Creek	Jan-10	MIN100703108	Phosphate Hill	Incitec Pivot Ltd	X	X		X		Notification from EA holder attached; Water quality analysis results attached
76	Discharge of stormwater in Feb 2009	10-Feb-09	MIN100476406	Great Australia Mine	Tennant Limited	X					The discharge occurred during flooding. Pollutants were quickly diluted. 3 Inspection Reports attached (16,19 & 27/02/09). 1 event summary attached. EE (STAT453) attached.
77	Pipe burst caused discharge of acidic water	18-May-09	MIN100476406	Great Australia Mine	Tennant Limited	X	X		X	X	Council issued warning notice on 19/05/2009; Vegetation dieback and fish kill observed. 2 Inspection reports (19 & 20/05/09) attached. 2 clean up notices attached (STAT464 and STAT 500)
78	Eloise Mar 2009 release	25-Mar-09	MIN100548607	Eloise Copper Mine	FMR Investments Pty Ltd						Investigation was required by DERM as ecosystem trigger limit for sulphate was exceeded, no action from Eloise was noted. This issue is part of the reason that an EE (STAT 625) was issued. Sampling inspection running sheet and results attached.
79	Overflow of seepage sump to Scrubby Creek	13-Mar-11	MIN100548607	Eloise Copper Mine	FMR Investments Pty Ltd	X					The site has a on going record of exceedances of ANZECC stock drinking limits (mainly Sulphate). An EE (STAT 625) was issued on 7/6/2009 in response. Notification attached. EE (STAT625) attached.
80	Carpentaria Gold non-compliance with Environmental Authority condition for release of contaminants to waters	Nov-10	MIN100882509 (formerly MIM800075702)	Ravenswood	Carpentaria Gold Pty Ltd		X	X	X		Non-compliance was detected as a result of a DERM compliance inspection carried out during November 2010. Results indicate that contaminants were detected at levels exceeding Environmental Authority limits and relevant guideline values. Compliance inspection plan and report attached.
81	Release into Mill Creek Dam	29-Jan-11	MIN100489906	Birla-Mt Gordon	Birla Mt Gordon Pty Ltd						
82	Upper Esperanza Dam Discharge	18-Mar-11	MIN100489906	Birla-Mt Gordon	Birla Mt Gordon Pty Ltd						Attachment
83	Sampling undertaken by DERM of water from on site storages seen to be discharging to the receiving environment.	4-Apr-11 to 5-Apr-11	MIM800046302	Kidston Gold Mine	Kidston Gold Mines Ltd				X		Receiving water contaminant levels exceeded for EC, sulphate, Cd, Zn, Cu for the various storages

84	Mount Moss receiving water contamination detected in April 2011 compliance inspection	Apr-11	MIN102513411 (formerly MIN100501907)	Mount Moss	Mount Moss Mining Pty Ltd		X		X	DERM conducted a compliance inspection of the Mount Moss mine site in April 2011 and undertook water quality sampling. The sampling results showed non compliances with the environmental authority water quality contamination limits. The receiving waters are not known to be associated with drinking water or primary or secondary contact or aesthetic uses. The contaminant levels detected are below ANZECC 2000 livestock drinking water levels. The contaminant levels detected are above ANZECC 2000 95% species protection levels for freshwater aquatic ecosystems (see Attachment 4 of 'Compliance Inspection Plan Report_FA_MtMoss_110411_Final')
85	Big Rush receiving water contamination detected in April 2011 compliance inspection	Apr-11	MIN100881109 (formerly MIM800214803)	Big Rush	Alphadale Pty Ltd		X	X	X	DERM conducted a compliance inspection of the Big Rush mine site in April 2011 and undertook water quality sampling. The sampling results showed non compliances with the environmental authority water quality contamination limits, particularly for Arsenic. The receiving waters are not known to be associated with drinking water or primary or secondary contact or aesthetic uses. The contaminant levels detected are above ANZECC 2000 livestock drinking water levels. The contaminant levels detected are above ANZECC 2000 95% species protection levels for freshwater aquatic ecosystems (see Attachment 3 of 'Big Rush_TSV604_Compliance Inspection Plan & Report_200511_DraftA')
86	Amanda Bell receiving water contamination detected in April 2011 compliance inspection	Apr-11	MIN200872709	Amanda Bell	Golden Ant Mining Pty Ltd		X	X	X	DERM conducted a compliance inspection of the Amanda Bell in April 2011 and undertook water quality sampling. The sampling results showed non compliances with the environmental authority water quality contamination limits, particularly for Arsenic. The receiving waters are not known to be associated with drinking water or primary or secondary contact or aesthetic uses. The contaminant levels detected are above ANZECC 2000 livestock drinking water levels. The contaminant levels detected are above ANZECC 2000 95% species protection levels for freshwater aquatic ecosystems (see Attachment 3 of 'Amanda Bell_TSV573_Compliance Inspection Plan & Report_200511_DraftC')

Department of Environment and Resource Management

Environmental Services - Mining

Central West Region – Proactive Wet-Season Preparation Inspections

Project Outline



Contents

1. Project Scope
2. Priority Sites
3. Resources external to Central West Region
4. Roles/Expectations
5. Project Finalisation
6. Inspection Calendar
7. Travel and Accommodation

Attached Documents

1. Standard Operating Procedures – Proactive Compliance Inspection – B Water
2. Form - Audit Plan – Objectives, Scope & Criteria (Inspection Report Requirement)
3. Form – Compliance Program – Inspection (Inspection Report Requirement)
4. Form – Compliance Program – Audit Report (Inspection Report Requirement)
5. Checklist – Audit Checklist (Inspection Report Requirement)
6. Form – Photo Template (Inspection Report Requirement)
7. Form – Document Register (Inspection Report Requirement)
8. Guideline – Preparation of water management plans for mining
9. Guideline – Guidelines for level C compliance inspections
10. Procedural Guide – How to record Annual Compliance Plan Inspections in EcoTrack
11. EcoTrack Proactive Compliance Guide
12. Procedural Guide – Use of official note books
13. Monitoring and Sampling Manual 2009 - Water

Project Scope

The Water Management Proactive Compliance Program form part of the department's proactive inspection program for Central West Region and is a requirement of the regions wet season preparedness plan. The inspections undertaken by regional officers will form part of the data set required to meet the programs objectives.

Objectives

Principal Objective

1. To identify high risk water management systems in coal mines prior to the commencement of the 2011-12 Wet Season (1 November).

Focus

1. To identify the wet season storage capacity at each Priority Site.
2. To identify any potential water contamination issues at each Priority Site.
3. To identify the quality of water contained on each Priority Site.
4. To identify the water management contingencies for the next wet season at each Priority Site.
5. To identify infrastructure upgrades that have been undertaken at each Priority Site over the previous 12 months.
6. To identify potential non-compliances with Environmental Authority conditions.

Priority Sites

The criteria for determining which sites are priorities for inclusion within the 2011-12 FY Mine Water Management Proactive Compliance Program is:

- Required a Transitional Environmental Management Program (TEP) during the 2010-11 wet season; AND
- Had non compliances with environmental approvals (environmental authority, TEP, emergency direction) during the 2010-11 wet season; OR
- Have been identified as high risk by the project manager due to on-going water management issues.

The priority sites are identified in *Table 1: Priority Inspection Sites*.

Table 1: Priority Inspection Sites

1. Baralaba	11. Ensham	21. Moranbah North
2. Blackwater	12. German Creek	22. Newlands
3. Burton	13. Gregory Crinum	23. Oaky Creek
4. Callide	14. Hail Creek	24. Peak Downs
5. Carborough Downs	15. Isaac Plains	25. Poitrel ²
6. Cook	16. Jellinbah ¹	26. Rolleston
7. Coppabella	17. Kestrel	27. Saraji
8. Curragh	18. Lake Vermont	28. Sonoma
9. Dawson Central/North	19. Millennium ²	29. South Walker
10. Dawson South	20. Moorvale	30. Yarrabee ¹

1. Boonal Joint Venture is linked to the water management of the Jellinbah and Yarrabee Coal Mines and will be inspected during this process but will not form part of final reporting. Boonal Joint Venture is a coal load out facility, managed through a development approval and authorised under a Registration Certificate.
2. Red Mountain Joint Venture is linked to the water management of the Poitrel and Millennium Coal Mines and will be inspected during this process but will not form part of final reporting. The Red Mountain Joint Venture is a Coal Handling and Preparation Plant and coal load out facility located on a mining lease and authorised under an EA.

Resources External to Central West Region

Central West Region requires additional resources to complete the proposed inspection program prior to 1 November 2011. The resources are identified as:

- 6 weeks of a PO4/PO5 level position; and
- 3 weeks of a PO3 level position.

South East Region has offered staff to assist with this inspection program. The volunteers and the period of time they will be required in Central West Region are identified in *Table 2: South East Region – Support Staff*.

Table 2: South East Region – Support Staff

Week Commencing (Sunday)	Week Ending (Friday)	Position Level Required/Officer's Name	Central West Region Office Location
28 August 2011	2 September 2011	PO4/PO5 ([REDACTED])	Emerald
18 September 2011	23 September 2011	PO4/PO5 ([REDACTED]) PO3 ([REDACTED])	Emerald Mackay
25 September 2011	30 September 2011	PO4/PO5 ([REDACTED])	Emerald
2 October 2011	7 October 2011	PO3 ([REDACTED]) PO3 ([REDACTED]) PO4/PO5 ([REDACTED]) [REDACTED] PO4/PO5 ([REDACTED])	Mackay Gladstone Emerald Emerald

Roles/Expectations

Project Managers

It is anticipated that project complete the pre-inspection preparation. Project managers will have approximately half to one day with support officers prior to the inspection so the majority of the work will be required to be completed prior to their arrival. Pre-inspection preparation will involve:

- review of EA conditions;
- review of Water Management Plan;
- review of Environmental Management Plan commitments relating to water;
- review of Plan of Operations action program relating to water;
- review of any non-compliances had within the previous 12 months relating to water management; and
- review of any Transitional Environmental Programs issued or current within the previous 12 months relating to water management.

Project Managers are expected to lead the on-site inspection.

Following the inspection, project managers will be required to either (1) assist Support Officers from South East Region with completing inspection reports; or (2) complete inspection reports where the support officer is from Central West Region, as per normal inspection procedure.

Project Managers are required to enter and finalise all compliance actions in EcoTrack and the regional inspection program.

Project Managers are required to liaise with support officers regarding any site safety inductions required to be completed prior to the inspection.

Project Managers are required to ensure:

- vehicles are booked;
- equipment is available;
- accommodation for overnight travel is organised and confirmed.

Support Officers from South East Region

It is requested that Officers travelling from South East Region bring:

- laptop; and
- personal Protective Equipment.

Personal Protective Equipment: You will be required to have (1) Steel capped lace up boots – some sites require above ankle, if your boots are lower than your ankle please let the project manager know and they can advise the individual sites requirements; (2) Long cotton drill pants – DERM approved safety; (3) Long sleeved DERM approved safety shirt (either chambray or high viz).

It is preferable if you have (but not necessary as you can be supplied with) (1) Safety glasses/sunglasses or overglasses; (2) Hard Hat with sun protection brim; (3) Safety gloves; (4) Ear Plugs; (5) High viz vest; (6) sun screen; (7) personal water bottle (you will need a couple of litres per day); (8) ID/Authorised Officer Cards; and (9) Official Note Books..

Some sites have safety inductions to be completed prior to attending the site. The project manager will advise you if you will be required to complete a safety induction prior to attending the site.

It is anticipated that during your time with Central West Region, you will be able to:

- assist with pre inspection preparation prior to attending the site;

- assist the Project Manager with undertaking the site inspection; and
- take responsibility for completing the post inspection write up (i.e. compiling the inspection report), with the assistance of the project manager.

During the lead up to the wet season Project Managers will be undertaking amendments to the majority of their Environmental Authorities, following the approval of the updated Model Water Conditions for coal mines within the Fitzroy basin, and assessing Water Management Transitional Environmental Program. Your assistance in completing the inspection reports prior to heading home would be greatly appreciated.

Support Officers from Central West Region

As per normal inspection procedure, it is anticipated that support officers from Central West Region assist the project manager with pre-inspection preparation, on site inspection work and the final inspection report.

Project Finalisation

All inspection reports will be summarised into an overall report detailing high risks/priorities identified for the upcoming wet season. This will form part of the regions wet season preparedness plan.

Inspection Calendar

AUGUST				
Monday	Tuesday	Wednesday	Thursday	Friday
8	9	10	11	12
15	16	17	18	19
22	23	24 <i>DERM/DEEDI MEETING</i>	25 <i>WATER CONDITIONS TRAINING</i>	26
29	30	31		
SEPTEMBER				
Monday	Tuesday	Wednesday	Thursday	Friday
			1	2
5	6 - Blackwater ([redacted]) - Cook ([redacted])	7	8 - Oaky Creek ([redacted]) - Kestrel ([redacted])	9
12	13 - Coppabella ([redacted]) and ([redacted]) - Isaac Plains ([redacted])	14 - Carborough ([redacted]) - Moorvale ([redacted]) (inson)	15 - Moranbah North ([redacted])	16
19	20 - South Walker ([redacted]) and ([redacted])	21	22 - German Creek ([redacted]) and ([redacted])	23

26	27 - Jellinbah (Mackay PO3 and [REDACTED])	28 WATER IN MINING	29 - Saraji ([REDACTED] and [REDACTED])	30 WATER IN MINING
OCTOBER				
Monday	Tuesday	Wednesday	Thursday	Friday
3	4 - Gregory Crinum ([REDACTED] and [REDACTED]) - Lake Vermont ([REDACTED] and [REDACTED]) - Baralaba (Terry Farley and Chris Mooney)	5 - Hail Creek ([REDACTED] and [REDACTED])	6 - Burton ([REDACTED] and [REDACTED]) - Peak Downs ([REDACTED] and [REDACTED]) - Callide ([REDACTED] and [REDACTED]) - Rolleston ([REDACTED] and [REDACTED]) - Ensham ([REDACTED] and [REDACTED])	7
10	11 - Poitrel ([REDACTED] and [REDACTED])	12 - Sonoma ([REDACTED] and [REDACTED]) - Dawson Central and North ([REDACTED] and [REDACTED]) - Millennium ([REDACTED] and [REDACTED]) - Red Mountain Joint Venture ([REDACTED] and [REDACTED])	13 - Newlands ([REDACTED] and [REDACTED]) - Dawson South ([REDACTED] and [REDACTED])	14
17	18 - Boonal ([REDACTED] and [REDACTED]) - Yarrabee ([REDACTED] and [REDACTED])	19 -	20	21
24	25	26 - Curragh ([REDACTED] and [REDACTED])	27	28

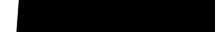
		██████)		
31				

Travel and Accommodation



Flights Brisbane to Emerald Sunday 18 September 2011 – Evening
Friday 23 September 2011 – Late Afternoon/Evening

To be organised by



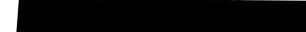
Accommodation in Emerald Arrive: Sunday 18 September 2011
Depart: Monday 19 September 2011

To be organised by



Accommodation in Moranbah Arrive: Monday 19 September 2011
Depart: Wednesday 21 September 2011

To be organised by



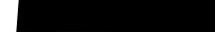
Accommodation in Emerald Arrive: Wednesday 21 September 2011
Depart: Friday 23 September 2011

To be organised by



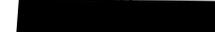
Flights Brisbane to Emerald Sunday 9 October 2011 - Evening
Flights Emerald to Brisbane Friday 14 October 2011 – Later Afternoon/Evening

To be organised by



Accommodation in Emerald Arrive: Sunday 9 October 2011
Depart: Monday 10 October 2011

To be organised by



Accommodation in Moranbah Arrive: Monday 10 October 2011
Depart: Thursday 13 October 2011

To be organised by



Accommodation in Emerald Arrive: Thursday 13 October 2011
Depart: Friday 14 October 2011

To be organised by



[REDACTED]

Flights Brisbane to Mackay
Flights Mackay to Brisbane

Sunday 11 September 2011 – Evening
Friday 16 September 2011 – Late Afternoon/Evening

To be organised by

[REDACTED]

Accommodation in Mackay

Arrive: Sunday 11 September 2011
Depart: Monday 12 September 2011

To be organised by

[REDACTED]

Accommodation in Moranbah

Arrive: Monday 12 September 2011
Depart: Wednesday 14 September 2011

To be organised by

[REDACTED]

Accommodation in Mackay

Arrive: Wednesday 14 September 2011
Depart: Friday 16 September 2011

To be organised by

[REDACTED]

Flights Brisbane to Mackay

Sunday 2 October 2011 – Evening
Friday 7 October 2011 – Late Afternoon/Evening

To be organised by

[REDACTED]

Accommodation in Mackay

Arrive: Sunday 2 October 2011
Depart: Tuesday 4 October 2011

To be organised by

[REDACTED]

Accommodation in Nebo

Arrive: Tuesday 4 October 2011
Depart: Thursday 6 October 2011

To be organised by

[REDACTED]

Accommodation in Mackay

Arrive: Thursday 6 October 2011
Depart: Friday 7 October 2011

To be organised by

[REDACTED]

[REDACTED]

Flights Brisbane to Emerald
Flights Emerald to Brisbane
Monday 26 September 2011 – Morning
Friday 7 October 2011 – Late Afternoon

To be organised by

[REDACTED]

Accommodation in Emerald
Arrive: Monday 26 September 2011
Depart: Wednesday 28 September 2011

To be organised by

[REDACTED]

Accommodation in Dysart
Arrive: Wednesday 28 September 2011
Depart: Friday 30 September 2011

To be organised by

[REDACTED]

[REDACTED]

Flights Brisbane to Gladstone
Flights Gladstone to Brisbane
Sunday 2 October 2011 – Evening
Friday 7 October 2011 – Late Afternoon/Evening

To be organised by

[REDACTED]

Accommodation in Gladstone
Arrive: Sunday 2 October 2011
Depart: 7 October 2011

To be organised by

[REDACTED]

[REDACTED]

Flights Brisbane to Emerald
Flights Emerald to Brisbane

Sunday 2 October 2011 – Evening
Friday 7 October 2011 – Late Afternoon/Evening

To be organised by

[REDACTED]

Accommodation in Emerald

Arrive: Sunday 2 October 2011
Depart: Wednesday 5 October 2011

To be organised by

[REDACTED]

Accommodation in Dysart

Arrive: Wednesday 5 October 2011
Depart: 7 October 2011

To be organised by

[REDACTED]

[REDACTED]

Flights Brisbane to Emerald
Flights Emerald to Brisbane

Sunday 2 October 2011 – Evening
Friday 7 October 2011 – Late Afternoon/Evening

To be organised by

[REDACTED]

Accommodation in Emerald

Arrive: Sunday 2 October 2011
Depart: 7 October 2011

To be organised by

[REDACTED]

[REDACTED]

Accommodation in Moranbah

Arrive: Monday 19 September 2011
Depart: Wednesday 21 September 2011

To be organised by

[REDACTED]

Accommodation in Moranbah

Arrive: Monday 10 October 2011
Depart: Thursday 13 October 2011

To be organised by

[REDACTED]

[REDACTED]

Accommodation in Moranbah

Arrive: Monday 12 September 2011
Depart: Wednesday 14 September 2011

To be organised by

[REDACTED]

Accommodation in Nebo

Arrive: Tuesday 4 October 2011
Depart: Thursday 6 October 2011

To be organised by

[REDACTED]

[REDACTED]

Accommodation in Moranbah Arrive: Tuesday 13 September 2011
Depart: Friday 16 September 2011

To be organised by

[REDACTED]

[REDACTED]

Accommodation in Moranbah Arrive: Tuesday 13 September 2011
Depart: Friday 16 September 2011

To be organised by

[REDACTED]

[REDACTED]

Accommodation in Collinsville Arrive: Tuesday 11 October 2011
Depart: Friday 14 October 2011

To be organised by

[REDACTED]

[REDACTED]

Accommodation in Collinsville Arrive: Tuesday 11 October 2011
Depart: Friday 14 October 2011

To be organised by

[REDACTED]

[REDACTED]

Accommodation in Moura Arrive: Wednesday 12 October 2011
Depart: Thursday 13 October 2011

To be organised by

[REDACTED]

[REDACTED]

Accommodation in Moura Arrive: Wednesday 12 October 2011
Depart: Thursday 13 October 2011

To be organised by

[REDACTED]

[Redacted]

Accommodation in Dysart

Arrive: Wednesday 28 September 2011
Depart: Friday 30 September 2011

To be organised by

[Redacted]

Accommodation in Dysart

Arrive: Wednesday 5 October 2011
Depart: 7 October 2011

To be organised by

[Redacted]

CSG DISCHARGE RESPONSE PLAN

Regional Service Delivery

**South West Region
Central West Region**



**Department of Environment
& Resource Management**

Coal Seam Gas Discharge Response Plan – Contents

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COAL SEAM GAS DISCHARGE RESPONSE PLAN

Regional Service Delivery South West and Central West Regions

SITUATION

Petroleum and gas activities are regulated under Chapter 5A of the *EP Act 1994*. Operators must have an Environmental Authority (EA) in order to carry out Chapter 5A activities. An EA sets out the strict conditions by which a proponent must operate.

Coal Seam Gas (CSG) activities are classified as either level 1 or level 2 based on the risk of environmental harm being caused by the activities. The assessment processes for level 1 CSG activities are more comprehensive than level 2 activities

CSG operators must consider and detail:

- impacts on air quality
- CSG water management, treatment storage and disposal
- mapping and protection of remnant vegetation and other important areas of habitat for native wildlife
- nuisance noise impacts
- impacts on the local communities
- management and disposal of wastes
- a rehabilitation program for any areas disturbed by the proposed activity.

The Petroleum and Gas sector is expanding at a significant rate as multinational proponents prepare to establish themselves in the lucrative liquefied natural gas (LNG) export market.

CSG is extracted from primarily within the Surat, Bowen and Galilee basin gas fields where it is then transported via gas transmission pipelines to Curtis Island (Gladstone) to be converted to LNG for later export.

Both South West and Central West Regions encompass a broad range of industrial operations that include heavy industry, large mining operations including **Coal Seam Gas operations**, each of which can be located in or near populated areas or in the more remote areas of the state.

The valuable sub-terranean CSG reserves can only be accessed by first relieving water pressure from within the underground aquifer in which it is held.

This process generate a considerable volume of what is referred to as “production” or “associated” CSG water and may vary considerably in composition and quality (see *attached CSG water fact sheet*) although is has typically high in salts and bicarbonates.

This chemical composition of CSG water has the potential to cause environmental harm if released into the surrounding environment so CSG operators store the water in large onsite “regulated” dams to mitigate that risk.

In the majority of environmental and operational circumstances, regulated dams are very effective for the containment of CSG water, however there may be instances where there may be, for one reason or another, a discharge of CSG dam water to land or water ways.

Regions experiencing unusually high rainfall are at a greater risk of a potential release or discharge from the CSG regulated dams.

Discharge situations may occur at any time and therefore a plan is required to ensure a 24 hour response capability by this division.

To determine whether the response to a contamination event triggers this plan, the criteria for a Coal Seam Gas Contamination Event (CSG CE) are outlined in **Action 4** in execution.

The criteria listed under the CSG CE will determine whether this CSG Discharge Response Plan is activated. If activated the response to the CSG CE will be in accordance with CSG Discharge Response Plan.

Area of operation:

The area of the South West Region includes the area designated by Map - **Appendix A**.

The area of the Central region includes the area designated by Map **Appendix B**.

Staffing:

RSD has staff based at Roma, Dalby and Toowoomba. A full contact list including each person's role / expertise is attached as **Appendix C**

Resources:

The primary response staff are:

- Regional Manager, Regional Services, Central West and South West Regions
- Manager – Environmental Services Central West and South West Regions
- Team Leaders across (Roma, Toowoomba)
- An On Call Environmental Officer is available to provide initial response to calls 24 hours a day.
- A list of emergency contacts for internal departmental teams as well as key external stakeholders is also detailed in **Appendix C**.

MISSION

To ensure a professional, consistent and timely initial response by DERM to major CSG discharge events from project sites in the South West and Central West Regions.

EXECUTION

The response to any large scale situation of reported CSG contamination event / discharge shall be executed as outlined below.

This document sets out the roles and responsibilities when responding to a **major CSG discharge event**. These roles may be altered based on operational requirements. Additionally, several roles may be undertaken by a single officer.

Action 1: Initial information/ First notification (Duty of Receiving Officer)

- Please refer to interim LNG Enforcement Unit procedure relating to incident notification, escalation and reporting. (Attached)

Action 2: Information (Duty of Receiving Officer)

Confirm initial information along with the following where practicable:-

- Other Government agencies involved
- Company / persons directly involved (operators)
- Witnesses (to confirm their observations, involvement and details)

Note: *If situation has the potential for immediate serious harm, and on scene resources and urgent actions can avoid or reduce the harm, take immediate reasonable steps to implement those actions. – Advise manager as soon as practicable of actions.*

Action 3: Notify Management of CSG Discharge (Duty of Receiving Officer)

- Brief the following RSD personnel:
 - Team Leader
 - Manager and
 - Regional Manager (Management Team)

Action 4: Assess information against criteria for CSG Discharge (Duty of Management Team)

- Determine whether the incident meets the CSG discharge criteria.

Note: While an event may not initially meet the criteria to activate this plan, as further information becomes available, it may be appropriate to revisit the discharge plan. The plan may be activated at any time.

CSG discharge event criteria

For a contamination event to trigger a response under this plan, the event must meet the following criteria:

1. Originate from an active or abandoned CSG Chapter 5A EP Act activity; and
2. Have an actual or potential release of CSG water or brine through a collapse, overtopping or pumping from dam infrastructure or failure of pipe infrastructure;
 - Release to waters of any volume of brine
 - Release to waters of approx 1000L of CSG water

- Release to land of 1000L of brine
- Release to land of greater than 500,000L of CSG water

Note – The volumes above are a guide only and need to be considered with regard to risk to or potential risk to human health, property, livestock, an environmental value, or a community value; and Environmentally Sensitive Area's (ESA's) Categories A,B,C in conjunction with the -

- Available information about the water/brine composition
- If the water/brine contains "fracking" or drilling chemicals
- If the water is known to be of a poor quality in regards to metals, hydrocarbons, EC, pH, etc or other serious contaminants
- Has releases occurred across several CSG sites requiring a co-ordinated response

3. Response to the event solely by the CSG company is inappropriate.

Action 5: Activation of CSG Discharge Response Plan

(Duty of Regional Manager)

- RSD may immediately or at any time in the response to the incident, activate the CSG Discharge Response Plan if the CSG CE criteria is met

CSG Discharge Response Plan Activation Procedures

1. Regional Manager to be briefed on situation.
2. Regional Manager to determine incident should be dealt with under CSG Discharge Response Plan
3. Regional Manager to Activate Response Plan
4. Regional Manager to advise Regional Service Director in writing (e.g. email) of CSG Discharge Response Plan Activation
5. Regional Manager to meet with Management Team (Environmental Services Team Leaders and Environmental Services Manager) to form Incident Management Team (IMT).

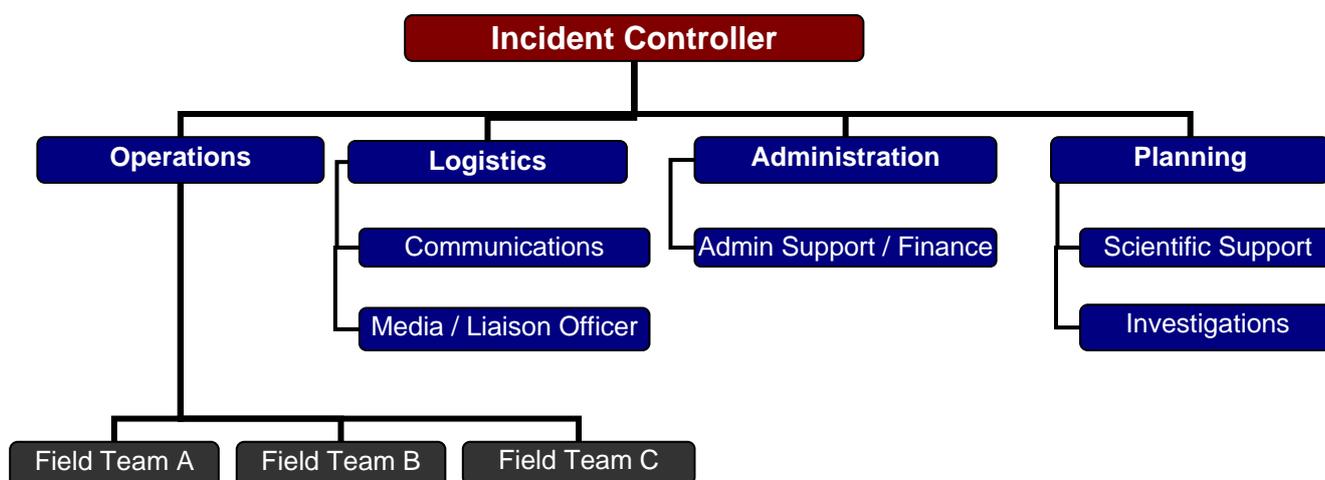
Action 6: Form Incident Management Team (Duty of Regional Manager)

1. Upon activation of the CSG Discharge Response Plan, the Regional Manager will then appoint an incident controller (which can be any staff member including the Regional Manager).
2. The Incident Controller will then form an Incident Management Team (IMT) in consultation with the Regional Manager.

Note: the IMT may consist of as many or as few staff as required by the Incident Controller, largely dependant on the scale and nature of the CSG CE. Additionally, one officer may conduct more than one functional role.

The IMT (shown in blue) may consist of any officers, but it is recommended that Team Leaders and/or Managers are involved in the IMT.

Incident Management Team Structural Command



Action 7: Develop Action Plan (Duty of Incident Management Team)

- IMT to develop Action Plan
- Action Plan may include Sampling Plan
- IMT to appoint Field Team(s) as required
- Action Plan to be carried out / reviewed / amended in accordance with structural command.
- Refer to Action Plan Template – **Appendix H**

Action 8: Implementation of the plan (Duty of all Personnel)

The Field Team(s) shall be responsible for the implementation of the plan on site and report to Operations Commander.

This responsibility will include:-

PRIOR TO TRAVEL:-

- Liaising with IMT on required actions and briefing rest of field response team
- Organising response kit / field equipment (Refer to check list **Appendix E**)
- Organizing flights / transport to and from the site for staff and equipment. (In conjunction with Administration and Logistics teams in IMT)
- Organizing accommodation where required (In conjunction with Administration and Logistics teams in IMT)

ON SITE:-

- Evaluate the situation – determine the extent of the issue
- Brief on ground staff – allocate specific duties
- Ensure Staff Safety (WPH&S)
- Provide regular Sit Reps to Manager - as previously arranged – **Appendix I**
- Exercising of provisions under the *Environmental Protection Act 1994* – refer to **Appendix F** – Field guide.
- Record Keeping – notes/records/ photographs/ logs. (running sheet – **Appendix G**)
- Sampling - **Appendix J** - Sampling point guides

Action 9: Review of Action Plan and Situation Report

(Duty of Incident Management Team)

- IMT to review Situation Reports provided by Field Team(s) to determine if Action Plan is achieving prescribed outcomes.
- IMT to amend Action Plan if planned outcomes are not achieved
- If outcomes not achieved – IMT to refer back to Action 7.
- If outcomes are achieved, IMT to continue to Action 10.

Action 10: Deactivation (Duty of Incident Management Team)

- Regional Manager may deactivate the plan if:
 - (a) The incident no longer meets the CSG CE criteria; or
 - (b) The initial response phase to the incident is completed.

CSG Discharge Response Plan Deactivation Procedures

1. Regional Manager to be briefed on implementation of action plan and success of response
2. Regional Manager to assess whether the goals of the action plan were achieved and whether the Department's immediate response has concluded.
3. Regional Manager to Deactivate Response Plan
4. Regional Manager to advise Regional Service Director in writing (e.g. email) of CSG Discharge Response Plan Deactivation
6. Team Leader (Mining) advised on Deactivation and to coordinate remaining response and investigations as per standard Departmental procedures.

Action 11: Demobilisation and Debrief

- Field Team(s) to liaise with Operations of demobilisation from the field
- Operations to liaise with logistics and administration on:
 - re-stocking used equipment;
 - sending samples to lab;
 - cleaning and calibration of equipment.
- Incident Controller to hold a debrief within 5 working days of the CSG Discharge Response Plan being deactivated. The debrief should address:
 - Success of initial response;
 - Identification of further actions / response required (e.g. Med-Long term response plans / remediation plans);
 - Identification of responsible officer(s) / team(s) for management of the response / incident following the deactivation of the Mine Discharge Response Plan.
 - Nomination of officer(s) / team(s) responsible for ensuring that the actions under the Mine Discharge Response Plan are appropriately documented.

ADMINISTRATION AND LOGISTICS

Administration -

Staffing:

The selection of staffing to respond to a matter shall be the responsibility of the Incident Controller and IMT. The approval to recall staff back to duty will lie with the Regional Manager.

Expenditure approvals:

All expenditure must be approved by the Regional Manager prior to purchase unless circumstances exist that would make the approval unreasonable at the time.

Travel:

All travel must be approved by the Manager or Regional Manager prior to commencement unless circumstances exist that would make the approval unreasonable at the time. In that case the Team leader may provide initial approval.

Equipment and vehicle use:

All users must hold the relevant qualifications, training and approvals to operate the equipment and vehicles used by them.

Flights/ Air Travel:

All flights must be approved by the Manager or Regional Manager prior to commencement. Refer to Logistics Section for arrangement details.

Work Hours:

Work hours shall be conducted in line with the award and response needs. Weekend work and work after 6pm and before 6am will be with the approval of the Regional Manager.

On Call staff:

An on-call officer shall be available to respond to phone calls 24 hours a day as per existing on-call regional arrangements.

Logistics

Vehicles:

Sargents (1800 077 353) hire vehicles with remote site equipment in case Departmental vehicles are unavailable. The Sargents offices/depots in Roma, Blackwater and Chinchilla are the most convenient for CSG site visits.

Air Travel:

- Domestic Travel is to be arranged through the Travel Management System during Business Hours on 1300 729 912 and After Hours on 1300 474 287
- Other flights (Helicopter) to be arranged by the Travel Management System

Remote operations:

Remote travel requires the possession and use of equipment designed to support this type of operation – Car Kits and Field Kits are to be utilised.

Field and Sampling Equipment:

Refer to the RSD on-call roster for appropriate field equipment and safety equipment.

* It is the responsibility of the Team Leader to ensure that their office have equipped vehicles, safety kits, and CSG discharge response kits available and up to date prior to the wet season.

COMMAND AND COMMUNICATIONS

Command

INCIDENT CONTROLLER

- Overall Incident Command and lead the IMT
- Approve action plans
- Brief Regional Service Director

OPERATIONS

- Responsible for carrying out approved action plans
- Brief Incident Controller
- Coordinate actions of Field Team(s)

Field Teams

- Responsible for carrying out action plan on ground
- Brief Operations
- Sampling and evidence collection as detailed in action plan
- Provide situation reports on regular basis

LOGISTICS

- Responsible for providing logistical support to carry out action plan
- Brief Incident Controller
- Coordinate transport, food, equipment and accommodation for Field Team(s)
- Responsible for communication systems between Field Team(s), Incident Management Team and other stakeholders
- Notification of incident to appropriate stakeholders and government departments
- Coordinate Media responses

Communications

- Establish lines of communication between field teams, mining operators, IMT, stakeholders and within the Department
- Record and track communications and develop / track briefings

Media / Liaison

- Engage with stakeholders external to the IMT and provide briefings to stakeholders
- Operate as a single point of contact for all incoming enquires from external stakeholders
- Liaise with Media Unit on development of media releases and response to media enquires

ADMINISTRATION

- Brief Incident Controller
- Track expenditures
- Provide support to operations, logistics and planning
- Track staff movements and administer call-in safety procedures

Admin Support / Finance

- Support administration and IMT through provision of documents, record keeping etc.
- Track expenditures and liaise with finance department as appropriate.

PLANNING

- Responsible for development of action plan
- Brief Incident Controller
- Coordinate support from sciences, investigations, litigation as required
- Arrange mobilisation / demobilisation of Field Team(s)

Scientific Support

- Provide scientific advice on the nature of the incident, sampling plan development or remediation

Investigations

- Provide advice on powers of officers, or how to ensure evidence collection is appropriate in the event of offences being investigated under the *Environmental Protection Act 1994*.

Communications

Primary communications:-

Telephone: - Use of telephone for the receipt and relay of information will be the primary means of communication between the parties where face to face capability does not exist. A full list of phone numbers is provided on **Appendix B**.

Secondary Communications:-

Email and Fax: - Shall be used as Secondary means of communications only and a response from the receiver should be requested to ensure receipt of information. A list of email addresses and Fax numbers are listed in **Appendix B**.

Satellite Telephones:-

Sat Phones may be the only source of communications in remote areas. The Field Response Coordinator will ensure the serviceable operation of the phone prior to departure. Ensure the contact number is advised on the Response Plan. Sat Phone Numbers also listed on **Appendix B**.

Reporting Requirements - Field Operations

Reporting times, Sit Reps and protocols will be adhered to whilst conducting the field response. The reporting times will be as per policy and incorporated as part of the Response Plan. The Field Team(s) will ensure reporting times and procedures are adhered to.

APPENDIX A - MAPS

ARROW REGIONAL MAPS:



Arrow - Central West Arrow - south west & south east

QGC REGIONAL MAPS:



QGC - Central West QGC - South West

SANTOS REGIONAL MAP:



Santos - Central West and South West

ORIGIN REGIONAL MAPS:



Origin - Central West Origin - North Origin - South West

APPENDIX B – EMERGENCY CONTACT LISTS

Additional Internal and External Contacts

Table 1.1: DERM – Pollution Hotline

CONTACT	POSITION	NUMBER
Pollution Hotline	(24 hours)	1300 130 372
3 Hutchison Paging	A/H Call Escalation Confirmation	1300 551 166

Table 1.2: DERM - Regional Service Delivery (Environmental Services)

CONTACT	POSITION	OFFICE	MOBILE
NORTH REGION			
Rob Lawrence	Regional Manager, Mining & Industry		
	A/Regional Manager, Coastal, Quarry Material & Riverine Protection		
	Manager, Coastal, Quarry Material & Riverine Protection		
	Manager, Mining & Heavy Industry		
	Manager, Environment Townsville		
Cairns / Mt Isa	On call	-	
Townsville	On call	-	
CENTRAL WEST REGION			
	Regional Manager, Environment		
	A/Regional Manager, Mining		
	Manager, Mackay		
	A/Manager, Emerald		
	Manager, Rockhampton		6
	Manager, Gladstone		
Mackay	On call	-	
Emerald	On call	-	
Gladstone / Rockhampton	On call	-	
SOUTH WEST REGION			
	Regional Manager		
	Manager, Toowoomba		
	Manager, Toowoomba		
Toowoomba	On call	-	
SOUTH EAST REGION - NORTH			
	Regional Manager, North		
	Manager, Moreton Bay		
	Manager, Sunshine Coast		
	Manager, Ipswich		
	Manager, Wide Bay Burnett		
	Manager, Compliance		
Moreton / Sunshine Coast	On call	-	
Ipswich	On call	-	
Maryborough	On call	-	
SOUTH EAST REGION - SOUTH			
	Regional Manager, South		
	Manager, Gold Coast		
	Manager, Logan & Scenic Rim		
	Principal Environmental Officer, Redlands		
	Manager, Brisbane City South		
	Manager, Brisbane City North		
Gold Coast / Brisbane	On Call	-	

Table 1.3: DERM – Incident Response Unit

CONTACT	POSITION	OFFICE	MOBILE	SATELLITE PHONE
[REDACTED]	Manager, Incident	[REDACTED]	[REDACTED]	[REDACTED]
	Principal Advisor			
	Principal Advisor			
Gear Bag 1	-	-	-	
Gear Bag 2			-	
Brisbane Car	-	-	-	
Northern IRU	-	-	-	
VOTE CODE				
Vote Code	EDBANGBC02	-	-	-
CAR RENTAL				
Avis Brisbane	Wizard Number	[REDACTED]	-	-
PROTECTOR ALLSAFE				
Account:	Code Address: #35	132 832	-	-
TELECONFERENCES				
Call in number: 1800 500 536 then *80168151*			Moderators number: *2789*	
TMS				
TMS	After Hours	1300 370 270	-	-
TMS	Business Hours	1300 729 912	-	-

Table 1.4: DERM – State Incident Response Network (SIRN)

CONTACT	POSITION	OFFICE	MOBILE	HOME
[REDACTED]	Manager, Incident Response	[REDACTED]	[REDACTED]	
	Principal Advisor, Incident Response (SEQ)			
	Principal Advisor, Incident Response (CQ)			
	Principal Project Officer, Technical Strategies			
	Principal Environmental Officer, Compliance and Investigations			
	Principal Environmental Officer, Brisbane South			
	Manager, Emerald			
	Principal Environmental Officer, Cairns			
	Manager, Toowoomba			
	Manager, Rockhampton			

Table 1.5: DERM – Specialist Areas (Environment)

CONTACT	POSITION	OFFICE	MOBILE
PETROLEUM & GAS – CENTRAL OFFICE			
[REDACTED]	General Manager, Energy Resources	[REDACTED]	[REDACTED]
	Director		
	Director, UCG		
	Manager		
	Team Leader		
PETROLEUM & GAS – LAND ACCESS			
[REDACTED]	Senior Valuer, DERM	[REDACTED]	
PETROLEUM & GAS – COAL SEAM GAS SAFETY			
[REDACTED]	Chief Inspector, Mines & Energy	[REDACTED]	[REDACTED]
PETROLEUM & GAS – GREAT ARTESIAN BASIN SUBSIDY INITIATIVE			
Andrew Brier	Regional Manager, Roma	[REDACTED]	[REDACTED]
PETROLEUM & GAS – WATER SERVICES			
[REDACTED]	Manager, Toowoomba	[REDACTED]	[REDACTED]
COMPLIANCE & INVESTIGATIONS			
[REDACTED]	Director, Compliance and Investigation	[REDACTED]	[REDACTED]
	State Manager, Investigations		
	Manager Regional Investigations (SEQ) Nambour		
	Manager Regional Investigations (SEQ) Brisbane		
	Principal Environmental Investigator		
AIR			
[REDACTED]	Principal Environmental Officer	[REDACTED]	-

CONTACT	POSITION	OFFICE	MOBILE
	Principal Environmental Officer		-
	Principal Environmental Officer		-
AIR AND VEGETATION			
	Principal Environmental Officer		-
WATER			
	Chief Scientist		
	Chief Scientist		
	Principal Environmental Officer		-
NOISE			
	Principal Environmental Officer		-
WATER SAMPLING AND ASSESSMENT			
	Senior Principal Scientist		
FISH KILLS			
	Senior Principal Scientist		
CONTAMINATED LAND			
	Chief Scientific Officer		-
	Manager, Project Support		5
DAMS			
	Manager, Regulated Dams		
OILED WILDLIFE			
	Manager, Incident Response		
NARANGBA			
	Regional Manager, Brisbane North		
DERM STORM TIDES (Nov-May)			
Rostered	Duty Advisor	Pager 1300 555 555 Quote 90029	

Table 1.6: DERM – DG and Operations and Environmental Regulator Business Group

CONTACT	POSITION	OFFICE	MOBILE
John Bradley	Director-General		
Terry Wall	Associate DG		
	Assistant DG, Environment and Natural Resource Regulation		
	Assistant DG, Regional Service Delivery		
	Assistant DG, QPWS		
	Assistant DG, Sustainable Communities and Landscapes		
	Assistant DG, Environmental Sciences		
	Executive Director, Wet Tropics Management Authority		

Table 1.7: DERM – Environment and Natural Resource Regulation

CONTACT	POSITION	OFFICE	MOBILE
	Assistant DG, Environment and Natural Resource Regulation		
Lindsay Delzoppo	General Manager, Operations		
	General Manager, Energy Resources		
	General Manager, Office of the Water Supply Regulator		
	Senior Director, Technical Operations		
	Director, CSG Policy		
	Director, Litigation		
	A/Director, Compliance and Investigation		
	Director, Environmental Impact Assessments		
Jon Womersley	Director, Regulatory Support and Practice		

Table 1.8: DERM – Regional Service Directors

CONTACT	POSITION	OFFICE	MOBILE
	RSD – North		
	RSD - Central West		
	RSD - South East		
Mike Birchley	RSD - South West		

Table 1.9: DERM – Technical Operations

CONTACT	POSITION	OFFICE	MOBILE
	Senior Director, Technical Operations		
	Chief Advisor, Incident Management		
	Manager, Project Support		
	Team Leader, Contaminated Land		
	Assistant Director, Technical Strategies		
	Manager, Regulated Dams		
	Principal Project Officer, Technical Strategies		

Table 1.10: DERM – Environment and Resource Sciences

CONTACT	POSITION	OFFICE	MOBILE
	Assistant DG, Environmental Sciences		
	Director, Air Services		
Julia Playford	Director, Freshwater and Marine Sciences		
	Chief Scientist, Freshwater and Marine Sciences		
	Chief Scientist, Freshwater and Marine Sciences		
	Senior Principal Scientist, Freshwater and Marine Sciences		
	Chief Scientist, Aquatic Threatened Species and Threatening Processes		

Table 1.11: DERM – General Contacts (Environment)

CONTACT	POSITION	OFFICE	MOBILE
Environment - General	-	1300 130 372	-
Natural Resource - General		13 13 04	-
Water Management	-		-
Vegetation Management	-		-
Acid Sulphate Soils	-		-
IT SUPPORT			
Help Desk	-		1800 806 602
WEB SUPPORT			
	Manager, Multimedia Services		
MEDIA			
	Manager, Media		
STATE DISASTER MANAGEMENT COMMITTEE REPRESENTATIVE			
	A/Director, Coastal Sciences		
WORKPLACE HEALTH AND SAFETY			
	Senior Workforce Management Officer		-
HEALTHY WATERWAYS			
	Project Manager		
INDUSTRY LIAISON			
	Manager, Partnerships Unit		

Table 1.12: DERM – QPWS Division

CONTACT	POSITION	OFFICE	MOBILE
	Assistant DG, QPWS		
QPW –Terrestrial			
	Senior Director		
	Wet Tropics – Regional Manager		
	Wet Tropics - Operations Manager		

CONTACT	POSITION	OFFICE	MOBILE
	Wet Tropics – Operations Manager		
	Sunshine Coast/Burnett – Regional Manager		
	Sunshine Coast/Burnett - Operations Manager		
	Sunshine Coast/Burnett - Operations Manager		
	Cape York/Savanna – A/Regional Manager		
	Cape York/Savanna – A/Operations Manager		
	Cape York/Savanna – A/Operations Manager		
	Capricornia – Regional Manager		
	Capricornia - Operations Manager		
	Capricornia - Operations Manager		
	South East – A/Regional Manager		
	South East – Operations Manager		
	South East – A/Operations Manager		
	Western – Regional Manager		
	Western - Operations Manager		
	Western – Operations Manager		
QPW - MARINE			
	Senior Director		
	Northern Qld Marine – Regional Manager		
	Northern Qld Marine - Operations Manager		
	Central Qld Marine – Regional Manager		
	Central Qld Marine - Operations Manager		
	Central Qld Marine – A/Team Leader		
	Great Sandy – Regional Manager		
	Great Sandy – Operations Manager		
	Moreton Bay – Regional Manager		
	Moreton Bay – Operations Manager		
	Moreton Bay – Principal Conservation Officer		
INJURED WILDLIFE			
-	QPWS Moggill Office		-
MARINE INJURED WILDLIFE			
-	Hotline	1300 360 898	1300 130 372
	Chief Scientist – afterhours if Hotline not functional		
WILDLIFE MANAGEMENT (HUMAN RISK)			
	Team Leader, Wildlife Branch (North)		
	Wildlife Operations Manager (Central)		
	Manager, Wildlife Branch		
PARKS ASSETTS			
	Principal Project Officer		-
TURTLES			
	Chief Scientist		

Table 2.1: State Government Contacts - General

AGENCY	SECTION/ISSUE (state Govt – General)	B/H	A/H
Department of Emergency Services	Police, fire, ambulance	000 / 112(mob)	000 / 112(mob)
	POLICE COMMUNICATIONS (POLcom)		
	POLcom – Brisbane		
	POLcom – Gold Coast		
	POLcom – Sunshine Coast		
	POLcom – Toowoomba		
	POLcom – Rockhampton		
	POLcom – Townsville		
	POLcom – Cairns		
	AMBULANCE AND FIRE COMMUNICATIONS (FIREcom)		
AFcom – Brisbane			

AGENCY	SECTION/ISSUE (state Govt – General)	B/H	A/H
	AFcom – Gold Coast		
	AFcom – Sunshine Coast		
	AFcom – Toowoomba		
	AFcom – Rockhampton		
	AFcom – Townsville		
	AFcom – Cairns		
	Other		
	RACE (Response Advice for Chemical Emergencies)		
	SES		-
SES Helicopter		-	
Queensland Transport	Call Centre	13 23 80	-
	Smoky Vehicle Hotline		13 20 19
	MARITIME SAFETY QUEENSLAND		
	General		-
	Brisbane		
	Sunshine Coast		
	Gold Coast		
	Hervey Bay		
	Bundaberg		
	Gladstone		
	Rosslyn Bay (David Channels)		
	Airlie Beach		
	Mackay		
	Townsville		
	Cairns		
	WiDERM		
	Karumba		
	Thursday Island		
	DoT / MSQ Maritime Weather Service Qld / Marine / SEQ		1300 360 426 / 427 / 428
	QUEENSLAND RAIL		
	Emergencies		1800 079 303
Brisbane and Gold Coast			
Outside Brisbane			
Department of Main Roads	Brisbane		
	Gold Coast		
	Gympie		-
	Bundaberg		-
	Rockhampton/Emerald		
	Mackay		
	Toowoomba Traffic Management Centre		
	Townsville		-
	Cairns		-
	Barcaldine		1800 023 126
	Cloncurry		-
	Roma		-
Department of Primary Industries	Call Centre	13 25 23	-
	Animal Disease Watch Hotline		1800 675 888
	Illegal Fishing	1800 017 116	-
	Exotic Plants	1800 084 881	-
	Pathology Lab Loading Bay 12, 39 Kessels Rd, Coopers Plains		-
Department of	Call Centre	1800 657 567	-

AGENCY	SECTION/ISSUE (state Govt – General)	B/H	A/H
Mines and Energy	Mines Inspectorate	[REDACTED]	-
	Explosives Inspectorate (Exp)	1300 739 868 &	[REDACTED]
	Petroleum and Gas Inspectorate (Gas)	[REDACTED]	-
	QME – Brisbane	Exp: [REDACTED]	Gas: [REDACTED]
	QME – Rockhampton	Exp: [REDACTED]	Gas: [REDACTED]
	QME – Townsville	Exp: [REDACTED]	Gas: [REDACTED]
	QME – Cairns	[REDACTED]	Gas: [REDACTED]
	QME – Mt Isa	Exp: [REDACTED]	[REDACTED]
	QME - Mackay	El: [REDACTED]	Gas: [REDACTED]
Dept of Employment and Industrial Relations	Workplace Health and Safety	1300 369 915	
Queensland Health	Call Centre	[REDACTED]	-
	Poisons Information Centre	131 126	
	Asbestos Issues	13 432584	-
	Population Health Branch	13 432584	-
	Forensic and Scientific Services Laboratory 39 Kessels Road, Coopers Plains 4108	[REDACTED]	-
Qld Treasury	Liquor Licensing	13 13 04	-
Department of Justice and A-G	Dispute Resolution Centre	[REDACTED]	-
Ombudsman	Queensland Ombudsman	1800 068 908	-

Table 2.2: Authorities

AGENCY	SECTION/ISSUE (Qld Authorities)	B/H	A/H
PORT AUTHORITIES			
Brisbane			[REDACTED]
Bundaberg			[REDACTED]
Gladstone			[REDACTED]
Mackay			[REDACTED]
Townsville			[REDACTED]
Cairns			[REDACTED]
PORTS CORP QLD			
Ports Corp QLD	(Head Office)	[REDACTED]	[REDACTED]
Hay Point		[REDACTED]	[REDACTED]
Abbot Point		[REDACTED]	[REDACTED]
Lucinda		[REDACTED]	[REDACTED]
Mourilyan		[REDACTED]	[REDACTED]
Cape Flattery		[REDACTED]	[REDACTED]
Thursday Island		[REDACTED]	[REDACTED]
Weipa		[REDACTED]	[REDACTED]
Karumba		[REDACTED]	[REDACTED]
WATER AUTHORITIES			
SEQ Water	(QLD Bulk Water Assn)	[REDACTED]	-
NQ Water		[REDACTED]	-

Table 3: Federal Government Contacts

AGENCY	SECTION/ISSUE (Federal Govt)	B/H	A/H
AMSA			
Australian Maritime Safety Authority	Major oil spills and shipping emergencies		1800 641 792
GREAT BARRIER REEF MARINE PARK AUTHORITY			
GBRMPA	Duty Environment Coordinator		quote "OIL SPILL"
GBRMPA			
AQIS			
AQIS	Australian Quarantine and Inspection Service		1800 020 504
FEDERAL POLICE			
Australian Federal Police	– Environmental Crime Officer		
AIRCRAFT			
Air Services Australia	Aircraft noise enquiries		1300 301 120
CASA	Civil Aviation Safety Authority	131 757	131 757
WEATHER			
Bureau of Meteorology	Queensland Regional Office (Brisbane 24hrs)		
	Field Meteorology Office – Cairns		--
	Field Meteorology Office – Charleville		--
	Field Meteorology Office – Longreach		--
	Field Meteorology Office – Mackay		--
	Field Meteorology Office – Mount Isa		--
	Field Meteorology Office – Rockhampton		--
	Field Meteorology Office – Townsville (RAAF)		--
	Field Meteorology Office – Weipa		--
	DoT / MSQ Maritime weather service Qld / Marine / SEQ		1300 360 426 / 427 / 428

Table 4: Local Government Contacts

COUNCIL	B/H	A/H	DERM OFFICE
Aurukun Shire Council			Cairns
Balonne Shire Council			
Banana Shire Council			Gladstone
Barcardine Regional Council			Emerald
Barcoo Shire Council			Emerald
Blackall -Tambo Regional Council			Emerald
Brisbane City Council			Brisbane City North and Brisbane City South
Brisbane Traffic Control			
Boulia Shire			
Bulloo Shire Council			
Bundaberg Regional Council			Wide Bay Burnett
Burdekin Shire Council			Townsville
Burke Shire Council			Cairns
Cairns Regional Council			Cairns
Carpentaria Shire Council			Cairns
Cassowary Coast Regional Council			Cairns
Central Highlands Regional Council			Emerald
Charters Towers Regional Council			Townsville
Cherbourg Aboriginal Shire Council			Wide Bay Burnett
Cloncurry Shire Council			Cairns
Cook Shire Council			Cairns
Croydon Shire Council			Cairns
Dalby Regional Council			
Dalrymple Shire			Townsville
Diamantina Shire Council			Emerald

COUNCIL	B/H	A/H	DERM OFFICE
Doomadgee Aboriginal Shire Council			Cairns
Etheridge Shire Council			Cairns
Flinders Shire Council			Townsville
Fraser Coast Regional Council			Wide Bay Burnett
Gladstone Regional Council			Gladstone
Gold Coast City Council			Gold Coast
Goondiwindi Regional Council			
Gympie Regional Council		1300 307 800	Wide Bay Burnett
Hinchinbrook Shire Council			Cairns
Hope Vale Aboriginal Shire Council			Cairns
Ipswich City Council			Ipswich
Isaac Regional Council			Mackay
Kowanyama Aboriginal Shire Council			Cairns
Lockhart River Aboriginal Shire Council			
Lockyer Valley Regional Council			Ipswich
Logan City Council			Logan – Scenic Rim
Longreach Regional Council			Emerald
Mackay Regional Council			Mackay
Mapoon Aboriginal Shire Council			Cairns
McKinlay Shire Council			Cairns
Moreton Bay Regional Council		Pine Rivers	Moreton Bay
		Redcliffe 1300 733 480	Moreton Bay
		Caboolture	Moreton Bay
Mornington Shire Council			Cairns
Mount Isa City Council			
Murweh Shire Council			
Napranum Aboriginal Shire Council			Cairns
North Burnett Regional Council			Wide Bay Burnett
Northern Peninsula Area Regional			Cairns
Palm Island Aboriginal Shire Council			Townsville
Paroo Shire Council			
Pormpuraaw Aboriginal Shire Council			Cairns
Quilpie Shire Council			
Redland City Council			Redland
Richmond Shire Council			
Rockhampton Regional Council			Rockhampton
Roma Regional Council			Toowoomba
Scenic Rim Regional Council			Logan – Scenic Rim
Somerset Regional Council			Ipswich
South Burnett Regional Council			Wide Bay Burnett
Southern Downs Regional Council			Toowoomba
Sunshine Coast Regional Council		1300 007 272	Sunshine Coast
Tablelands Regional Council			Cairns
Toowoomba Regional Council			Toowoomba
Torres Shire Council			Cairns
Torres Strait Island Regional Council			Cairns
Townsville City Council			Townsville
Weipa Town Council			Cairns
Whitsunday Regional Council			Mackay
Winton Shire Council			Emerald
Woorabinda Aboriginal Shire Council			Rockhampton
Wujal Wujal Aboriginal Shire Council			Cairns
Yarrabah Aboriginal Shire Council			Cairns

Table 5: Interstate Environmental Science Coordinators (ESCs)

STATE	ESC	B/H	A/H
Queensland			
Queensland			
Queensland			
Queensland - MSQ			

STATE	ESC	B/H	A/H
Queensland - GBRMP			
Queensland - GBRMP			
New South Wales			
New South Wales			
Victoria			
Victoria			
Tasmania			
South Australia			
Western Australia			
Western Australia			
Northern Territory			
New Zealand			
New Zealand			
AMSA			

Table 6: Other Contacts

AGENCY	SECTION/ISSUE	B/H	A/H
LABORATORIES			
ALS	Stafford 4053		-
QLD Health	Coopers Plains 4108		-
DPI	Yeerongpilly Pathology Lab		-
SIMTARS	Mineral laboratory		-
ELECTRICITY			
Energex		131 253	131 253
CAR BREAKDOWN			
RACQ		131 111	131 111
TELECOMMUNICATIONS			
Orange Paging	Message confirmation	1300 551 166	1300 551 166
Optus	Directory Assistance Service	124 937	124 937
REGULATED WASTE TRANSPORTERS			
Thiess Services			
Transpacific	(Zappaway, Nationwide Oil)		
Veolia	(Collex)		1300 134 364
Cleanaway		131 339	
Barkoola Environmental			
Wanless			
Sita environmental Services		131 335	
Specialised Waste Services			
Chemtrans			1800 190 900
REGULATED WASTE DISPOSAL			
Rosedale Landfill	(Thiess)		
Willowbank	(Violia)		
Swanbank	(Thiess)		
INCINERATION FACILITIES			
Ace Waste		1300 850 901	
QLD Funeral Directors' Assn			-
CONTRACTORS (RESPONSE AND CONTAMINATED LAND)			
URS			
OTEK			
GHD			
Golder			
Coffey			
Sinclair Knight Merz			
Parsons Brinkerhoff			
WBM			
ISS First Response	Emergency response	1300 131 001	1300 131 001

AGENCY	SECTION/ISSUE	B/H	A/H
Aussie Excavators	Earthmoving services	[REDACTED]	[REDACTED]
Austrans	Vacuum trucks	[REDACTED]	[REDACTED]
PETROLEUM COMPANIES			
BP		[REDACTED]	
Caltex		[REDACTED]	
Santos		[REDACTED]	
Shell		13 16 18	
HIRE COMPANIES			
Coates Hire		[REDACTED]	
KMT Temporary Fencing	Temporary fencing	[REDACTED]	
Transite Hire	Demountable offices	[REDACTED]	
National Hire	Toilets	136 366	
QLD GOVERNMENT - CHARTERING AIRCRAFT POLICY			
Independent Aviation	http:QGOV.independentaviation.com.au Standing Offer Arrangement: QGCPO609	[REDACTED]	1300 307 747
HELICOPTERS			
SES		[REDACTED]	
Austcopters P/L		[REDACTED]	
Aeropower		[REDACTED]	
CHARTER PLANES			
Air Charter Co-Ordinators	rayorr@bigpond.net.au	[REDACTED]	
Great Western Aviation P/L		[REDACTED]	
Austrek Aviation P/L	morjetA2@bigpond.com	[REDACTED]	[REDACTED]
QANTAS	Mt Isa, Longreach, Barcaldine, Emerald, Blackwater, Blackall, Biloela, Charleville, Roma, Proserpine	13 13 13	

CSG COMPANY CONTACTS AND MAIN SITE INFORMATION

SANTOS KEY SITES

<p>“Fairview” CSG Plant Environmental Authority: PEN100178208 Santos contact: [REDACTED] (Environmental Advisor) Phone: (07) [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@santos.com</p> <p>KNOWN ISSUES:</p> <ul style="list-style-type: none"> TEP to address CSG water releases PL99 “OK1” well has 2 overflowing “turkeys nest” dams as of 24 Dec 2010. Santos are addressing this matter Pending TEP [program notice submitted] for turkeys nests 	<p>Local Government: Maranoa Regional Council Mayor: Councillor Robert Loughnan Contact Details Phone: [REDACTED] Email: [REDACTED]@maranoa.qld.gov.au</p> <p>Nearest town: Injune Injune Police Station: Phone: (07) 4626 1200 47 Station Street, Injune, QLD 4454</p>
<p>“Arcadia” CSG Plant Environmental Authority: PEN200361209 Santos contact: [REDACTED] (Environmental Advisor) Phone: (07) [REDACTED] Mobile: [REDACTED] [preferable] Email: [REDACTED]@santos.com</p> <p>KNOWN ISSUES:</p> <ul style="list-style-type: none"> Pending TEP [program notice submitted] for turkeys nests 	<p>Local Government: Central Highlands Regional Council Mayor: Councillor Peter Maguire Contact Details Phone: mobile [REDACTED] office (07) 4 [REDACTED] Email: [REDACTED]@chrc.qld.gov.au</p> <p>Nearest town: Injune Injune Police Station: Phone: (07) 4626 1200 47 Station Street, Injune, QLD 4454</p>
<p>“Roma” CSG Plant Environmental Authority: PEN100385309 Santos contact: [REDACTED] (Environmental Advisor) Phone: (07) [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@santos.com</p> <p>KNOWN ISSUES:</p> <ul style="list-style-type: none"> Pending TEP [program notice submitted] for turkeys nests 	<p>Local Government: Maranoa Regional Council Mayor: Councillor Robert Loughnan Contact Details Maranoa Regional Council Phone: [REDACTED] Email: [REDACTED]@maranoa.qld.gov.au</p> <p>Nearest town: Roma Roma Police Station: Phone: (07) 4622 9333 44-46 Queen Street, ROMA, QLD, 4455</p>

QGC Key SITES

<p>“Walloon Fairway”–Northwest QGC Development Area Environmental Authority: PEN100020207 (Project EA) QGC contact: [REDACTED] (Manager Environment – Upstream Operations) Phone: (07) [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@bg-group.com</p>	<p>Local Government: Western Downs Regional Council Mayor: Councillor Ray Brown Contact Details Phone: 0407 650 216 Email: [REDACTED]@wdrc.qld.gov.au</p> <p>Nearest town: Wandoan Wandoan Police Station: Phone: (07) 4627 4222 Royd St, Wandoan QLD 4419</p>
<p>“Walloon Fairway”– Central QGC Development Area Environmental Authority: PEN100020207 (Project EA) QGC contact: [REDACTED] (Manager Environment – Upstream Operations) Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@bg-group.com</p>	<p>Local Government: Western Downs Regional Council Mayor: Councillor Ray Brown Contact Details Phone: [REDACTED] Email: [REDACTED]@wdrc.qld.gov.au</p> <p>Nearest Town/s: Miles, Chinchilla Chinchilla Police Station: Phone: (07) 4662 7200, Henney St and Bell, Chinchilla QLD 4413 Miles Police Station: Phone: (07) 4627 1222, 32 Constance St, Miles QLD 4415</p>
<p>“Walloon Fairway”– Southern QGC Development Area Environmental Authority: PEN100020207 (Project EA) QGC contact: [REDACTED] (Manager Environment – Upstream Operations) Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@bg-group.com</p>	<p>Local Government: Western Downs Regional Council Mayor: Councillor Ray Brown Contact Details Phone: [REDACTED] Email: [REDACTED]@wdrc.qld.gov.au</p> <p>Nearest Town: Tara Tara Police Station: (07) 4665 3200 Sara St and Bilton St, Tara QLD 4421</p>
<p>“The Walloon Subgroup” Environmental Authority: PEN200030207 BG International Contact: [REDACTED] (Manager Environment – Upstream Operations) Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@bg-group.com</p> <p>Local Government: Banana Regional Council Mayor: Councillor John B Hooper Contact Details Phone: [REDACTED] Email: john.hooper@banana.qld.gov.au</p>	<p>Local Government: Western Downs Regional Council Mayor: Councillor Ray Brown Contact Details Phone: [REDACTED] Email: [REDACTED]@wdrc.qld.gov.au</p> <p>Nearest town/s: Wandoan and Taroom Wandoan Police Station: Phone: (07) 4627 4222 Royd St, Wandoan QLD 4419 Taroom Police Station: (07) 4627 3200</p>

ARROW ENERGY KEY SITES

<p>Moranbah Gas Project</p> <p>Environmental Authority: PEN100015907 Arrow Contact: N/A Phone: 1800 779 448 Mobile: N/A Email: N/A</p> <p>KNOWN ISSUES:</p> <ul style="list-style-type: none"> ▪ Currently discharging from CSG dam to Isaacs River. Likely to continue whilst river is above 1090ML flow ▪ This is an unauthorised release that. ▪ Draft TEP submitted, but does not contain sufficient info for DERM to complete assessment as at 24 Dec. 	<p>Local Government: Isaac Regional Council Mayor: Cedric Marshall Contact Details Phone: [REDACTED] Email: mayor@isaac.qld.gov.au</p> <p>Nearest town: Moranbah Moranbah Police Station: Phone: (07) 49416 200 St Francis Dr, Moranbah QLD 4744</p>
<p>Arrow Dalby Expansion Project</p> <p>Environmental Authority: PEN100449509 Dalby Contact: N/A Phone: 1800 779 448 Mobile: N/A Email: N/A</p> <ul style="list-style-type: none"> ▪ 	<p>Local Government: Western Downs Regional Council Mayor: Ray Brown Contact Details Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@wdrc.qld.gov.au</p> <p>Nearest town: Dalby Dalby Police Station: Phone: (07) 4669 9222 47 Drayton Street Dalby QLD 4405</p>

ORIGIN ENERGY KEY SITES

<p>Spring Gully Environmental Authority: PEN1000709307 Contact name: [REDACTED] Phone: [REDACTED] Mobile: n/a Email: [REDACTED]@originenergy.com.au</p> <p>Contact name: [REDACTED] Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@originenergy.com.au</p> <p>KNOWN ISSUES:</p> <ul style="list-style-type: none"> ▪ No current to waters, but potential discharge if in excess of 250mm rain falls on site. ▪ Draft TEP submitted 21 Dec and DERM requested info. ▪ Draft TEP re-submitted 24 Dec, however does not contain sufficient information for DERM to complete assessment on 24 Dec. 	<p>Local Government: Maranoa Regional Council Mayor: Councillor Robert Loughnan Contact Details Phone: [REDACTED] Email: [REDACTED]@maranoa.qld.gov.au</p> <p>Nearest town: Injune Injune Police Station: Phone: (07) 4626 1200 47 Station Street, Injune, QLD 4454</p>
<p>Talinga Environmental Authority: EA150165 Contact name: [REDACTED] Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@originenergy.com.au</p> <p>Contact name: [REDACTED] Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@originenergy.com.au</p>	<p>Local Government: Western Downs Regional Council Mayor: Ray Brown Contact Details Phone: [REDACTED] Email: [REDACTED]@wdrc.qld.gov.au</p> <p>Nearest town: Chinchilla</p> <p>Chinchilla Police Station: Henney St and Bell Chinchilla QLD 4413 (07) 4662 7200</p>
<p>Peat Environmental Authority: EA150040 Contact name: [REDACTED] Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@originenergy.com.au</p> <p>Contact name: [REDACTED] Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@originenergy.com.au</p>	<p>Local Government: Central Highlands Regional Council Mayor: Peter Maguire Contact Details Phone: [REDACTED] qld.gov.au</p> <p>Nearest town: Wandoan Wandoan Police Station: Phone: (07) 46274222 47 Ryde Street Wandoan 4419</p>

<p>Denison Trough – Yellow Bank Environmental Authority: 150 036 Contact name: [REDACTED] Phone: [REDACTED] Mobile: n/a Email: [REDACTED]@originenergy.com.au</p> <p>Contact name: [REDACTED] Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@originenergy.com.au</p>	<p>Local Government: Maranoa Regional Council Mayor: Councillor Robert Loughnan Contact Details Phone: [REDACTED] Email: [REDACTED]@maranoa.qld.gov.au</p> <p>Nearest town: Injune Injune Police Station: Phone: (07) 4626 1200 47 Station Street, Injune, QLD 4454</p>
<p>Denison Trough – Rolleston Environmental Authority: 150 036 Contact name: [REDACTED] Phone: [REDACTED] Mobile: n/a Email: [REDACTED]@originenergy.com.au</p> <p>Contact name: Pat Ford Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@originenergy.com.au</p>	<p>Local Government: Central Highlands Regional Council Mayor: Peter Maguire Contact Details Phone: [REDACTED] Email: enquiries@chrc.qld.gov.au</p> <p>Nearest town: Rolleston</p>
<p>Kincora Environmental Authority: PEN100240608 (PL14, PL21, PL22, PL27, PL30, PL53, PL56, PL64, PL70, PL71, PL74, PL174 - Surat); PEN200033407 (PL227 - Horseshoe) and PEN200288909 (PL264 – Emu Apple).</p> <p>Contact name: [REDACTED] Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]r@originenergy.com.au</p> <p>Contact name: [REDACTED] Phone: [REDACTED] Mobile: [REDACTED] Email: [REDACTED]@originenergy.com.au</p>	<p>Local Government: Maranoa Regional Council Mayor: Councillor Robert Loughnan Phone: [REDACTED]6 Email: [REDACTED]@maranoa.qld.gov.au</p> <p>Nearest town: Roma Roma Police Station: Phone: (07) 4622 9333 44-46 Queen Street, ROMA, QLD, 4455</p> <p>Nearest town: Surat</p>

APPENDIX D – RESPONSE NOTIFICATION PROMPT SHEET

Date, Time and Location of discharge	
Tenure number?	
Production / Exploration?	
Name, position, and contact number of the person notifying of the incident?	
What is the cause of the discharge (if known)?	
Is the discharge ongoing?	
Can we access the discharge site, CSG site and receiving environment?	
What is the company involved?	
Who is the appropriate contact person and his/her details?	
What actions have the CSG taken to date?	
Are there any Safety Hazards?	
What is the quantity of discharge?	
What is the water quality of the discharging water?	
If no water samples have been taken of the actual discharge, has the water been previously sampled? If so, what is the water quality.	
Will the company sample (at point of discharge, upstream and downstream)	
What type of material was discharged (e.g. hydrocarbons, CSG Water, Brine, RO permeate, sewage, chemicals, stormwater)?	
What Creeks / Rivers / Watercourses have been affected or have potential to be affected?	

What is the current flow rate of the creek/watercourse?	
Is there any drinking, recreational or livestock water points downstream?	
What are the environmental values of the receiving environment? Are there any sensitive downstream values?	
Who are the potentially impacted landholders or stakeholders?	
Has these landholders / stakeholders been notified? What are their contact details? Has the local council been notified?	
What immediate actions are proposed by the company?	
Is this a potential breach of the companies EA? If so, what condition?	

APPENDIX E – INITIAL RESPONSE KIT

Minimum Personal Protective Equipment

- Hard Hat
- High Visibility Vest
- Steel Cap Boots
- Qld Government Long Sleeve Shirt and Trousers

Minimum Safety Equipment

- UHF Radios
- Satellite Phone
- Emergency Beacon
- 4WD vehicle
- GPS
- Fresh Water
- Batteries
- Orange Flashing Light
- Torch
- Camera
- Pens
- Official Notebook
- Paper / Maps

Basic Sampling Equipment Kit (*to be refined*)

- Sampling Pole
- TPS / YSI (in-situ field measurements)
- pH strips
- Minimum 1L of Distilled Water
- 10 x sediment jars
- 10 x metal analysis bottles (water quality)
- 10 x standard physical unpreserved bottles (water quality)
- 2 x oil / grease / hydrocarbon bottles
- 2 x Ammonia / Nitrogen / phosphorous bottles (sewage)
- 1 x box gloves
- 20 x syringes
- 1 x box of 0.45 µm syringe filters

APPENDIX F - COMPLIANCE ACTIVITY FIELD GUIDE

Preface: This field guide is formulated to provide basic information to field officers in relation to assessing activities for compliance and to provide information on procedures to follow when making inquiries or investigation into suspected non-compliance.

This guide relates to the provisions of the *Environmental Protection Act 1994*. Field Officers must be familiar of the provisions of the *Environmental Protection Act 1994* (the 'Act') so that they can carry out their duties effectively and lawfully.

Whilst the enforceable provisions of the Act for Petroleum and Gas activities relate to Chapter 5A of the *Environmental Protection Act 1994*, the field staff will be designated as Authorised Persons under the Act and therefore knowledge of their obligations and the provisions of the Act is crucial.

Topics covered by this guide:

- Part 1. Authorised Persons - Section 445 *Environmental Protection Act 1994***
- Part 2. Powers of Authorised Persons - Chapter 9**
- Part 3. Offences that relate to the powers of Authorised Persons**
- Part 4. Records and Record Keeping requirements**
- Part 5. Exhibit Handling- Sect's 461-462**
- Part 6. Interviewing/ Witness Statements**
- Part 7. Field Equipment – Types and Use**
- Part 8. Flow Charts - Compliance Management Guide/ Compliance Actions**

PART 1 AUTHORISED PERSONS

All field staff will be required to be appointed as an Authorised Person under the provisions of Section 445 of the *Environmental Protection Act 1994*. To exercise any of the powers under the legislation the person must be an Authorised Person in possession of an Identity Card.

PART 2. POWERS OF AUTHORISED PERSONS

Chapter 9 of the *Environmental Protection Act 1994*, Investigation and Enforcement.

This chapter outlines the general powers of authorised persons and all field staff should be familiar with the contents of that chapter of the legislation.

Section 449 *Production of identity card.*

(1) An authorised person may exercise a power in relation to someone else only if the authorised person—

(a) first produces his or her identity card for the person's inspection; or

(b) has his or her identity card displayed so that it is clearly visible to the person.

(2) If, for any reason, it is not practicable to comply with subsection (1), the authorised person must produce the identity card for inspection by the person at the first reasonable opportunity.

Section 452 *Entry of place—general*

(1) An authorised person may enter a place if—

(a) its occupier consents to the entry and, if the entry is for exercising a power under chapter 7, part 5B or 8, its owner consents; or

(b) it is a public place and the entry is made when the place is open to the public; or

(ca) it is a place to which an Agricultural ERA, a registration certificate, a development approval subject to a development condition or a code of environmental compliance relates and the entry is made when—

(i) the chapter 4 activity to which the certificate, approval or code relates is being carried out; or

(ii) the place is open for conduct of business; or

(iii) the place is otherwise open for entry; or

Note: In relation to the Environmental Services staff it is expected that entry to places will be primarily conducted as outlined in Section 452(1)(a) with the owner / occupier having knowledge of the visit and providing consent for the visit.

Where consent is given, consideration should be given to obtaining confirmation of that consent either in writing from the owner/ occupier or by corroboration of such consent. Section 485 refers to content of consent form.

Section 455 *Entry of land for access*

(1) This section applies if—

*(a) an authorised person may enter land (the **primary land**) under section 452 or 454; and*

*(b) it is necessary or desirable to cross other land (the **access land**) to enter the primary land.*

Note: This section provides for the access across other property to obtain entry into the primary land. There is provision for such access with consent of the occupier and this would be the preferred method. The section further outlines the actions required if that consent is not obtained.

Sections 456 and 457 relate to the **authority to apply for Warrants** and how applications may be made. It should be noted that any application and subsequent entry

via the execution of a Warrant should only be done with the approval of the Regional Service Director and Director of the Compliance and Investigations Branch .

Section 458 Order to enter land to conduct investigation or conduct work

This section states that an authorised person may apply to a magistrate for an order to enter land to carry out work on the land to secure compliance with an accredited ERMP. Application for any order under this section should only be done with the approval of the Manager of the Reef Unit.

Section 459 Entry or boarding of vehicles

- (1) An authorised person may enter or board a vehicle if the authorised person has reasonable grounds for suspecting—*
 - (a) the vehicle is being, or has been, used in the commission of an offence against this Act; or*
 - (b) the vehicle, or a thing in or on the vehicle, may provide evidence of the commission of an offence against this Act; or*
- (2) If the vehicle is moving or about to move, the authorised person may signal the person in control of the vehicle to stop the vehicle or not to move it.*
- (3) To enable the vehicle to be entered or boarded, the authorised person may—*
 - (a) act with necessary and reasonable help and force; and*
 - (b) require the person in control of the vehicle to give reasonable help to the authorised person.*

Section 471 creates the offence for failing to comply with a signal under section 459(2) to stop or not to move a vehicle.

Note: The power outlined in Section 459(2) and (3) should be carried out with care taking into account the options available to achieve the same outcome. Consider the assistance of Police where the vehicle is not on the occupiers/ owners property or on a roadway and the need exists to stop the vehicle.

Section 460 General powers for places and vehicles

This section provides broad powers to Authorised Persons who lawfully enters a place or boards a vehicle to conduct their duties.

Authorised Persons should be familiar with the content of this section as the powers apply to all entries and boarding's and are not confined only to enforcement actions

Section 461 Power to seize evidence

This Section applies to the power to seize evidence where lawful entry has been gained with the intent of seizing evidence to a place either with warrant or by occupiers consent.

Any entry done with the intent of seizing evidence should be carried out as per this section and with the assistance of an investigator and/or supervisor where practicable.

Approval for such entry and seizure should, where practicable, be approved by the manager of the Reef Unit.

Section 462 Procedure after seizure of evidence

Outlines the requirement that an authorised person must give a receipt for a thing seized to the person from whom it was seized.

The section also outlines the procedure and associated requirements for dealing with the receipt and seized property. Subsections 5 to 7 relates to the retention of the seized material/ item and the return of it to the owner.

Any material or item seized should be dealt with as an exhibit. Refer to Compliance Investigations Manual Chapter 8 which refers to Exhibit Management.

Section 464 Power to require name and address

(1) An authorised person may require a person to state the person's name and address if the authorised person—

(a) finds the person committing an offence against this Act; or

(b) finds the person in circumstances that lead, or has information that leads, the authorised person to suspect on reasonable grounds that the person has committed an offence against this Act.

(2) When making the requirement, the authorised person must warn the person that it is an offence against this Act to fail to state the person's name and address, unless the person has a reasonable excuse.

(3) The authorised person may require the person to give evidence of the correctness of the person's name or address if the authorised person suspects on reasonable grounds that the name or address given is false.

Section 475 creates the offence for failing to comply with name and address requirement.

Section 465 Power to require answers to questions

(1) This section applies if an authorised person suspects, on reasonable grounds, that—

(a) an offence against this Act has happened; and

(b) a person may be able to give information about the offence.

(2) The authorised person may require the person to answer a question about the offence.

(3) When making the requirement, the authorised person must warn the person it is an offence to fail to comply with the requirement, unless the person has a reasonable excuse.

Section 476 creates the offence for failure to comply with requirement under Section 465.

Section 466 Power to require production of documents

(1) An authorised person may require a person to produce to the authorised person for inspection a document required to be held or kept under this Act or a development condition of a development approval.

(2) The authorised person may keep a produced document to take an extract from, or make a copy of, the document.

(3) The authorised person must return the document to the person as soon as practicable after taking the extract or making the copy.

PART 3. OFFENCES THAT RELATE TO THE POWERS OF AUTHORISED PERSONS

Part 5 of the *Environmental Protection Act 1994* deals with multiple offences that relate to the compliance powers of Authorised Persons. Appropriate offences are outlined hereunder.

Note: The provisions mentioned in this guide are limited and referral to the Act should occur and assistance sought where suspicion of non compliance occurs.

Section 471 Failure to comply with signal

This section provides an offence for failing to obey a signal under section 459(2) to stop or not to move a vehicle, unless the person has a reasonable excuse for not obeying the signal. Defences apply (E.g. safety, first opportunity)

Section 475 Failure to give name and address etc.

This section relates to where a person is required by an authorised person under section 464(1) to state the person's name or address or is required by an authorised person under section 464(3) to give evidence of the correctness of a name fails to comply with the requirement, unless the person has a reasonable excuse for not complying with it.

Subsection (3) states; *The person does not commit an offence against this section if—*
(a) *the authorised person required the person to state the person's name and address on suspicion of the person having committed an offence against this Act; and*
(b) *the person is not proved to have committed the offence.*

476 Failure to answer questions

This section applies if an authorised person requires a person under section 465 to answer a question, the person must comply with the requirement unless the person has a reasonable excuse for not complying with it.

Reasonable excuse – “might tend to incriminate the person”.

No offence committed if the information sought by the authorised person is not in fact relevant to the offence.

477 Failure to produce document

This section creates the offence for a person who was required under section 466 to produce a document and failed to comply with the requirement, unless the person had a reasonable excuse for not complying with it.

482 Obstruction of authorised persons

This section creates the offence for a person who obstructs an authorised person in the exercise of a power under this chapter, unless the person has a reasonable excuse for obstructing the authorised person. In this section **authorised person** includes a person who is—

- (a) acting under an authorised person's direction under section 363K; or
- (b) authorised by an authorised person to take action under section 467(2)(b); or
- (c) helping an authorised person under this chapter.

PART 4 RECORDS and RECORD KEEPING

Environmental Services staff are required to keep accurate records to ensure monitoring of progress against Service Delivery requirements is achievable and the content is of a standard that would pass judicial review.

Records are for two purposes;

- Compliance Monitoring and Service Delivery
- Compliance Enforcement

Compliance Monitoring and Service Delivery

Records for this purpose will be kept for;

- Statistics
- Performance delivery
- Service delivery
- Enforcement/ compliance actions

Records for this purpose will be by way of ;

- Diary Entries
- Field Inspection reports
- Ecotrack data entry

Compliance Enforcement

Records for this purpose will be kept for;

- Statistics
- Compliance History
- Investigation process
- Court Proceedings
- Evidence

Records for this purpose will be by way of;

- Diary entries
- Official Note Book entries
- Field Inspection reports
- Ecotrack data entry

PART 5 EXHIBIT HANDLING – (Including Sections 461 and 462(EPA))
(Includes extracts from Departmental Compliance Investigation Manual)

Introduction

Failure to control an exhibit lawfully may result in the exclusion of the exhibits as evidence and jeopardize the final outcome of the prosecution case, and subsequent repercussions to the investigator personally.

Continuity of Evidence

Continuity of possession is required to ensure any material that may be used as evidence is kept in a manner that ensures originality. This includes the need to keep the material secure, ensure no alterations are made and to have a record of the place kept and in whose possession it has been. The Compliance Investigation Manual Chapter 8 refers to Exhibit Management.

Property Receipt

If a thing is taken or seized, a property receipt must immediately be given to the person in control of the thing (normally the owner or custodian of the thing). If it is impossible to immediately give the person a property receipt then it must be given as soon as practicable after the seizure or the receipt may be left at the place of seizure in a conspicuous and reasonably secure place.

The following information must also be completed on the property receipt:

- name and address of the person from whom the property was seized or taken.
- Authorised Officer's name – name of the investigator's taking or seizing the property;
- the location the exhibit was taken from – this also includes a description of the location within the property from where it was seized or taken.
- a brief description of the exhibit including any serial number and/or identification marks;
- comment on its condition and value (if known) at the time of seizure;
- date and time taken; and
- CIRaM number (If known).

The property receipt is to have the following distribution:

- Investigator's brief/ Reef Unit File - Original
- Person from whom thing taken or seized - Copy 1
- Attached to the thing - Copy 2
- Remaining in book - Copy 3

Exhibit Registers

The Exhibit Register is an official and auditable document in which all physical exhibits (other than original documents) that cannot be satisfactorily controlled by the investigator are to be entered. It records all ingress and egress of exhibits at property point, and identifies the custodian of the exhibit should it be removed from the property point for analysis or further investigation purposes. Each exhibit must be labelled securely so that the label will not become detached in packing or handling. Details of the exhibit must be recorded in an exhibit register so its whereabouts can be tracked. The exhibit itself should be appropriately secured.

PART 6 INTERVIEWING/ WITNESS STATEMENTS

(Includes extracts from Departmental Compliance Investigation Manual)

Interviews

Whilst the following information primarily relates to interviews associated with suspected offences, the day to day field inquiries may wish to adopt the general standard so that progression to enforcement actions is supported by previous field records and practices.

Chapter 9 of the Compliance Investigation Manual provides detail for Interviewing.

A Record of Interview with a suspected offender should be conducted using electronic recording devices (Video/ Audio). Where practicable assistance should be sought from supervisors and/or investigators prior to conducting this type of interview.

Interviews should be conducted in a courteous and sensitive manner with an emphasis on portraying a professional image of the investigator and the Department.

Location

The location chosen to conduct an interview may set the tone for an interview. Whilst it is best practice to conduct any interview in a private area free from distractions and interruptions, it is recognised that some interviewees may request or insist on the interview occurring at a location set by themselves (e.g. in their home or at their workplace)

For any interview consider interference factors including interjection by other persons, machinery or electronic noises and comfort.

Witness Statements

As part of day to day field operation staff will become involved with potential witnesses and also be witnesses to offences.

As a result field staff should be familiar with the process of taking or making a statement to a standard that is suitable for production in a criminal proceeding. Seek assistance from a supervisor or investigator if necessary.

Chapter 9 of the Compliance Investigation Manual provides detail for Statement taking and making

A statement may be made:

In an Official Notebook

Handwritten on paper

Typewritten (Most preferred for court)

Electronic Recording (Audio/ Video)

If requested to obtain or make a formal statement the following should occur:

- Seek advice from the Supervisor/ Manager
- Gather all known facts relevant to the incident,
- Understand the elements to be proved regarding the offences alleged to have been committed,
- Identify the best venue to interview the witness,
- Identify what information the witness may be able to provide and remember the 'who, what, where, when and how' questions that underpin an interview

- Preliminary inquiries with the witness will determine what the person knows about the incident.
- Evaluate this information to determine if it is relevant to the investigation.
- Record the information formally as a statement.

Guide to Validating Witness' Observations

A witness' observations may be critical in describing an offence or proving a particular element of an offence. To assist in assessing a witness' observations the ADVOKATE acronym is valuable:

A - Amount of time the witness observed the incident or offender

D - Distance between the offence and witness

V - Visibility including atmospheric conditions, lighting etc

O - Obstructions to the witness' line of sight

K - Knowledge with regard to the witness having previously known the offender

A - Any special reason for the witness to remember the incident or offender

T - Time lapse between the incident and when the witness made their statement

E - Errors or discrepancies

PART 7 FIELD EQUIPMENT

To ensure continuity of evidence and quality of evidence it is necessary to have personalised field equipment.

Equipment to be carried

Camera- Digital
Voice Recorder- digital
Diary
Official Note Book
Field forms
Receipt Book.
Bags and Containers

Note: Personal issue allows users to maintain the equipment to a high standard and also provides a high standard of knowledge of use.

Procedures when working with field equipment.

Note: All records made and kept by this department may be subject to audit, public access or production in court.

Camera.

For evidence purposes the person who takes the photo should be the person who downloads the photo and subsequently prints the photo or copies the photo to another medium. The person who takes the photo must be the person who produces the photo (exhibit) to a court.

Voice Recorder

For evidence purposes the person who makes the recording should be the person who downloads the recording and subsequently copies the recording to another medium. The person who makes the recording must be the person who produces the recording (exhibit) to a court.

Diary

To be used for day to day compliance monitoring and management. Records should briefly include;

- Dates and times (in and out)
- Place visited
- Persons Spoken to
- Outline of matters discussed
- Observations including positive matters
- Non Compliance activities

Note: This record may be subpoenaed for court or be required to be produced under RTI legislation. Avoid opinion or derogatory statements.

Official Note Book

To record any official information regarding compliance activities. Records should include;

- Dates, times
- Place
- Details of suspects and witnesses
- Observations of suspected non compliance

- Corroborators endorsements
- Witness statements
- Details of actions taken.

Note: These notes are primarily made with consideration that they may be produced in a court proceeding. Notes should be factual and should not include irrelevant information and opinion.

Field Forms

To be completed for every field inspection in relation to Level A and B inspections. These are notes made at the time and should be signed by the person making the entries and adoption sought by initial from the property occupier/ owner.

Receipt Book

Section 462 *Environmental Protection Act 1994- Procedure after seizure of evidence*
 Outlines the requirement that an authorised person must give a receipt for a thing seized to the person from whom it was seized.

Where property / documents are voluntarily provided by the owner/ occupier in relation to monitoring day to day compliance, consideration should be given to making a record in the Official Note Book and have the owner/ occupier acknowledge the supply and return of the items in that book. A receipt may be issued from the Receipt Book and an acknowledgement (Indemnity Receipt) of the items return should be kept in that book or other place of record.

Bags and Containers

- Preservation of all items and material taken into the possession of DERM staff is required to ensure;
- The item is identifiable.
- The item can be returned to the owner in the condition that it was taken.
- The item is maintained in its condition for court purposes.
- The item is not contaminated – when taken for further tests/ examination.
- The item is properly identified without the need to mark the actual item.

Examples of use:

- Plastic envelopes to preserve documents- can be marked with details
- Plastic Bags to preserve items from external contamination- identified and sealed
- Plastic bags and containers suitable to hold soil/chemicals for further testing. (Of a kind that does not affect the contents) – Can be identified and sealed.
- Boxes/ Larger Containers- To house large items or to maintain all items in one location.

APPENDIX H – ACTION PLAN TEMPLATE

CSG Discharge Incident

Date

Regional Manager

Team Leader (Mining)

Field Response Team
Members

**Safety Assessment
Completed**

Details

Field Response Required

Details

**Remote Area Trip sheet
Supplied**

Travel Arrangements

Details

Accommodation Required

Details

**Risk to Drinking,
recreational or livestock**

Details

water

**Immediate Preventative
Actions Required**

Details

**Immediate Enforcement
Action**

Details

**Evidence Collection /
Sampling Plan**

Details

Notification to Stakeholders

Details

Remediation Required

Details

Notification to Investigators

Details

SAMPLING PLAN

Ecosystems potentially impacted Take Filtered Samples

Livestock drinking water potentially impacted Take unfiltered Samples

Sediment Sampling Consider taking composite mixed samples

Sampling Checklist

Water Sampling Metals Unfiltered	Water Sampling Metals Filtered	Water Sampling General	Water Sampling – Specific analyte	Sediment Samples (Grab samples)	Sediment Samples (Composite samples)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sampling Locations

Sample ID	Location Details	Site Justification
Reference Sites		
Point Source Release Sites / Discharge Points		
Impacted Sites		

SAMPLING REGIME FOR CSG SPILLS:

SPILL TO LAND:

Soil samples:

- EC (1:5 soil:water),
- pH (1:5 soil:water),
- chloride
- SAR (as a measure of ESP)
- Samples should be a depth intervals 0-10 cm, 20-30cm and 50-60 cm and ideally, 3 replicates taken. A brief description of the soil, vegetation and land use should be also be provided.

PAH	TPH	Metals (total and dissolved)
Naphthalene	Naphthalene	Arsenic
Acenaphthylene	Nitrobenzene	Beryllium
Acenaphthene	2,4-dinitrotoluene	Barium
Fluorene	2,4,6-trinitrotoluene	Cadmium
Phenathrene	Phenol	Chromium [3, 6, total]
Anthracene	2,4-dinitrophenol	Cobalt
Fluoroanthene	Benzene	Copper
Pyrene	Toluene	Lead
Benz(a)anthracene	Ethylbenzene	Manganese
Chrysene	Xylenes [o-xylene and p-xylene]	Molybdenum
Benzo(b)fluoranthene		Nickel
Benzo(k)fluoranthene		Selenium
Benzo(a)pyrene		Strontium
		Vanadium
		Zinc
		Boron
		Sodium

Liquid samples of ponded water : Sample as table above including TDS, SAR, EC, pH, chloride, fluoride, major Anions, Major Cations and anions.

SPILL TO WATERS [if it actually made it that far]:

Waters:

- Samples as table above including physical analytes pH, EC, DO, Turbidity or suspended solids, chloride, fluoride, major Anions, major Cations and anions.

Sediment sample: Sample as table above including EC and pH.

APPENDIX I – SITUATION REPORT

CSG Discharge Incident

Date

Time

Field Response Coordinator

Sit Rep To:

Current Environmental Risk

N/A

Low

Medium

High

Details

Actions Taken to Date

Proposed Actions

Recommendation:

Operations Officer:

Signed:

Date:

Comment and Recommendation:

Incident Controller:

Signed:

Date:

MINE DISCHARGE RESPONSE PLAN

Regional Service Delivery

North Region



**Department of Environment
And Resource Management**

Mine Discharge Response Plan – Contents

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MINE DISCHARGE RESPONSE PLAN

Regional Services - North Region - DERM

SITUATION

The Department of Environment and Resource Management administers the *Environmental Protection Act 1994* and has a responsibility to address environmental issues associated with that legislation.

The North Region encompasses a broad range of industrial operations that include heavy industry and large mining operations each of which can be located in or near populated areas or in the more remote areas of the state. The conduct of the mining operations may result in environmental issues that require urgent actions by departmental staff.

Seasonal factors such as excessive rainfall often place a higher risk on the potentiality of mine releases / discharges.

Mine discharge situations may occur at any time and therefore a plan is required to ensure a 24 hour response capability by this division.

To determine whether the response to a contamination event triggers this plan, the criteria for a Mine Contamination Event (MCE) are outlined in **Action 4** in execution.

The criteria under the MCE will determine whether this Mine Discharge Response Plan is activated. If activated the response to the MCE will be in accordance with Mine Discharge Response Plan.

Area of operation:

The area of the North Region includes the Mount Isa, Cairns, and Townsville Districts which incorporates Cape York, North Queensland Coastline, Gulf Areas and North West Queensland – **Appendix A**.

Staffing:

Regional Services Division has staff based at Townsville, Cairns and Mt Isa. A full contact list including each person's role / expertise is attached as **Appendix B**

Own Resources:

The primary response staff are:

- Regional Manager, Regional Services, North Region
- Manager (Mining)
- 3 Team Leaders (Mining) across Townsville, Cairns, and Mount Isa
- An On Call Environmental Officer/ Project Officer is available to provide initial response to calls 24 hours a day. On call roster is attached as **Appendix C**.
- A list of emergency contacts for internal departmental teams as well as key external stakeholders is also detailed in **Appendix C**.
- The Mining and Heavy Industry team have staff in Townsville, Cairns and Mount Isa available to respond to incidents

MISSION

To ensure a professional, consistent and timely initial response by the Department of Environment and Resource Management to major contamination events resulting from mines in North Queensland.

EXECUTION

The response to any situation of reported mine contamination event / discharge shall be executed as outlined hereunder.

This document sets out the roles and responsibilities when responding to a contamination event. These roles may be altered based on operational requirements. Additionally, several roles may be undertaken by a single officer.

Action 1: Initial information/ First notification (Duty of Receiving Officer)

- Obtain particulars of informant:-
 - Name
 - Contact details (phone, address)
 - Determine role of informant (employee/ manager/ witness etc)
- Obtain all available information about environmental issue from informant:-
 - Refer to prompt sheet – **Appendix D.**
 - What other agencies / stakeholders have been alerted
- Obtain from the informant details of other:-
 - Witnesses
 - Persons involved
 - Assistance available (human and physical resources)
 - On site expertise that is present
 - Action that has taken place since the incident to rectify/ address the matter

Action 2: Information / Communications search (Duty of Receiving Officer)

Confirm initial information along with the following where practicable:-

- Other Government agencies involved
- Company / persons directly involved (operators)
- Witnesses (to confirm their observations, involvement and details)

Note: If situation has the potential for immediate serious harm, and on scene resources and urgent actions can avoid or reduce the harm, take immediate reasonable steps to implement those actions. – Advise manager as soon as practicable of actions.

Action 3: Notify Management of Mine Discharge (Duty of Receiving Officer)

- Brief the Team Leader (Mining), Manager (Mining) and Regional Manager on situation (Management Team)

Action 4: Assess information against criteria for Mine Contamination Event (MCE) (Duty of Management Team)

Determine whether the incident meets the criteria for an MCE considering the information from:-

- The information received from the initial informant
- The additional information from other agencies and witnesses
- The records, files and local knowledge within the Department

Note: While an event may not initially meet the criteria to activate this plan, as further information becomes available, it may be appropriate to revisit the MCE. The plan may be activated at any time.

Mine Contamination Event Criteria (MCE Criteria)

For a discharge(s) to trigger a response under this plan, the event must meet the following criteria:

1. Originate from an active or abandoned mining activity; and
2. Have an actual or potential impact footprint outside of the mine's boundaries; and
3. There is actual or potential risk to human health, property, livestock, an environmental value, or a community value; and
4. Response to the event under the Department's Standard Operating Procedures is not sufficient to manage the event.

When considering the applicability of MCE criteria 4, the following may trigger the criteria:

- a) The scale of the impact is excessive; or
- b) The concentration of the contamination is high; or
- c) The event involves hazardous substances or dangerous goods; or
- d) Contamination events have occurred across several mines requiring a coordinated approach; or
- e) The receiving environment is highly sensitive.

Action 5: Activation of Mine Discharge Response Plan

(Duty of Regional Manager)

- Regional Manager may immediately or at any time in the response to the incident, activate the Mine Discharge Response Plan if the MCE criteria is met

Mine Discharge Response Plan Activation Procedures

1. Regional Manager to be briefed on situation.
2. Regional Manager to determine incident should be dealt with under Mine Discharge Response Plan
3. Regional Manager to Activate Response Plan
4. Regional Manager to advise Regional Service Director in writing (e.g. email) of Mine Discharge Response Plan Activation
5. Regional Manager to meet with Management Team (Mining Team Leaders and Mining Manager) to form Incident Management Team (IMT).

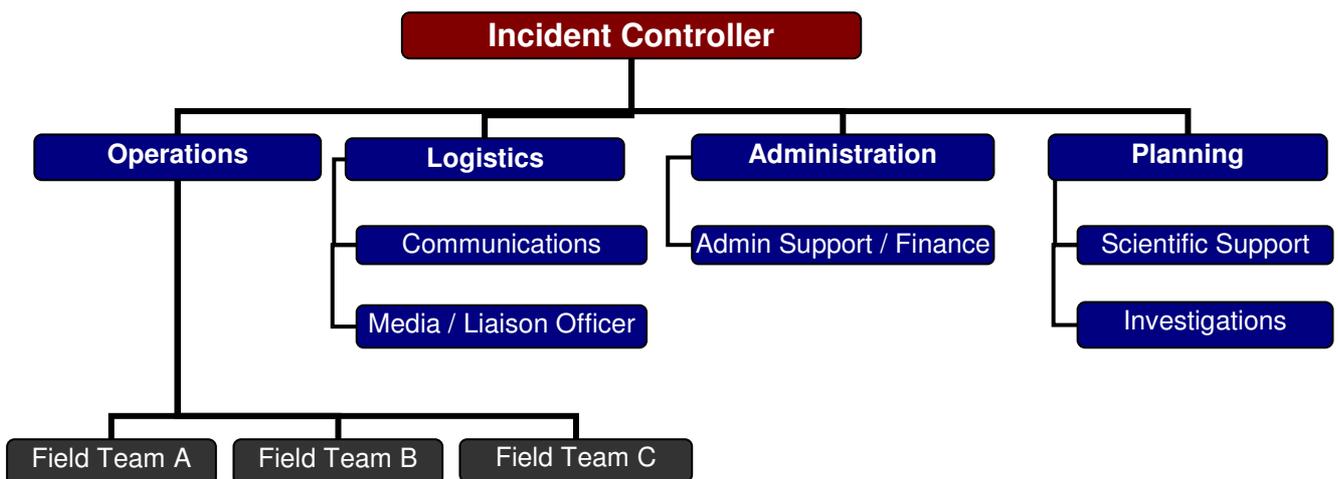
Action 6: Form Incident Management Team (Duty of Regional Manager)

1. Upon activation of the Mine Discharge Response Plan, the Regional Manager will then appoint an incident controller (which can be any staff member including the Regional Manager).
2. The Incident Controller will then form an Incident Management Team (IMT) in consultation with the Regional Manager.

Note: the IMT may consist of as many or as few staff as required by the Incident Controller, largely dependant on the scale and nature of the MCE. Additionally, one officer may conduct more than one functional role.

The IMT (shown in blue) may consist of any officers, but it is recommended that Team Leaders and/or Managers are involved in the IMT.

Incident Management Team Structural Command



Action 7: Develop Action Plan (Duty of Incident Management Team)

- IMT to develop Action Plan
- Action Plan may include Sampling Plan
- IMT to appoint Field Team(s) as required
- Action Plan to be carried out / reviewed / amended in accordance with structural command.
- Refer to Action Plan Template – **Appendix H**

Action 8: Implementation of the plan (Duty of all Personnel)

The Field Team(s) shall be responsible for the implementation of the plan on site and report to Operations Commander.

This responsibility will include:-

PRIOR TO TRAVEL:-

- Liaising with IMT on required actions and briefing rest of field response team
- Organising response kit / field equipment (Refer to check list **Appendix E**)
- Organizing flights / transport to and from the site for staff and equipment. (In conjunction with Administration and Logistics teams in IMT)
- Organizing accommodation where required (In conjunction with Administration and Logistics teams in IMT)

ON SITE:-

- Evaluate the situation – determine the extent of the issue
- Brief on ground staff – allocate specific duties
- Ensure Staff Safety (WPH&S)
- Provide regular Sit Reps to Manager - as previously arranged – **Appendix I**
- Exercising of provisions under the *Environmental Protection Act 1994* – refer to **Appendix F** – Field guide.
- Record Keeping – notes/records/ photographs/ logs. (running sheet – **Appendix G**)
- Sampling - **Appendix J** - Sampling point guides

Action 9: Review of Action Plan and Situation Report

(Duty of Incident Management Team)

- IMT to review Situation Reports provided by Field Team(s) to determine if Action Plan is achieving prescribed outcomes.
- IMT to amend Action Plan if planned outcomes are not achieved
- If outcomes not achieved – IMT to refer back to Action 7.
- If outcomes are achieved, IMT to continue to Action 10.

Action 10: Deactivation (Duty of Incident Management Team)

- Regional Manager may deactivate the plan if:
 - (a) The incident no longer meets the 4 MCE criteria; or
 - (b) The initial response phase to the incident is completed.

Mine Discharge Response Plan Deactivation Procedures

1. Regional Manager to be briefed on implementation of action plan and success of response
2. Regional Manager to assess whether the goals of the action plan were achieved and whether the Department's immediate response has concluded.
3. Regional Manager to Deactivate Response Plan
4. Regional Manager to advise Regional Service Director in writing (e.g. email) of Mine Discharge Response Plan Deactivation
6. Team Leader (Mining) advised on Deactivation and to coordinate remaining response and investigations as per standard Departmental procedures.

Action 11: Demobilisation and Debrief

- Field Team(s) to liaise with Operations of demobilisation from the field
- Operations to liaise with logistics and administration on:
 - re-stocking used equipment;
 - sending samples to lab;
 - cleaning and calibration of equipment.
- Incident Controller to hold a debrief within 5 working days of the Mine Discharge Response Plan being deactivated. The debrief should address:
 - Success of initial response;
 - Identification of further actions / response required (e.g. Med-Long term response plans / remediation plans);
 - Identification of responsible officer(s) / team(s) for management of the response / incident following the deactivation of the Mine Discharge Response Plan.
 - Nomination of officer(s) / team(s) responsible for ensuring that the actions under the Mine Discharge Response Plan are appropriately documented.

ADMINISTRATION AND LOGISTICS

Administration -

Staffing:

The selection of staffing to respond to a matter shall be the responsibility of the Incident Controller and IMT. The approval to recall staff back to duty will lie with the Regional Manager.

Expenditure approvals:

All expenditure must be approved by the Regional Manager prior to purchase unless circumstances exist that would make the approval unreasonable at the time.

Travel:

All travel must be approved by the Manager or Regional Manager prior to commencement unless circumstances exist that would make the approval unreasonable at the time. In that case the Team leader may provide initial approval.

Equipment and vehicle use:

All users must hold the relevant qualifications, training and approvals to operate the equipment and vehicles used by them.

Flights/ Air Travel:

All flights must be approved by the Manager or Regional Manager prior to commencement. Refer to Logistics Section for arrangement details.

Work Hours:

Work hours shall be conducted in line with the award and response needs. Weekend work and work after 6pm and before 6am will be with the approval of the Regional Manager.

On Call staff:

An on-call officer shall be available to respond to phone calls 24 hours a day as per existing on-call regional arrangements.

Logistics

Vehicles:

Remote Area 4WD vehicles are available in Cairns, Townsville and Mount Isa. Cairns and Townsville have available an on call vehicle with remote field equipment for response. Mount Isa has 2 vehicles equipped with remote area field equipment and mining safety equipment. Sargents (1800 077 353) hire vehicles with mine site equipment in case Departmental vehicles are unavailable.

Air Travel:

- Domestic Travel is to be arranged through the Travel Management System during Business Hours on 1300 729 912 and After Hours on 1300 474 287
- Helicopters or other chartered aircrafts are to be book in accordance with the Department's policy for chartering aircrafts - <http://ggov.independentaviation.com.au/login?return>
- In an emergency, it may be necessary to directly arrange helicopter services with local providers.

Remote operations:

Remote travel requires the possession and use of equipment designed to support this type of operation – Car Kits and Field Kits are to be utilised.

Field Equipment:

Field equipment and safety equipment is available for use, located at Cairns, Townsville and Mt Isa offices. Each office must prepare and maintain field equipment ready for use during the wet season.

Sampling Equipment:

Sampling equipment is located at Cairns, Townsville and Mt Isa Offices.

* It is the responsibility of the Team Leader (Mining) to ensure that their office have equipped vehicles, safety kits, and mine discharge response kits available and up to date prior to the wet season.

COMMAND AND COMMUNICATIONS

Command

INCIDENT CONTROLLER

- Overall Incident Command and lead the IMT
- Approve action plans

OPERATIONS

- Responsible for carrying out approved action plans
- Brief Incident Controller
- Coordinate actions of Field Team(s)

Field Teams

- Responsible for carrying out action plan on ground
- Brief Operations
- Sampling and evidence collection as detailed in action plan
- Provide situation reports on regular basis

LOGISTICS

- Responsible for providing logistical support to carry out action plan
- Brief Incident Controller
- Coordinate transport, food, equipment and accommodation for Field Team(s)
- Responsible for communication systems between Field Team(s), Incident Management Team and other stakeholders
- Notification of incident to appropriate stakeholders and government departments
- Coordinate Media responses

Communications

- Establish lines of communication between field teams, mining operators, IMT, stakeholders and within the Department
- Record and track communications and develop / track briefings
- Brief RSD as required

Media / Liaison

- Engage with stakeholders external to the IMT and provide briefings to stakeholders
- Operate as a single point of contact for all incoming enquires from external stakeholders
- Liaise with Media Unit on development of media releases and response to media enquires

ADMINISTRATION

- Brief Incident Controller
- Track expenditures
- Provide support to operations, logistics and planning
- Track staff movements and administer call-in safety procedures

Admin Support / Finance

- Support administration and IMT through provision of documents, record keeping etc.
- Track expenditures and liaise with finance department as appropriate.

PLANNING

- Responsible for development of action plan
- Brief Incident Controller
- Coordinate support from sciences, investigations, litigation as required
- Arrange mobilisation / demobilisation of Field Team(s)

Scientific Support

- Provide scientific advice on the nature of the incident, sampling plan development or remediation

Investigations

- Provide advice on powers of officers, or how to ensure evidence collection is appropriate in the event of offences being investigated under the *Environmental Protection Act 1994*.

Communications

Primary communications:-

Telephone: - Use of telephone for the receipt and relay of information will be the primary means of communication between the parties where face to face capability does not exist. A full list of phone numbers is provided on **Appendix B**.

Secondary Communications:-

Email and Fax: - Shall be used as Secondary means of communications only and a response from the receiver should be requested to ensure receipt of information. A list of email addresses and Fax numbers are listed in **Appendix B**.

Satellite Telephones:-

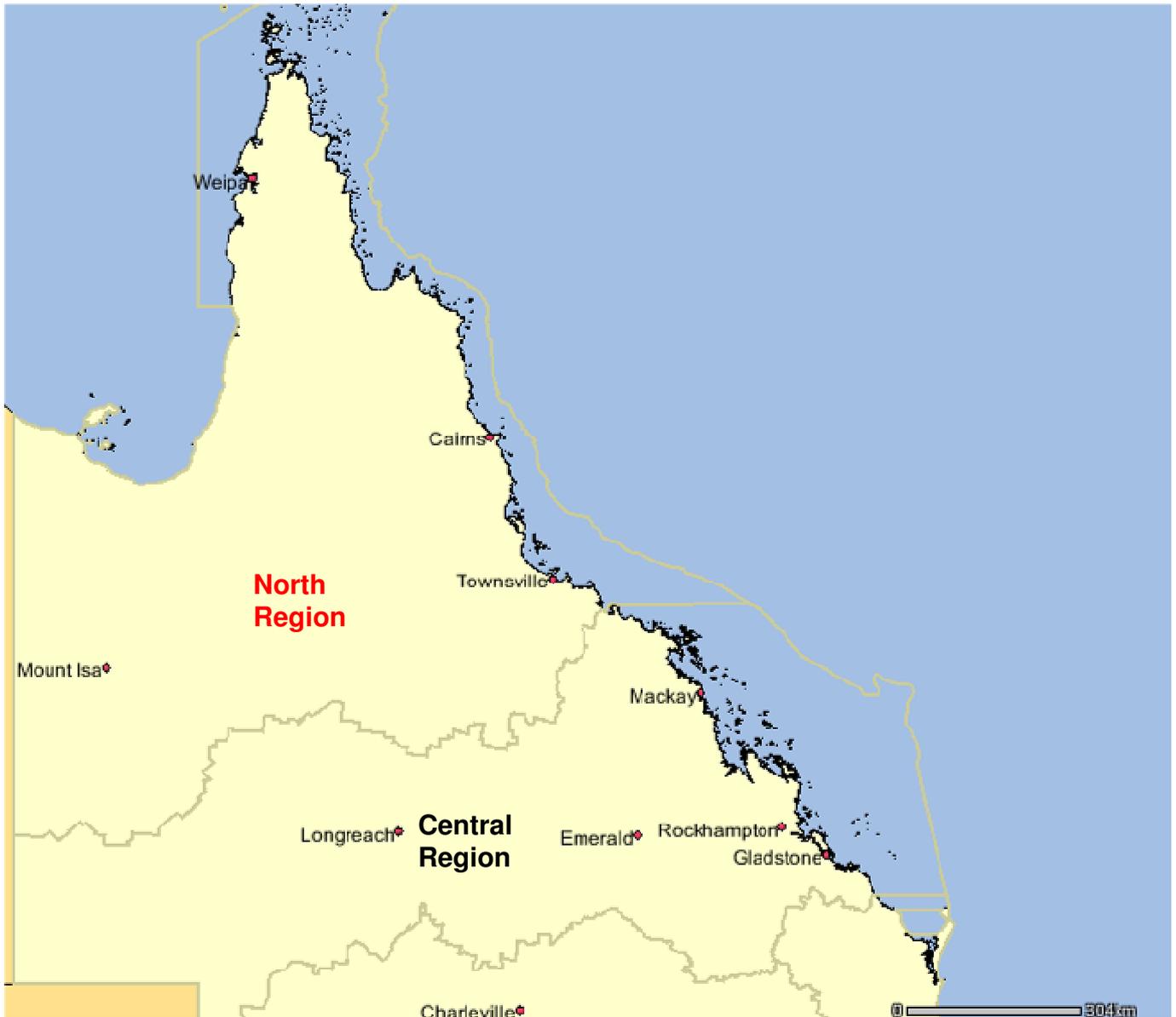
Sat Phones may be the only source of communications in remote areas. The Field Response Coordinator will ensure the serviceable operation of the phone prior to departure. Ensure the contact number is advised on the Response Plan. Sat Phone Numbers also listed on **Appendix B**.

Reporting Requirements - Field Operations

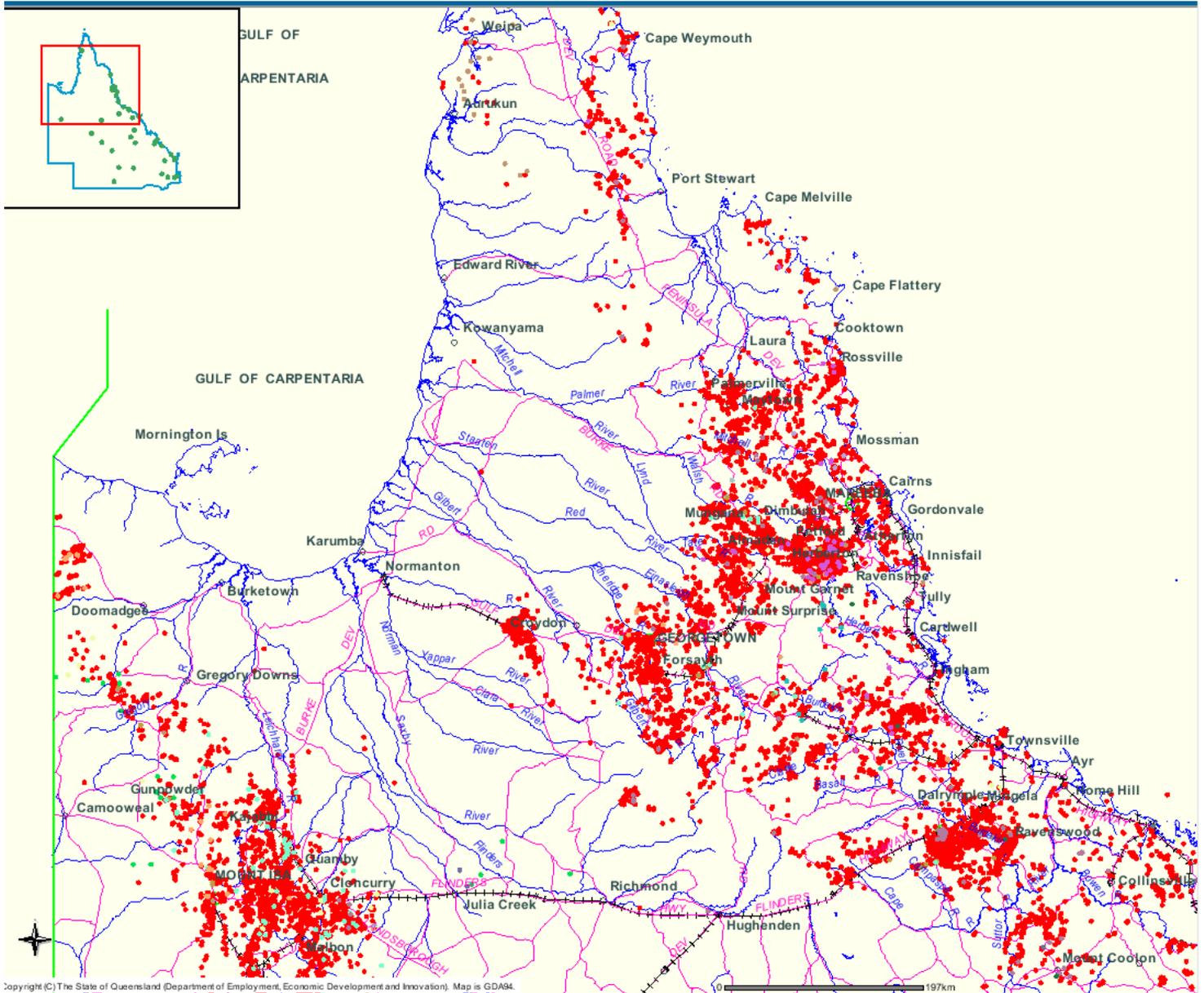
Reporting times, Sit Reps and protocols will be adhered to whilst conducting the field response. The reporting times will be as per policy and incorporated as part of the Response Plan. The Field Team(s) will ensure reporting times and procedures are adhered to.

APPENDIX A - MAPS

REGIONAL MAP



MAP OF MINES IN NORTH QUEENSLAND



APPENDIX B – EMERGENCY CONTACT LIST

	Name	Position	Mobile No.	Home No.
Management	Rob Lawrence	Director		
		Executive Assistant		
		Environmental Support Officer		
		Manager		
		Manager (Investigations)		
Cairns Mining Team		Manager - Cairns		
		Senior Environmental Officer		
		Principal Environmental Officer		
		Principal Environmental Officer		
		Senior Environmental Officer		
		Principal Environmental Officer		
		Senior Environmental Officer		
		Environmental Officer		
Mount Isa Mining Team		Senior Environmental Officer		N/A
		Environmental Officer		
		Environmental Officer		
		Environmental Support Officer		
		Senior Environmental Officer		
Townsville Mining Team		Senior Environmental Officer		
		Manager - Townsville		
		Senior Environmental Officer		
		Senior Environmental Officer		
		Principal Environmental Officer		
		Senior Environmental Officer		
	Senior Technical Officer			
	Principal Environmental Officer			

Vehicles Available

Vehicle	Location	Satellite Phone #	Remote Equipment
Nissan Patrol (QGBY54)	CAIRNS		YES
Toyota Hilux (QGBE92)	CAIRNS		YES
Toyota Hilux (QGDE45)	CAIRNS	N/A	NO
Subaru Forrester (429QGF)	CAIRNS	N/A	NO
Subaru Forester (809QGZ)	CAIRNS	N/A	NO
Nissan Patrol (QGP178)	MOUNT ISA		YES
Toyota Prado (QGT206)	MOUNT ISA		YES
Nissan Patrol (QGBY103)	TOWNSVILLE		YES
Subaru Forrester (177QGQ)	TOWNSVILLE		YES

Mining Contacts - North Region

Name	Position	Expertise / Background
Managers		
Rob Lawrence	Regional Manager	Response Plan Delegate / Media / Briefings
	Team Leader	Water Quality / Aquatic Biology
Cairns Team		
	Senior Environmental Officer	North West Mining and Landholders
	Senior Environmental Officer	Financial Assurance / Chemical Processing
	Principal Environmental Officer	Geology / Waste Rock / Geochemistry
	Senior Environmental Officer	Rehabilitation / Bauxite Mining
	Senior Environmental Officer	Project Management / Port Facilities
	Principal Environmental Officer	Groundwater / Legislation
	Principal Environmental Officer	ANZECC 2000 Water Quality
	Environmental Officer	Birla /
	Environmental Support Officer	Administration / Travel / Logistics
Mount Isa Team		
	Senior Environmental Officer	ERA's / North West Mining
	Senior Environmental Officer	Rehabilitation / Engineering
	Environmental Officer	Water Sampling / EMS
	Senior Environmental Officer	Engineering / Noise abatement
	Environmental Officer	Sewage
	Environmental Support Officer	Administration / Travel / Logistics
Townsville Team		
	Manager - Townsville	Rehabilitation / Geology
	Senior Environmental Officer	Townsville Mining
	Senior Environmental Officer	Refineries / Port Activities
	Principal Environmental Officer	Refineries / Port Activities
	Senior Environmental Officer	Refineries / Port Activities
	Senior Technical Officer	Equipment / Sampling

Key Discharge Stakeholder Contacts

Contact Name	Position	Phone Number	Email	Comments
Queensland Mines and Energy (Division of DEEDI)				
Oskar Kadletz	Manager, Mining Industry Liaison Unit	Ph: [REDACTED] Mob: [REDACTED]	[REDACTED]@deedi.qld.gov. au	Contact for abandoned mines
[REDACTED]	Regional Director	Ph: [REDACTED] Mob: [REDACTED]	[REDACTED]@deedi.qld.gov.au	Contact for QME issues
Primary Industry and Fisheries (Division of DEEDI)				
[REDACTED]	Director, Program Coordination	Ph: [REDACTED] Mob: [REDACTED]	[REDACTED]@deedi.qld.gov. au	Contact for livestock issues
Queensland Health				
[REDACTED]	Director, Tropical Regional Services	Ph: [REDACTED]	[REDACTED]@health.qld.g ov.au	Contact for public health issues
Queensland Police				
[REDACTED]	Operations Officer – Mt Isa	Ph: [REDACTED] Mob: [REDACTED]	[REDACTED]@police.ql d.gov.au	Contact in Mount Isa for Disaster Management Group
Communications Centre	Mareeba / Tablelands	Ph: [REDACTED]		Police Comms Centre for tableland region
Communications Centre	Greater Townsville Region	Ph [REDACTED]		Police Comms Centre for Townsville region

Additional Internal and External Contacts

Table 1.1: DERM – Pollution Hotline

CONTACT	POSITION	NUMBER
Pollution Hotline	(24 hours)	1300 130 372
3 Hutchison Paging	A/H Call Escalation Confirmation	1300 551 166

Table 1.2: DERM - Regional Service Delivery (Environmental Services)

CONTACT	POSITION	OFFICE	MOBILE
NORTH REGION			
Rob Lawrence	Regional Manager, Mining & Industry		
	A/Regional Manager, Coastal, Quarry Material & Riverine Protection		
	Manager, Coastal, Quarry Material & Riverine Protection		
	Manager, Mining & Heavy Industry		
	Manager, Environment Townsville		
Cairns / Mt Isa	On call	-	
Townsville	On call	-	
CENTRAL WEST REGION			
	Regional Manager, Environment		
	A/Regional Manager, Mining		
	Manager, Mackay		
	A/Manager, Emerald		
	Manager, Rockhampton		
	Manager, Gladstone		
Mackay	On call	-	
Emerald	On call	-	
Gladstone / Rockhampton	On call	-	
SOUTH WEST REGION			
	Regional Manager		
	Manager, Toowoomba		
	Manager, Toowoomba		
Toowoomba	On call	-	
SOUTH EAST REGION - NORTH			
	Regional Manager, North		
	Manager, Moreton Bay		
	Manager, Sunshine Coast		
	Manager, Ipswich		
	Manager, Wide Bay Burnett		
	Manager, Compliance		
Moreton / Sunshine Coast	On call	-	
Ipswich	On call	-	
Maryborough	On call	-	
SOUTH EAST REGION - SOUTH			
	Regional Manager, South		
	Manager, Gold Coast		
	Manager, Logan & Scenic Rim		
	Principal Environmental Officer, Redlands		
	Manager, Brisbane City South		
	Manager, Brisbane City North		
Gold Coast / Brisbane	On Call	-	

Table 1.3: DERM – Incident Response Unit

CONTACT	POSITION	OFFICE	MOBILE		
[REDACTED]	Manager, Incident	[REDACTED]	[REDACTED]	[REDACTED]	
	Principal Advisor	[REDACTED]	[REDACTED]		
	Principal Advisor	[REDACTED]	[REDACTED]		
Gear Bag 1	-	-	-		
Gear Bag 2			-		
Brisbane Car	-	-	-		
Northern IRU	-	-	-		
VOTE CODE					
Vote Code	EDBANGBC02	-	-		-
CAR RENTAL					
Avis Brisbane	Wizard Number	[REDACTED]	-	-	
PROTECTOR ALLSAFE					
Account:	Code Address: #35	132 832	-	-	
TELECONFERENCES					
Call in number: 1800 500 536 then *80168151*			Moderators number: *2789*		
TMS					
TMS	After Hours	1300 370 270	-	-	
TMS	Business Hours	1300 729 912	-	-	

Table 1.4: DERM – State Incident Response Network (SIRN)

CONTACT	POSITION	OFFICE	MOBILE	HOME
[REDACTED]	Manager, Incident Response	[REDACTED]	[REDACTED]	
	Principal Advisor, Incident Response (SEQ)	[REDACTED]	[REDACTED]	
	Principal Advisor, Incident Response (CQ)	[REDACTED]	[REDACTED]	
	Principal Project Officer, Technical Strategies	[REDACTED]	[REDACTED]	
	Principal Environmental Officer, Compliance and Investigations	[REDACTED]	[REDACTED]	
	Principal Environmental Officer, Brisbane South	[REDACTED]	[REDACTED]	
	Manager, Emerald	[REDACTED]	[REDACTED]	
	Principal Environmental Officer, Cairns	[REDACTED]	[REDACTED]	
	Manager, Toowoomba	[REDACTED]	[REDACTED]	
	Manager, Rockhampton	[REDACTED]	[REDACTED]	

Table 1.5: DERM – Specialist Areas (Environment)

CONTACT	POSITION	OFFICE	MOBILE
PETROLEUM & GAS – CENTRAL OFFICE			
[REDACTED]	General Manager, Energy Resources	[REDACTED]	[REDACTED]
	Director	[REDACTED]	[REDACTED]
	Director, UCG	[REDACTED]	[REDACTED]
	Manager	[REDACTED]	[REDACTED]
	Team Leader	[REDACTED]	[REDACTED]
PETROLEUM & GAS – LAND ACCESS			
[REDACTED]	Senior Valuer, DERM	[REDACTED]	[REDACTED]
PETROLEUM & GAS – COAL SEAM GAS SAFETY			
[REDACTED]	Chief Inspector, Mines & Energy	[REDACTED]	[REDACTED]
PETROLEUM & GAS – GREAT ARTESIAN BASIN SUBSIDY INITIATIVE			
Andrew Brier	Regional Manager, Roma	[REDACTED]	[REDACTED]
PETROLEUM & GAS – WATER SERVICES			
[REDACTED]	Manager, Toowoomba	[REDACTED]	[REDACTED]
COMPLIANCE & INVESTIGATIONS			
[REDACTED]	Director, Compliance and Investigation	[REDACTED]	[REDACTED]
	State Manager, Investigations	[REDACTED]	[REDACTED]
	Manager Regional Investigations (SEQ) Nambour	[REDACTED]	[REDACTED]
	Manager Regional Investigations (SEQ) Brisbane	[REDACTED]	[REDACTED]
	Principal Environmental Investigator	[REDACTED]	[REDACTED]
AIR			

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CONTACT	POSITION	OFFICE	MOBILE
	Principal Environmental Officer		-
	Principal Environmental Officer		-
	Principal Environmental Officer		-
AIR AND VEGETATION			
	Principal Environmental Officer		-
WATER			
	Chief Scientist		
	Chief Scientist		
	Principal Environmental Officer		-
NOISE			
	Principal Environmental Officer		-
WATER SAMPLING AND ASSESSMENT			
	Senior Principal Scientist		
FISH KILLS			
	Senior Principal Scientist		
CONTAMINATED LAND			
	Chief Scientific Officer		-
	Manager, Project Support		
DAMS			
	Manager, Regulated Dams		
OILED WILDLIFE			
	Manager, Incident Response		
NARANGBA			
	Regional Manager, Brisbane North		
DERM STORM TIDES (Nov-May)			
Rostered	Duty Advisor		Pager 1300 555 555 Quote 90029

Table 1.6: DERM – DG and Operations and Environmental Regulator Business Group

CONTACT	POSITION	OFFICE	MOBILE
John Bradley	Director-General		
Terry Wall	Associate DG		
	Assistant DG, Environment and Natural Resource Regulation		
	Assistant DG, Regional Service Delivery		
	Assistant DG, QPWS		
	Assistant DG, Sustainable Communities and Landscapes		
	Assistant DG, Environmental Sciences		
	Executive Director, Wet Tropics Management Authority		

Table 1.7: DERM – Environment and Natural Resource Regulation

CONTACT	POSITION	OFFICE	MOBILE
	Assistant DG, Environment and Natural Resource Regulation		
Lindsay Delzoppo	General Manager, Operations		
	General Manager, Energy Resources		
	General Manager, Office of the Water Supply Regulator		
	Senior Director, Technical Operations		
	Director, CSG Policy		
	Director, Litigation		
	A/Director, Compliance and Investigation		
	Director, Environmental Impact Assessments		
Jon Womersley	Director, Regulatory Support and Practice		

Table 1.8: DERM – Regional Service Directors

CONTACT	POSITION	OFFICE	MOBILE
	RSD – North		
	RSD - Central West		
	RSD - South East		
Mike Birchley	RSD - South West		

Table 1.9: DERM – Technical Operations

CONTACT	POSITION	OFFICE	MOBILE
	Senior Director, Technical Operations		
	Chief Advisor, Incident Management		
	Manager, Project Support		
	Team Leader, Contaminated Land		
	Assistant Director, Technical Strategies		
	Manager, Regulated Dams		
	Principal Project Officer, Technical Strategies		

Table 1.10: DERM – Environment and Resource Sciences

CONTACT	POSITION	OFFICE	MOBILE
	Assistant DG, Environmental Sciences		
	Director, Air Services		
Julia Playford	Director, Freshwater and Marine Sciences		
	Chief Scientist, Freshwater and Marine Sciences		
	Chief Scientist, Freshwater and Marine Sciences		
	Senior Principal Scientist, Freshwater and Marine Sciences		
	Chief Scientist, Aquatic Threatened Species and Threatening Processes		

Table 1.11: DERM – General Contacts (Environment)

CONTACT	POSITION	OFFICE	MOBILE
Environment - General	-	1300 130 372	-
Natural Resource - General		13 13 04	-
Water Management	-		-
Vegetation Management	-		-
Acid Sulphate Soils	-		-
IT SUPPORT			
Help Desk	-		1800 806 602
WEB SUPPORT			
	Manager, Multimedia Services		
MEDIA			
	Manager, Media		
STATE DISASTER MANAGEMENT COMMITTEE REPRESENTATIVE			
	A/Director, Coastal Sciences		
WORKPLACE HEALTH AND SAFETY			
	Senior Workforce Management Officer		-
HEALTHY WATERWAYS			
	Project Manager		
INDUSTRY LIAISON			
	Manager, Partnerships Unit		

Table 1.12: DERM – QPWS Division

CONTACT	POSITION	OFFICE	MOBILE
	Assistant DG, QPWS		
QPW –Terrestrial			
	Senior Director		
	Wet Tropics – Regional Manager		

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CONTACT	POSITION	OFFICE	MOBILE
	Wet Tropics - Operations Manager		
	Wet Tropics – Operations Manager		
	Sunshine Coast/Burnett – Regional Manager		
	Sunshine Coast/Burnett - Operations Manager		
	Sunshine Coast/Burnett - Operations Manager		
	Cape York/Savanna – A/Regional Manager		
	Cape York/Savanna – A/Operations Manager		
	Cape York/Savanna – A/Operations Manager		
	Capricornia – Regional Manager		
	Capricornia - Operations Manager		
	Capricornia - Operations Manager		
	South East – A/Regional Manager		
	South East – Operations Manager		
	South East – A/Operations Manager		
	Western – Regional Manager		
	Western - Operations Manager		
	Western – Operations Manager		
QPW - MARINE			
	Senior Director		
	Northern Qld Marine – Regional Manager		
	Northern Qld Marine - Operations Manager		
	Central Qld Marine – Regional Manager		
	Central Qld Marine - Operations Manager		
	Central Qld Marine – A/Team Leader		
	Great Sandy – Regional Manager		-
	Great Sandy – Operations Manager		
	Moreton Bay – Regional Manager		
	Moreton Bay – Operations Manager		
	Moreton Bay – Principal Conservation Officer		
INJURED WILDLIFE			
-	QPWS Moggill Office		-
MARINE INJURED WILDLIFE			
-	Hotline	1300 360 898	1300 130 372
	Chief Scientist – afterhours if Hotline not functional		
MANAGEMENT (HUMAN RISK)			
	Team Leader, Wildlife Branch (North)		
	Wildlife Operations Manager (Central)		
	Manager, Wildlife Branch		
PARKS ASSETS			
	Principal Project Officer		-
TURTLES			
	Chief Scientist		

Table 2.1: State Government Contacts - General

AGENCY	SECTION/ISSUE (state Govt – General)	B/H	A/H
Department of Emergency Services	Police, fire, ambulance	000 / 112(mob)	000 / 112(mob)
	POLICE COMMUNICATIONS (POLcom)		
	POLcom – Brisbane		
	POLcom – Gold Coast		
	POLcom – Sunshine Coast		
	POLcom – Toowoomba		
	POLcom – Rockhampton		
	POLcom – Townsville		
	POLcom – Cairns		
AMBULANCE AND FIRE COMMUNICATIONS (FIREcom)			

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AGENCY	SECTION/ISSUE (state Govt – General)	B/H	A/H
	AFcom – Brisbane		
	AFcom – Gold Coast		
	AFcom – Sunshine Coast		
	AFcom – Toowoomba		
	AFcom – Rockhampton		
	AFcom – Townsville		
	AFcom – Cairns		
	Other		
	RACE (Response Advice for Chemical Emergencies)		
	SES		-
SES Helicopter		-	
Queensland Transport	Call Centre	13 23 80	-
	Smoky Vehicle Hotline		13 20 19
	MARITIME SAFETY QUEENSLAND		
	General		-
	Brisbane		
	Sunshine Coast		
	Gold Coast		
	Hervey Bay		
	Bundaberg		
	Gladstone		
	Roslyn Bay (David Channels)		
	Airlie Beach		
	Mackay		
	Townsville		
	Cairns		
	WiDERM		
	Karumba		
	Thursday Island		
	DoT / MSQ Maritime Weather Service Qld / Marine / SEQ		1300 360 426 / 427 / 428
	QUEENSLAND RAIL		
	Emergencies		1800 079 303
	Brisbane and Gold Coast		
	Outside Brisbane		
Department of Main Roads	Brisbane		
	Gold Coast		
	Gympie		-
	Bundaberg		-
	Rockhampton/Emerald		
	Mackay		
	Toowoomba Traffic Management Centre		
	Townsville		-
	Cairns		-
	Barcaldine		1800 023 126
	Cloncurry		-
	Roma		-

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AGENCY	SECTION/ISSUE (state Govt – General)	B/H	A/H
Department of Primary Industries	Call Centre	13 25 23	-
	Animal Disease Watch Hotline	1800 675 888	
	Illegal Fishing	1800 017 116	-
	Exotic Plants	1800 084 881	-
	Pathology Lab Loading Bay 12, 39 Kessels Rd, Coopers Plains	[REDACTED]	-
Department of Mines and Energy	Call Centre	1800 657 567	-
	Mines Inspectorate	[REDACTED]	-
	Explosives Inspectorate (Exp)	1300 739 868 &	[REDACTED]
	Petroleum and Gas Inspectorate (Gas)	[REDACTED]	-
	QME – Brisbane	Exp: [REDACTED]	Gas: [REDACTED]
	QME – Rockhampton	Exp: [REDACTED]	Gas: [REDACTED]
	QME – Townsville	Exp: [REDACTED]	Gas: [REDACTED]
	QME – Cairns	[REDACTED]	Gas: [REDACTED]
	QME – Mt Isa	Exp: [REDACTED]	[REDACTED]
	QME - Mackay	El: [REDACTED]	Gas: [REDACTED]
Dept of Employment and Industrial Relations	Workplace Health and Safety	1300 369 915	
Queensland Health	Call Centre	[REDACTED]	-
	Poisons Information Centre	131 126	
	Asbestos Issues	[REDACTED] 4	-
	Population Health Branch	[REDACTED]	-
	Forensic and Scientific Services Laboratory 39 Kessels Road, Coopers Plains 4108	[REDACTED]	-
Qld Treasury	Liquor Licensing	13 13 04	-
Department of Justice and A-G	Dispute Resolution Centre	[REDACTED]	-
Ombudsman	Queensland Ombudsman	1800 068 908	-

Table 2.2: Authorities

AGENCY	SECTION/ISSUE (Qld Authorities)	B/H	A/H
PORT AUTHORITIES			
Brisbane			[REDACTED]
Bundaberg			[REDACTED]
Gladstone			[REDACTED]
Mackay			[REDACTED]
Townsville			[REDACTED]
Cairns			[REDACTED]
PORTS CORP QLD			
Ports Corp QLD	(Head Office)	[REDACTED]	[REDACTED]
Hay Point		[REDACTED]	[REDACTED]
Abbot Point		[REDACTED]	[REDACTED]
Lucinda		[REDACTED]	[REDACTED]
Mourilyan		[REDACTED]	[REDACTED]
Cape Flattery		[REDACTED]	[REDACTED]
Thursday Island		[REDACTED]	[REDACTED]
Weipa		[REDACTED]	[REDACTED]
Karumba		[REDACTED]	[REDACTED]
WATER AUTHORITIES			
SEQ Water	(QLD Bulk Water Assn)	[REDACTED]	-
NQ Water		[REDACTED]	-

Table 3: Federal Government Contacts

AGENCY	SECTION/ISSUE (Federal Govt)	B/H	A/H
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AGENCY	SECTION/ISSUE (Federal Govt)	B/H	A/H
AMSA			
Australian Maritime Safety Authority	Major oil spills and shipping emergencies		1800 641 792
GREAT BARRIER REEF MARINE PARK AUTHORITY			
GBRMPA	Duty Environment Coordinator	[REDACTED]	quote "OIL SPILL"
GBRMPA	Malcolm Turner	[REDACTED]	[REDACTED]
AQIS			
AQIS	Australian Quarantine and Inspection Service		1800 020 504
FEDERAL POLICE			
Australian Federal Police	[REDACTED] – Environmental Crime Officer	[REDACTED]	
AIRCRAFT			
Air Services Australia	Aircraft noise enquiries		1300 301 120
CASA	Civil Aviation Safety Authority	131 757	131 757
WEATHER			
Bureau of Meteorology	Queensland Regional Office (Brisbane 24hrs)		3239 8700
	Field Meteorology Office – Cairns	[REDACTED]	--
	Field Meteorology Office – Charleville	[REDACTED]	--
	Field Meteorology Office – Longreach	[REDACTED]	--
	Field Meteorology Office – Mackay	[REDACTED]	--
	Field Meteorology Office – Mount Isa	[REDACTED]	--
	Field Meteorology Office – Rockhampton	[REDACTED]	--
	Field Meteorology Office – Townsville (RAAF)	[REDACTED]	--
	Field Meteorology Office – Weipa	[REDACTED]	--
	DoT / MSQ Maritime weather service Qld / Marine / SEQ		1300 360 426 / 427 / 428

Table 4: Local Government Contacts

COUNCIL	B/H	A/H	DERM OFFICE
Aurukun Shire Council	[REDACTED]	[REDACTED]	Cairns
Balonne Shire Council	[REDACTED]	[REDACTED]	
Banana Shire Council	[REDACTED]	[REDACTED]	Gladstone
Barcardine Regional Council	[REDACTED]	[REDACTED]	Emerald
Barcoo Shire Council	[REDACTED]	[REDACTED]	Emerald
Blackall -Tambo Regional Council	[REDACTED]	[REDACTED]	Emerald
Brisbane City Council	[REDACTED]	[REDACTED]	Brisbane City North and Brisbane City South
Brisbane Traffic Control	[REDACTED]	[REDACTED]	
Boulia Shire	[REDACTED]	[REDACTED]	
Bulloo Shire Council	[REDACTED]	[REDACTED]	
Bundaberg Regional Council	[REDACTED]	[REDACTED]	Wide Bay Burnett
Burdekin Shire Council	[REDACTED]	[REDACTED]	Townsville
Burke Shire Council	[REDACTED]	[REDACTED]	Cairns
Cairns Regional Council	[REDACTED]	[REDACTED]	Cairns
Carpentaria Shire Council	[REDACTED]	[REDACTED]	Cairns
Cassowary Coast Regional Council	[REDACTED]	[REDACTED]	Cairns
Central Highlands Regional Council	[REDACTED]	[REDACTED]	Emerald
Charters Towers Regional Council	[REDACTED]	[REDACTED]	Townsville
Cherbourg Aboriginal Shire Council	[REDACTED]	[REDACTED]	Wide Bay Burnett
Cloncurry Shire Council	[REDACTED]	[REDACTED]	Cairns
Cook Shire Council	[REDACTED]	[REDACTED]	Cairns
Croydon Shire Council	[REDACTED]	[REDACTED]	Cairns
Dalby Regional Council	[REDACTED]	[REDACTED]	
Dalrymple Shire	[REDACTED]	[REDACTED]	Townsville
Diamantina Shire Council	[REDACTED]	[REDACTED]	Emerald
Doomadgee Aboriginal Shire Council	[REDACTED]	[REDACTED]	Cairns
Etheridge Shire Council	[REDACTED]	[REDACTED]	Cairns

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COUNCIL	B/H	A/H	DERM OFFICE
Flinders Shire Council			Townsville
Fraser Coast Regional Council			Wide Bay Burnett
Gladstone Regional Council			Gladstone
Gold Coast City Council			Gold Coast
Goondiwindi Regional Council			
Gympie Regional Council		1300 307 800	Wide Bay Burnett
Hinchinbrook Shire Council			Cairns
Hope Vale Aboriginal Shire Council			Cairns
Ipswich City Council			Ipswich
Isaac Regional Council			Mackay
Kowanyama Aboriginal Shire Council			Cairns
Lockhart River Aboriginal Shire Council			
Lockyer Valley Regional Council			Ipswich
Logan City Council			Logan – Scenic Rim
Longreach Regional Council			Emerald
Mackay Regional Council			Mackay
Mapoon Aboriginal Shire Council			Cairns
McKinlay Shire Council			Cairns
Moreton Bay Regional Council		Pine Rivers	Moreton Bay
		Redcliffe	Moreton Bay
		Caboolture	Moreton Bay
Mornington Shire Council			Cairns
Mount Isa City Council			
Murweh Shire Council			
Napranum Aboriginal Shire Council			Cairns
North Burnett Regional Council			Wide Bay Burnett
Northern Peninsula Area Regional			Cairns
Palm Island Aboriginal Shire Council			Townsville
Paroo Shire Council			
Pormpuraaw Aboriginal Shire Council			Cairns
Quilpie Shire Council			
Redland City Council			Redland
Richmond Shire Council			
Rockhampton Regional Council			Rockhampton
Roma Regional Council			Toowoomba
Scenic Rim Regional Council			Logan – Scenic Rim
Somerset Regional Council			Ipswich
South Burnett Regional Council			Wide Bay Burnett
Southern Downs Regional Council			Toowoomba
Sunshine Coast Regional Council			Sunshine Coast
Tablelands Regional Council			Cairns
Toowoomba Regional Council			Toowoomba
Torres Shire Council			Cairns
Torres Strait Island Regional Council			Cairns
Townsville City Council			Townsville
Weipa Town Council			Cairns
Whitsunday Regional Council			Mackay
Winton Shire Council			Emerald
Woorabinda Aboriginal Shire Council			Rockhampton
Wujal Wujal Aboriginal Shire Council			Cairns
Yarrabah Aboriginal Shire Council			Cairns

Table 5: Interstate Environmental Science Coordinators (ESCs)

STATE	ESC	B/H	A/H
Queensland			
Queensland			
Queensland			
Queensland - MSQ			
Queensland - GBRMP			
Queensland - GBRMP			

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STATE	ESC	B/H	A/H
New South Wales			
New South Wales			
Victoria			
Victoria			
Tasmania			-
South Australia			
Western Australia			
Western Australia			
Northern Territory			
New Zealand			
New Zealand			
AMSA			

Table 6: Other Contacts

AGENCY	SECTION/ISSUE	B/H	A/H
LABORATORIES			
ALS	Shand Street, Stafford 4053		-
QLD Health	Kessels Road, Coopers Plains 4108		-
DPI	Yeerongpilly Pathology Lab		-
SIMTARS	Mineral laboratory		-
ELECTRICITY			
Energex		131 253	131 253
CAR BREAKDOWN			
RACQ		131 111	131 111
TELECOMMUNICATIONS			
Orange Paging	Message confirmation	1300 551 166	1300 551 166
Optus	Directory Assistance Service	124 937	124 937
REGULATED WASTE TRANSPORTERS			
Thiess Services			
Transpacific	(Zappaway, Nationwide Oil)		
Veolia	(Collex)		1300 134 364
Cleanaway		131 339	
Barkoola Environmental			
Wanless			
Sita environmental Services		131 335	
Specialised Waste Services			
Chemtrans			1800 190 900
REGULATED WASTE DISPOSAL			
Rochedale Landfill	(Thiess)		
Willowbank	(Violia)		
Swanbank	(Thiess)		
INCINERATION FACILITIES			
Ace Waste		1300 850 901	
QLD Funeral Directors' Assn			-
CONTRACTORS (RESPONSE AND CONTAMINATED LAND)			
URS			
OTEK			
GHD			
Golder			
Coffey			
Sinclair Knight Merz			
Parsons Brinkerhoff			
WBM			
ISS First Response	Emergency response	1300 131 001	1300 131 001
Aussie Excavators	Earthmoving services		
Austrans	Vacuum trucks		

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AGENCY	SECTION/ISSUE	B/H	A/H
		733	
PETROLEUM COMPANIES			
BP		████████	
Caltex		████████	
Santos		████████	
Shell		13 16 18	
HIRE COMPANIES			
Coates Hire		████████	
KMT Temporary Fencing	Temporary fencing	████████	
Transite Hire	Demountable offices	████████	
National Hire	Toilets	136 366	
QLD GOVERNMENT - CHARTERING AIRCRAFT POLICY			
Independent Aviation	http:QGOV.independentaviation.com.au Standing Offer Arrangement: QGCPO609	████████	1300 307 747
HELICOPTERS			
SES		████████	
Austcopters P/L		████████	
Aeropower		████████	
CHARTER PLANES			
Air Charter Co-Ordinators	████████@bigpond.net.au	████████	
Great Western Aviation P/L		████████	
Austrek Aviation P/L	████████@bigpond.com	████████	████████
QANTAS	Mt Isa, Longreach, Barcaldine, Emerald, Blackwater, Blackall, Biloela, Charleville, Roma, Proserpine	13 13 13	

APPENDIX C – ON CALL ROSTER

Wet Season On-Call Officers and Availability (Dec 2010 - Apr 2011)

Week Beginning	On-Call Officer (CNS)	On-Call Officer (TVS)	Officers Unavailable / On Leave		
			Cairns	Townsville	Mount Isa
3/12/2010	██████████		████d		████
10/12/2010	██████████ ██████████		██████████ ██████████		████
17/12/2010	██████████er		██████████ ████n (22/12)		
24/12/2010	██████████ ██████████		████		████ ████
7/01/2011			████		
14/01/2011			████		
21/01/2011			████		
28/01/2011			████		
4/02/2011					
11/02/2011					
18/02/2011					
25/02/2011					
4/03/2011					
11/03/2011					
18/03/2011					
25/03/2011					
1/04/2011					
8/04/2011					

APPENDIX D – RESPONSE NOTIFICATION PROMPT SHEET

Date, Time and Location of discharge	
Name, position, and contact number of the person notifying of the incident	
What is the cause of the discharge (if known)?	
Is the discharge ongoing?	
Can we access the discharge site, mine site and receiving environment?	
What is the company involved? Who is the appropriate contact person and his/her details?	
What actions have the mine taken to date?	
Are there any Safety Hazards?	
What is the quantity of material discharged?	
What type of material was discharged (e.g. oil, sewage, concentrate, stormwater)?	
What Creeks / Rivers / Watercourses have been affected or have potential to be affected?	
Is there any drinking, recreational or livestock water points downstream?	
What are the environmental values of the receiving environment? Are there any sensitive downstream values?	
Who are the potentially impacted landholders or stakeholders?	
Has these landholders / stakeholders been notified? What are their contact details?	
What immediate actions are proposed by the mine?	

APPENDIX E – INITIAL RESPONSE KIT

Minimum Personal Protective Equipment

- Hard Hat
- High Visibility Vest
- Steel Cap Boots
- Qld Government Long Sleeve Shirt and Trousers

Minimum Safety Equipment

- UHF Radios
- Satellite Phone
- Emergency Beacon
- 4WD vehicle
- GPS
- Fresh Water
- Batteries
- Orange Flashing Light
- Torch
- Camera
- Pens
- Official Notebook
- Paper / Maps

Basic Sampling Equipment Kit

- Sampling Pole
- TPS / YSI (in-situ field measurements)
- pH strips
- Minimum 1L of Distilled Water
- 10 x sediment jars
- 10 x metal analysis bottles (water quality)
- 10 x standard physical unpreserved bottles (water quality)
- 2 x oil / grease / hydrocarbon bottles
- 2 x Ammonia / Nitrogen / phosphorous bottles (sewage)
- 1 x box gloves
- 20 x syringes
- 1 x box of 0.45 µm syringe filters

APPENDIX F - COMPLIANCE ACTIVITY FIELD GUIDE

Preface: This field guide is formulated to provide basic information to field officers in relation to assessing activities for compliance and to provide information on procedures to follow when making inquiries or investigation into suspected non-compliance.

This guide relates to the provisions of the *Environmental Protection Act 1994*. Field Officers must be familiar of the provisions of the *Environmental Protection Act 1994* (the 'Act') so that they can carry out their duties effectively and lawfully.

Whilst the enforceable provisions of the Act for the mining activities are primarily focused on Chapter 5 of the *Environmental Protection Act 1994* the field staff will be designated as Authorised Persons under the Act and therefore knowledge of their obligations and the provisions of the Act is crucial.

Topics covered by this guide:

- Part 1. **Authorised Persons - Section 445 *Environmental Protection Act 1994***
- Part 2. **Powers of Authorised Persons - Chapter 9**
- Part 3. **Offences that relate to the powers of Authorised Persons**
- Part 4. **Records and Record Keeping requirements**
- Part 5. **Exhibit Handling- Sect's 461-462**
- Part 6. **Interviewing/ Witness Statements**
- Part 7. **Field Equipment – Types and Use**
- Part 8. **Flow Charts - Compliance Management Guide/ Compliance Actions**

PART 1 AUTHORISED PERSONS

All field staff will be required to be appointed as an Authorised Person under the provisions of Section 445 of the *Environmental Protection Act 1994*. To exercise any of the powers under the legislation the person must be an Authorised Person in possession of an Identity Card.

PART 2. POWERS OF AUTHORISED PERSONS

Chapter 9 of the *Environmental Protection Act 1994*, Investigation and Enforcement.

This chapter outlines the general powers of authorised persons and all field staff should be familiar with the contents of that chapter of the legislation.

Section 449 *Production of identity card.*

(1) *An authorised person may exercise a power in relation to someone else only if the authorised person—*

- (a) first produces his or her identity card for the person's inspection; or*
- (b) has his or her identity card displayed so that it is clearly visible to the person.*

(2) *If, for any reason, it is not practicable to comply with subsection (1), the authorised person must produce the identity card for inspection by the person at the first reasonable opportunity.*

Section 452 *Entry of place—general*

(1) *An authorised person may enter a place if—*

- (a) its occupier consents to the entry and, if the entry is for exercising a power under chapter 7, part 5B or 8, its owner consents; or*
- (b) it is a public place and the entry is made when the place is open to the public; or*
- (ca) it is a place to which an Agricultural ERA, a registration certificate, a development approval subject to a development condition or a code of environmental compliance relates and the entry is made when—*
 - (i) the chapter 4 activity to which the certificate, approval or code relates is being carried out; or*
 - (ii) the place is open for conduct of business; or*
 - (iii) the place is otherwise open for entry; or*

Note: In relation to the Environmental Services staff it is expected that entry to places will be primarily conducted as outlined in Section 452(1)(a) with the owner / occupier having knowledge of the visit and providing consent for the visit.

Where consent is given, consideration should be given to obtaining confirmation of that consent either in writing from the owner/ occupier or by corroboration of such consent. Section 485 refers to content of consent form.

Section 455 *Entry of land for access*

(1) *This section applies if—*

- (a) an authorised person may enter land (the **primary land**) under section 452 or 454; and*
- (b) it is necessary or desirable to cross other land (the **access land**) to enter the primary land.*

Note: This section provides for the access across other property to obtain entry into the primary land. There is provision for such access with consent of the occupier and this would be the preferred method. The section further outlines the actions required if that consent is not obtained.

Sections 456 and 457 relate to the **authority to apply for Warrants** and how applications may be made. It should be noted that any application and subsequent entry via the execution of a Warrant should only be done with the approval of the Manager of the Reef Unit and under the control of staff from the Regional Investigation Unit.

Section 458 *Order to enter land to conduct investigation or conduct work*

This section states that an authorised person may apply to a magistrate for an order to enter land to carry out work on the land to secure compliance with an accredited ERMP.

Application for any order under this section should only be done with the approval of the Manager of the Reef Unit.

Section 459 Entry or boarding of vehicles

(1) An authorised person may enter or board a vehicle if the authorised person has reasonable grounds for suspecting—

(a) the vehicle is being, or has been, used in the commission of an offence against this Act; or

(b) the vehicle, or a thing in or on the vehicle, may provide evidence of the commission of an offence against this Act; or

(2) If the vehicle is moving or about to move, the authorised person may signal the person in control of the vehicle to stop the vehicle or not to move it.

(3) To enable the vehicle to be entered or boarded, the authorised person may—

(a) act with necessary and reasonable help and force; and

(b) require the person in control of the vehicle to give reasonable help to the authorised person.

Section 471 creates the offence for failing to comply with a signal under section 459(2) to stop or not to move a vehicle.

Note: The power outlined in Section 459(2) and (3) should be carried out with care taking into account the options available to achieve the same outcome. Consider the assistance of Police where the vehicle is not on the occupiers/ owners property or on a roadway and the need exists to stop the vehicle.

Section 460 General powers for places and vehicles

This section provides broad powers to Authorised Persons who lawfully enters a place or boards a vehicle to conduct their duties.

Authorised Persons should be familiar with the content of this section as the powers apply to all entries and boarding's and are not confined only to enforcement actions

Section 461 Power to seize evidence

This Section applies to the power to seize evidence where lawful entry has been gained with the intent of seizing evidence to a place either with warrant or by occupiers consent.

Any entry done with the intent of seizing evidence should be carried out as per this section and with the assistance of an investigator and/or supervisor where practicable.

Approval for such entry and seizure should, where practicable, be approved by the manager of the Reef Unit.

Section 462 Procedure after seizure of evidence

Outlines the requirement that an authorised person must give a receipt for a thing seized to the person from whom it was seized.

The section also outlines the procedure and associated requirements for dealing with the receipt and seized property. Subsections 5 to 7 relates to the retention of the seized material/ item and the return of it to the owner.

Any material or item seized should be dealt with as an exhibit. Refer to Compliance Investigations Manual Chapter 8 which refers to Exhibit Management.

Section 464 Power to require name and address

(1) An authorised person may require a person to state the person's name and address if the authorised person—

(a) finds the person committing an offence against this Act; or

(b) finds the person in circumstances that lead, or has information that leads, the authorised person to suspect on reasonable grounds that the person has committed an offence against this Act.

(2) When making the requirement, the authorised person must warn the person that it is an offence against this Act to fail to state the person's name and address, unless the person has a reasonable excuse.

(3) The authorised person may require the person to give evidence of the correctness of the person's name or address if the authorised person suspects on reasonable grounds that the name or address given is false.

Section 475 creates the offence for failing to comply with name and address requirement.

Section 465 Power to require answers to questions

(1) This section applies if an authorised person suspects, on reasonable grounds, that—

(a) an offence against this Act has happened; and

(b) a person may be able to give information about the offence.

(2) The authorised person may require the person to answer a question about the offence.

(3) When making the requirement, the authorised person must warn the person it is an offence to fail to comply with the requirement, unless the person has a reasonable excuse.

Section 476 creates the offence for failure to comply with requirement under Section 465.

Section 466 Power to require production of documents

(1) An authorised person may require a person to produce to the authorised person for inspection a document required to be held or kept under this Act or a development condition of a development approval.

(2) The authorised person may keep a produced document to take an extract from, or make a copy of, the document.

(3) The authorised person must return the document to the person as soon as practicable after taking the extract or making the copy.

PART 3. OFFENCES THAT RELATE TO THE POWERS OF AUTHORISED PERSONS

Part 5 of the *Environmental Protection Act 1994* deals with multiple offences that relate to the compliance powers of Authorised Persons. Appropriate offences are outlined hereunder.

Note: The provisions mentioned in this guide are limited and referral to the Act should occur and assistance sought where suspicion of non compliance occurs.

Section 471 Failure to comply with signal

This section provides an offence for failing to obey a signal under section 459(2) to stop or not to move a vehicle, unless the person has a reasonable excuse for not obeying the signal. Defences apply (E.g. safety, first opportunity)

Section 475 Failure to give name and address etc.

This section relates to where a person is required by an authorised person under section 464(1) to state the person's name or address or is required by an authorised person under section 464(3) to give evidence of the correctness of a name fails to comply with the requirement, unless the person has a reasonable excuse for not complying with it.

Subsection (3) states; *The person does not commit an offence against this section if—*
(a) *the authorised person required the person to state the person's name and address on suspicion of the person having committed an offence against this Act; and*
(b) *the person is not proved to have committed the offence.*

476 Failure to answer questions

This section applies if an authorised person requires a person under section 465 to answer a question, the person must comply with the requirement unless the person has a reasonable excuse for not complying with it.

Reasonable excuse – “might tend to incriminate the person”.

No offence committed if the information sought by the authorised person is not in fact relevant to the offence.

477 Failure to produce document

This section creates the offence for a person who was required under section 466 to produce a document and failed to comply with the requirement, unless the person had a reasonable excuse for not complying with it.

482 Obstruction of authorised persons

This section creates the offence for a person who obstructs an authorised person in the exercise of a power under this chapter, unless the person has a reasonable excuse for obstructing the authorised person. In this section **authorised person** includes a person who is—

- (a) acting under an authorised person's direction under section 363K; or
- (b) authorised by an authorised person to take action under section 467(2)(b); or
- (c) helping an authorised person under this chapter.

PART 4 RECORDS and RECORD KEEPING

Environmental Services staff are required to keep accurate records to ensure monitoring of progress against Service Delivery requirements is achievable and the content is of a standard that would pass judicial review.

Records are for two purposes;

- Compliance Monitoring and Service Delivery
- Compliance Enforcement

Compliance Monitoring and Service Delivery

Records for this purpose will be kept for;

- Statistics
- Performance delivery
- Service delivery
- Enforcement/ compliance actions

Records for this purpose will be by way of ;

- Diary Entries
- Field Inspection reports
- Ecotrack data entry

Compliance Enforcement

Records for this purpose will be kept for;

- Statistics
- Compliance History
- Investigation process
- Court Proceedings
- Evidence

Records for this purpose will be by way of;

- Diary entries
- Official Note Book entries
- Field Inspection reports
- Ecotrack data entry

PART 5 EXHIBIT HANDLING – (Including Sections 461 and 462(EPA))
(Includes extracts from Departmental Compliance Investigation Manual)

Introduction

Failure to control an exhibit lawfully may result in the exclusion of the exhibits as evidence and jeopardize the final outcome of the prosecution case, and subsequent repercussions to the investigator personally.

Continuity of Evidence

Continuity of possession is required to ensure any material that may be used as evidence is kept in a manner that ensures originality. This includes the need to keep the material secure, ensure no alterations are made and to have a record of the place kept and in whose possession it has been. The Compliance Investigation Manual Chapter 8 refers to Exhibit Management.

Property Receipt

If a thing is taken or seized, a property receipt must immediately be given to the person in control of the thing (normally the owner or custodian of the thing). If it is impossible to immediately give the person a property receipt then it must be given as soon as practicable after the seizure or the receipt may be left at the place of seizure in a conspicuous and reasonably secure place.

The following information must also be completed on the property receipt:

- name and address of the person from whom the property was seized or taken.
- Authorised Officer's name – name of the investigator's taking or seizing the property;
- the location the exhibit was taken from – this also includes a description of the location within the property from where it was seized or taken.
- a brief description of the exhibit including any serial number and/or identification marks;
- comment on its condition and value (if known) at the time of seizure;
- date and time taken; and
- CIRaM number (If known).

The property receipt is to have the following distribution:

- Investigator's brief/ Reef Unit File - Original
- Person from whom thing taken or seized - Copy 1
- Attached to the thing - Copy 2
- Remaining in book - Copy 3

Exhibit Registers

The Exhibit Register is an official and auditable document in which all physical exhibits (other than original documents) that cannot be satisfactorily controlled by the investigator are to be entered. It records all ingress and egress of exhibits at property point, and identifies the custodian of the exhibit should it be removed from the property point for analysis or further investigation purposes. Each exhibit must be labelled securely so that the label will not become detached in packing or handling. Details of the exhibit must be recorded in an exhibit register so its whereabouts can be tracked. The exhibit itself should be appropriately secured.

PART 6 INTERVIEWING/ WITNESS STATEMENTS

(Includes extracts from Departmental Compliance Investigation Manual)

Interviews

Whilst the following information primarily relates to interviews associated with suspected offences, the day to day field inquiries may wish to adopt the general standard so that progression to enforcement actions is supported by previous field records and practices.

Chapter 9 of the Compliance Investigation Manual provides detail for Interviewing.

A Record of Interview with a suspected offender should be conducted using electronic recording devices (Video/ Audio). Where practicable assistance should be sought from supervisors and/or investigators prior to conducting this type of interview.

Interviews should be conducted in a courteous and sensitive manner with an emphasis on portraying a professional image of the investigator and the Department.

Location

The location chosen to conduct an interview may set the tone for an interview. Whilst it is best practice to conduct any interview in a private area free from distractions and interruptions, it is recognised that some interviewees may request or insist on the interview occurring at a location set by themselves (e.g. in their home or at their workplace)

For any interview consider interference factors including interjection by other persons, machinery or electronic noises and comfort.

Witness Statements

As part of day to day field operation staff will become involved with potential witnesses and also be witnesses to offences.

As a result field staff should be familiar with the process of taking or making a statement to a standard that is suitable for production in a criminal proceeding. Seek assistance from a supervisor or investigator if necessary.

Chapter 9 of the Compliance Investigation Manual provides detail for Statement taking and making

A statement may be made:

In an Official Notebook

Handwritten on paper

Typewritten (Most preferred for court)

Electronic Recording (Audio/ Video)

If requested to obtain or make a formal statement the following should occur:

- Seek advice from the Supervisor/ Manager
- Gather all known facts relevant to the incident,
- Understand the elements to be proved regarding the offences alleged to have been committed,
- Identify the best venue to interview the witness,
- Identify what information the witness may be able to provide and remember the 'who, what, where, when and how' questions that underpin an interview
- Preliminary inquiries with the witness will determine what the person knows about the incident.
- Evaluate this information to determine if it is relevant to the investigation.
- Record the information formally as a statement.

Guide to Validating Witness' Observations

A witness' observations may be critical in describing an offence or proving a particular element of an offence. To assist in assessing a witness' observations the ADVOKATE acronym is valuable:

- A** - Amount of time the witness observed the incident or offender
- D** - Distance between the offence and witness
- V** - Visibility including atmospheric conditions, lighting etc
- O** - Obstructions to the witness' line of sight
- K** - Knowledge with regard to the witness having previously known the offender
- A** - Any special reason for the witness to remember the incident or offender
- T** - Time lapse between the incident and when the witness made their statement
- E** - Errors or discrepancies

PART 7 FIELD EQUIPMENT

To ensure continuity of evidence and quality of evidence it is necessary to have personalised field equipment.

Equipment to be carried

Camera- Digital
Voice Recorder- digital
Diary
Official Note Book
Field forms
Receipt Book.
Bags and Containers

Note: Personal issue allows users to maintain the equipment to a high standard and also provides a high standard of knowledge of use.

Procedures when working with field equipment.

Note: All records made and kept by this department may be subject to audit, public access or production in court.

Camera.

For evidence purposes the person who takes the photo should be the person who downloads the photo and subsequently prints the photo or copies the photo to another medium. The person who takes the photo must be the person who produces the photo (exhibit) to a court.

Voice Recorder

For evidence purposes the person who makes the recording should be the person who downloads the recording and subsequently copies the recording to another medium. The person who makes the recording must be the person who produces the recording (exhibit) to a court.

Diary

To be used for day to day compliance monitoring and management. Records should briefly include;

- Dates and times (in and out)
- Place visited
- Persons Spoken to
- Outline of matters discussed
- Observations including positive matters
- Non Compliance activities

Note: This record may be subpoenaed for court or be required to be produced under RTI legislation. Avoid opinion or derogatory statements.

Official Note Book

To record any official information regarding compliance activities. Records should include;

- Dates, times
- Place
- Details of suspects and witnesses
- Observations of suspected non compliance
- Corroborators endorsements
- Witness statements
- Details of actions taken.

Note: These notes are primarily made with consideration that they may be produced in a court proceeding. Notes should be factual and should not include irrelevant information and opinion.

Field Forms

To be completed for every field inspection in relation to Level A and B inspections. These are notes made at the time and should be signed by the person making the entries and adoption sought by initial from the property occupier/ owner.

Receipt Book

Section 462 *Environmental Protection Act 1994- Procedure after seizure of evidence*

Outlines the requirement that an authorised person must give a receipt for a thing seized to the person from whom it was seized.

Where property / documents are voluntarily provided by the owner/ occupier in relation to monitoring day to day compliance, consideration should be given to making a record in the Official Note Book and have the owner/ occupier acknowledge the supply and return of the items in that book. A receipt may be issued from the Receipt Book and an acknowledgement (Indemnity Receipt) of the items return should be kept in that book or other place of record.

Bags and Containers

- Preservation of all items and material taken into the possession of DERM staff is required to ensure;
- The item is identifiable.
- The item can be returned to the owner in the condition that it was taken.
- The item is maintained in its condition for court purposes.
- The item is not contaminated – when taken for further tests/ examination.
- The item is properly identified without the need to mark the actual item.

Examples of use:

- Plastic envelopes to preserve documents- can be marked with details
- Plastic Bags to preserve items from external contamination- identified and sealed
- Plastic bags and containers suitable to hold soil/chemicals for further testing. (Of a kind that does not affect the contents) – Can be identified and sealed.
- Boxes/ Larger Containers- To house large items or to maintain all items in one location.

APPENDIX H – ACTION PLAN TEMPLATE

Mine Discharge Incident

Date

Incident Controller

Operations Controller

Field Response Team
Members

**Safety Assessment
Completed**

Details

Field Response Required

Details

**Remote Area Trip sheet
Supplied**

Travel Arrangements

Details

Accommodation Required

Details

**Risk to Drinking,
recreational or livestock
water**

Details

**Immediate Preventative
Actions Required**

Details

**Immediate Enforcement
Action**

Details

**Evidence Collection /
Sampling Plan**

Details

Notification to Stakeholders

Details

Remediation Required

Details

Notification to Investigators

Details

SAMPLING PLAN

Ecosystems potentially impacted Take Filtered Samples

Livestock drinking water potentially impacted Take unfiltered Samples

Gold Mine with Cyanide present Do NOT use Nitric Acid as preservative

Sediment Sampling Consider taking composite mixed samples

Sampling Checklist

Water Sampling Metals Unfiltered	Water Sampling Metals Filtered	Water Sampling General	Water Sampling – Specific analyte	Sediment Samples (Grab samples)	Sediment Samples (Composite samples)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sampling Locations

Sample ID	Location Details	Site Justification
Reference Sites		
Point Source Release Sites / Discharge Points		
Impacted Sites		

Details of Sampling Plan / Map

Cost Analysis

SAMPLE DESCRIPTION	COST PER SAMPLE (A\$)	NUMBER OF SAMPLES FOR ANALYSIS	TOTAL COST (A\$)
Water Quality – Field Filtered			
Metals 8			
Water Quality - Unfiltered			
Sulphate			
Cyanide			
Oils and Hydrocarbons			
Sediment Quality			
Metals 8			
Particle Size Distribution			
Other			
TOTAL COST (A\$)			

Justification and Recommendations

APPROVALS

Recommended By:

Endorsed By:

Approved By:

	Operations	Incident Controller

APPENDIX I – SITUATION REPORT

Mine Discharge Incident _____

Date _____

Time _____

Field Response Coordinator _____

Sit Rep To: _____

Current Environmental Risk

N/A Low Medium High

Details

Actions Taken to Date

Proposed Actions

Recommendation:

Operations Officer:

Signed:

Date:

Comment and Recommendation:

Incident Controller:

Signed:

Date:

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MINE CONTACTS

Birla Mount Gordon Mine

(Environmental Representative)
Ph: [REDACTED] **Mob:** [REDACTED]
E: [REDACTED]@adityabirla.com.au

Mine Site Address:
 Located Approximately 120km North west of
 Mount Isa.

(General Manager)
Ph: [REDACTED] **Mob:** [REDACTED]
E: [REDACTED]@adityabirla.com.au

Registered Business Address:
 Birla Mt Gordon Pty Ltd
 Level 3, Septimus Roe Square
 PERTH WA 6000
 &
 PO Box 2543
 Mount Isa QLD 4825

Landowners

Station	Approx. kms down-stream	Contact	Phone	Email
Calton Hills	0	[REDACTED]	[REDACTED]	[REDACTED]@bigpond.com
Barr Creek	0.8	[REDACTED]	[REDACTED]	[REDACTED]@skymesh.com.au
Chidna	21	Brussy Spreadborough	[REDACTED]	[REDACTED]@une.edu.au
Kamilaroi	28	[REDACTED]	[REDACTED]	[REDACTED]@stanbroke.com.au
Lorraine	100	[REDACTED]	[REDACTED]	[REDACTED]@bigpond.com
Nardoo	160	[REDACTED]	[REDACTED]	[REDACTED]@activ8.net.au
Augustus Downs	167	[REDACTED]	[REDACTED]	[REDACTED]@stanbroke.com.au
Neumayer Valley	205	[REDACTED]	[REDACTED]	manager@nvpastoral.com.au
Floraville	206	[REDACTED]	[REDACTED]	[REDACTED]@optusnet.com.au
Armaraynold	232	[REDACTED]	[REDACTED]	
Wernadinga	234	[REDACTED]	[REDACTED]	[REDACTED]@reachnet.com.au

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

Monitoring point	Lat	Long	Monitoring point	Lat	Long
Receiving Waters			Reference Sites		
WC02 Gunpowder Creek 50 metres downstream of confluence of Mill Creek	S 19° 41' 39.1" (S19° 41' 34.6")	E 139° 21' 48.2" (E139° 21' 56.1")	Gunpowder Creek – reference site ¹	S 19° 70' 82"	E 139° 33' 59"
WC04 – Gunpowder Creek 50 metres downstream of confluence with Greenstone Creek	S 19° 40' 09.8"	E 139° 22' 63.9"	WC 18 Magazine Creek reference site ¹	S 19° 41' 99.5"	E 139° 22' 25.3"
WC 03 - Magazine Creek – 300 Metres downstream of mining activities	S 19° 41' 27.9"	E 139° 22' 14.3"	Licensed Release Points		
WC 13 Greenstone Creek – 50 metres downstream of Magazine Creek confluence	S 19° 40' 92.0"	E 139° 22' 51.2"	W1 – Mill creek dam – at release point from mill creek dam to gunpowder creek	S19° 41' 40.8"	E139° 21' 54.7"
WC01 - Gunpowder Creek - Mount Oxide Road Causeway	S 19° 41' 43.4"	E 139° 21' 34.3"			

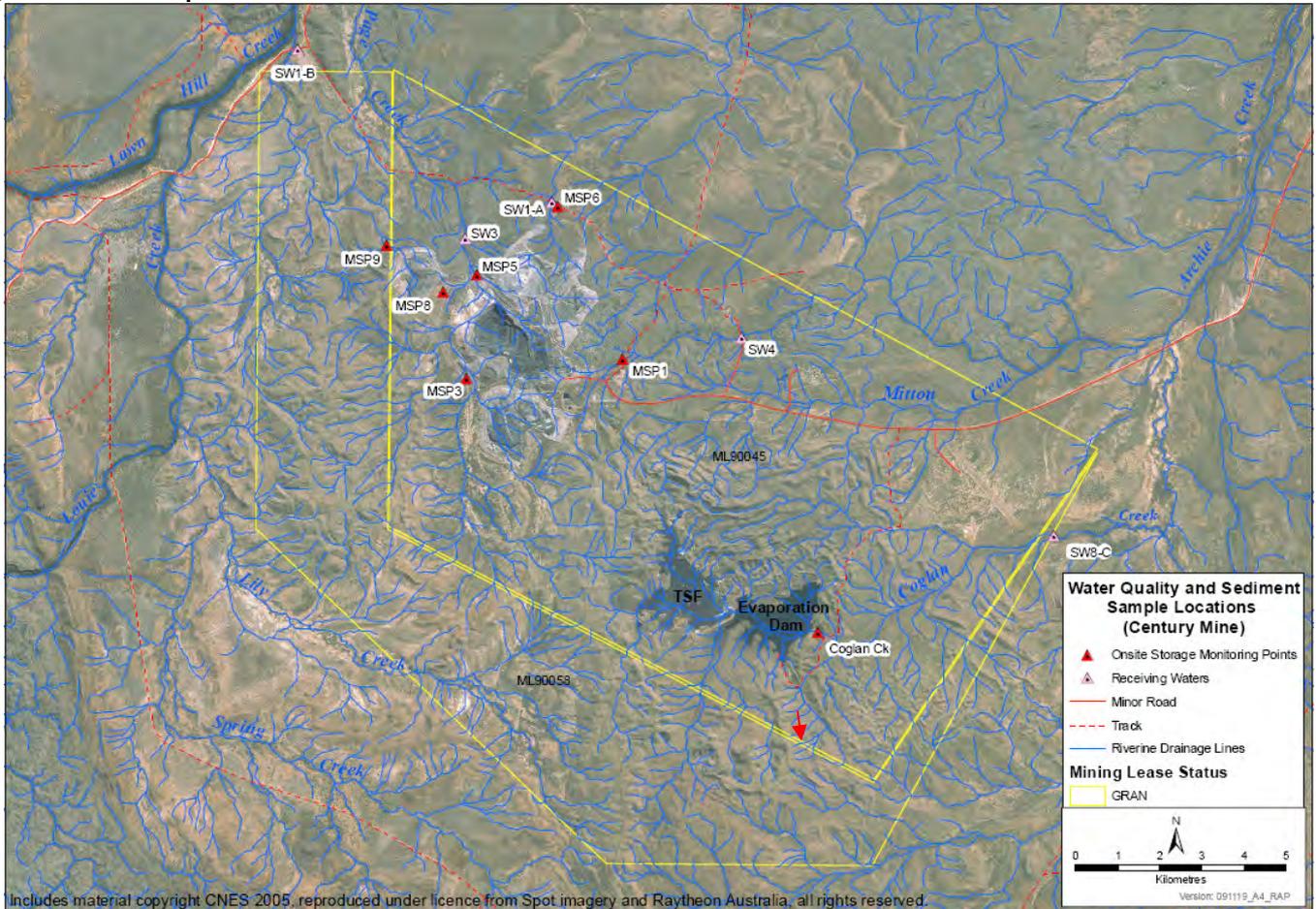
Onsite Storage Monitoring Points	Lat	Long
None specified in EA		

CENTURY MINE

Site Water Movements, On-site Monitoring Locations & Discharge Points



Regional Water Sample Locations



MINE CONTACTS

Century Mine

██████████ (Environmental Advisor)
Ph: ██████████ **Mob:** ██████████
E: ██████████@mmgroupltd.com

██████████ (Safety, Health and Environment Manager)
Ph: ██████████ **Mob:** ██████████
E: ██████████@mmgroupltd.com

██████████ (Environmental Superintendent)
Ph: ██████████ **Mob:** ██████████
E: ██████████@mmgroupltd.com

Mine Site Address:
 Century Mine
 LAWN HILL QLD 4825

Registered Business Address:
 Oz Minerals Century Limited
 Level 23
 28 Southbank Boulevard
 SOUTHBANK VIC 3006

Landowners

██████████ (Lawn Hill Riversleigh Pastoral Company)
Ph: ██████████7
E: ██████████

Address:

██████████ (Century Environment Committee – Traditional Owner Contact)
Ph: ██████████
E: ██████████@zinifex.com

Address:
 Zinifex Century Mine
 PO Box 8016
 Garbutt QLD 4814

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

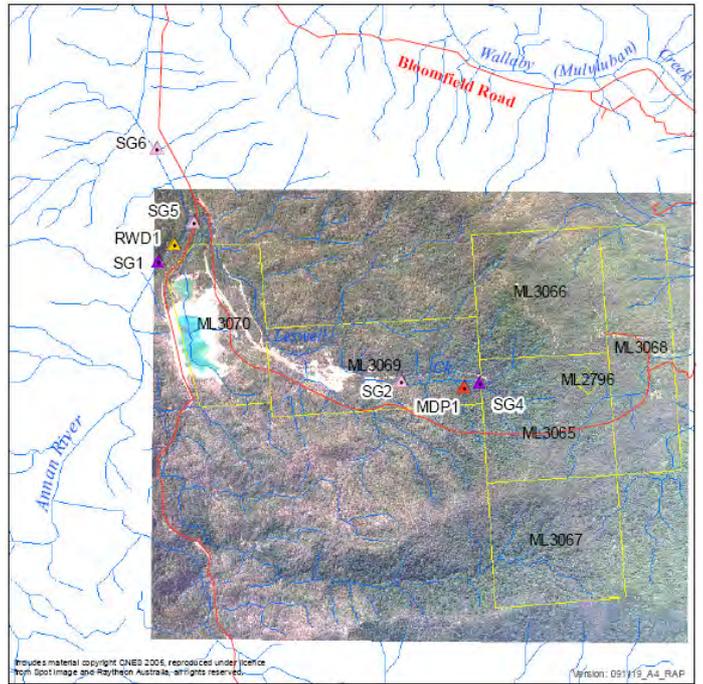
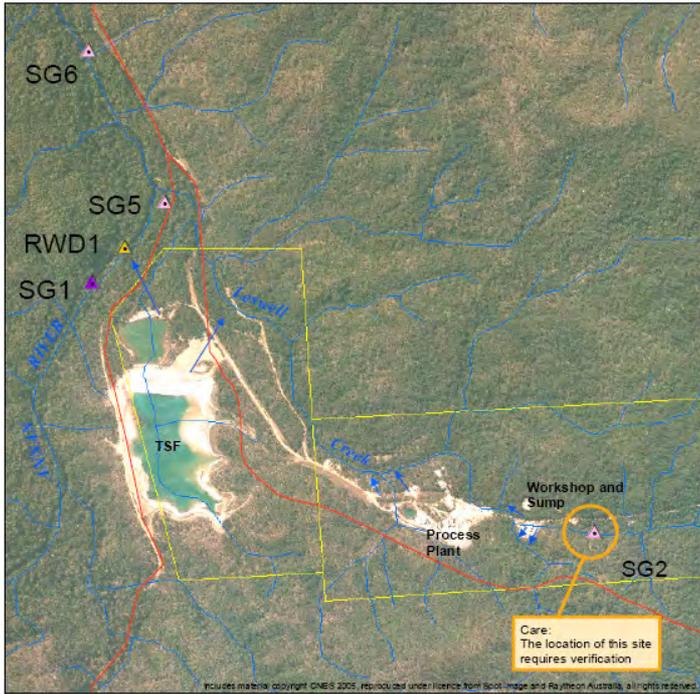
(GDA94 comparable with WGS84 on handheld GPS)

Monitoring point	Lat	Long	Monitoring point
Receiving Waters			Reference Sites
Page Creek P_SW03_REC	S18.70504	E138.59820	None Specified in EA
Mitton Creek NM_SW04_REC	S18.72665	E138.65729	Licensed Release Points
Little Archie Creek A_SW01_REC	S18.69715	E138.61684	None Specified in EA
Bull Ridge Creek B_SW01_REC	S18.66407	E138.56237	
Coglan Creek C_SW08_REC	S18.76971	E138.72427	

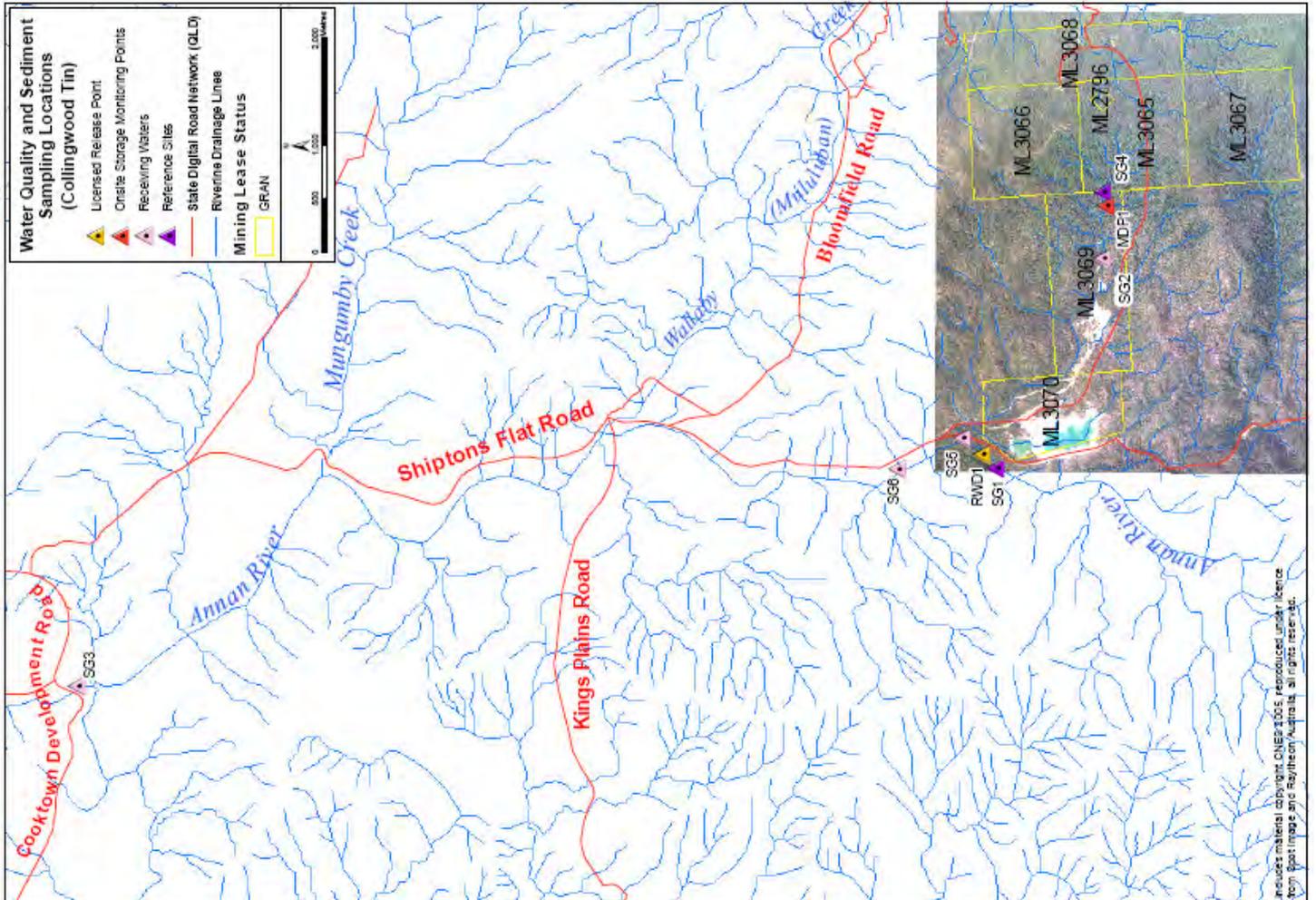
Onsite Storage Monitoring Points	Lat	Long
MSP1	S18.73139	E138.63196
MSP3	S18.73553	E138.59848
MSP5	S18.71293	E138.60079
MSP6	S18.69816	E138.61792
MSP8	S18.71671	E138.59343
MSP9	S18.70663	E138.58140
Coglan Creek	S18.79068	E138.67369

COLLINGWOOD TIN MINE

Site Water Movements and Discharge Points



Regional Water Sample Locations



MINE CONTACTS

Collingwood Tin

██████████ (SSE)

Ph: ██████████ Mob: ██████████
E: ██████████

██████████ (Chief Operating Officer)

Ph: ██████████ Mob: ██████████
E: ██████████

Mine Site Address:

Located 35km South of Cooktown and 330km North of Cairns.

Registered Business Address:

Bluestone Nominees Pty Ltd
Level 3 Hyatt Centre
123 Adelaide Terrace
EAST PERTH WA 6004

Landowners

██████████
Ph: ██████████
E: ██████████

Address: ██████████

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

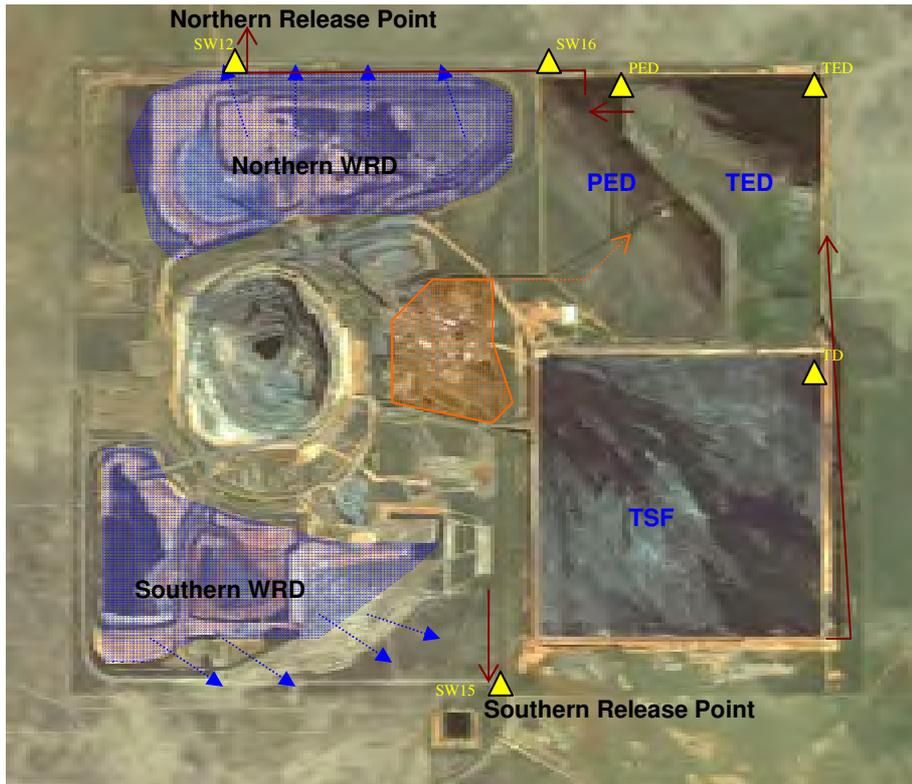
(GDA94 - also comparable with WGS84 on a handheld GPS receiver)

Monitoring point	Lat	Long	Monitoring point	Lat	Long
Receiving Waters			Reference Sites		
SG6 (SG1 - downstream) Annan River ~ 500 metres downstream of tributary discharging excess water from Decant Water Dam (DWD)	S15.749	E145.225	SG1 (upstream) Annan River ~ directly upstream from tributary discharging excess water from Decant Water Dam (DWD) - Background for discharge to Annan River	S15.757	E145.225
SG2 * Leswell Creek ~ 500 metres downstream of discharge of mine dewatering point	S15.766	E145.242	SG4 Leswell Creek ~ upstream of mine portal and mine dewatering point - Background for discharge to Leswell Creek	S15.766	E145.248
SG3 Annan River ~ at causeway on Cooktown Developmental Road	S15.680	E145.206	Licensed Release Points		
SG5 Unnamed Gully ~ 500 metres downstream discharge point of Decant Water Dam (DWD)	S15.754	E145.227	None specified in EA		

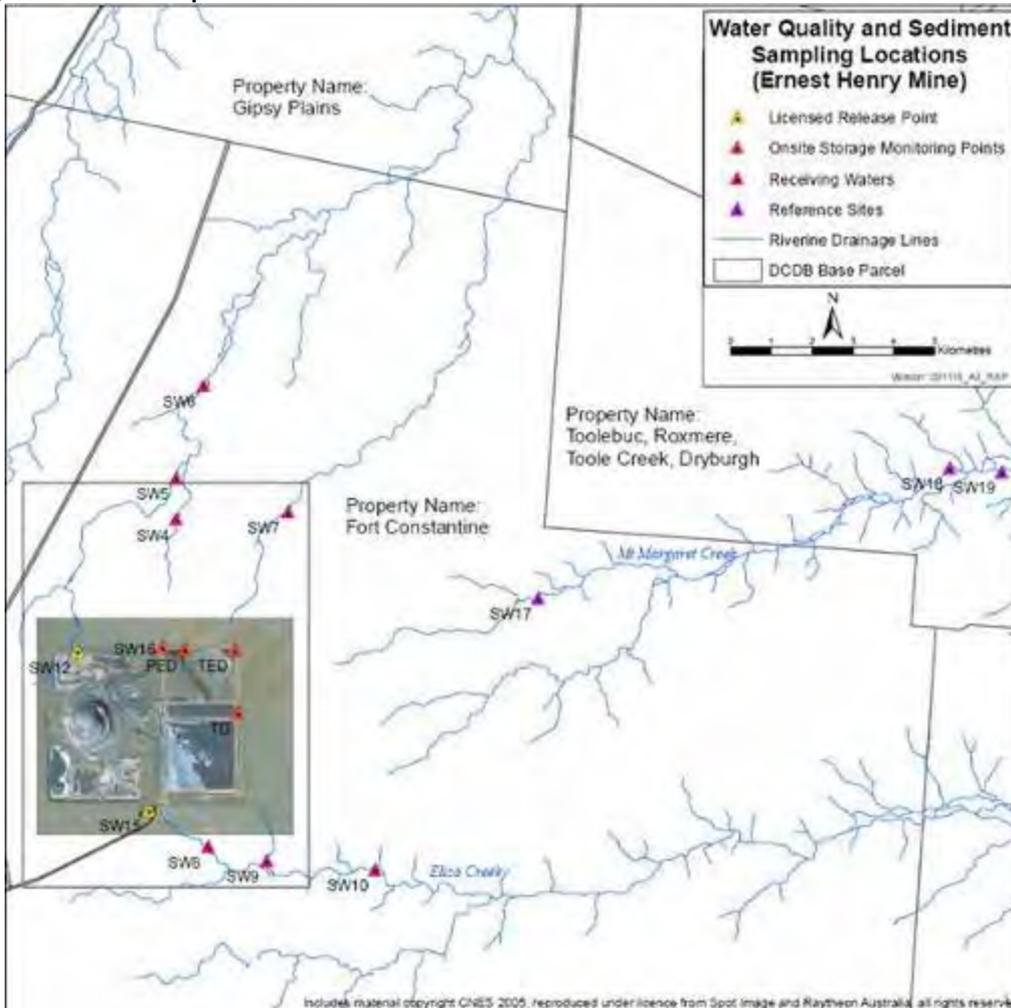
Onsite Storage Monitoring Points	Lat	Long
Mine dewatering point Leswell Creek (MDP 1)	S15.766	E145.247
Discharge point of excess water from Return Water Dam (RWD 1) *	S15.756	E145.226

ERNEST HENRY MINE

Site Water Movements and Discharge Points



Regional Water Sample Locations



MINE CONTACTS

Ernest Henry Mine

[REDACTED] (Environmental Superintendent)
Ph: [REDACTED] **Mob:** [REDACTED]
E: [REDACTED]@xstratacopper.com.au

Mine Site Address:
 PO Box 527
 Cloncurry QLD 4824

[REDACTED] (General Manager)
Ph: [REDACTED] **Mob:** [REDACTED]
E: [REDACTED]@xstratacopper.com.au

Registered Business Address:
 Level 9, Riverside Centre
 123 Eagle Street
 BRISBANE QLD 4000

Landowners

[REDACTED] (Gipsy Plains Cattle Company)
Ph: [REDACTED]
E: [REDACTED]@bigpond.com

Address:
 PO Box 80
 CLONCURRY QLD 4824

[REDACTED] (Stanbroke Pastoral Company)
 [REDACTED]
E: [REDACTED]stanbroke.com.au

Address:
 PMB 51
 JULIA CREEK QLD 4823

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA 94 MGA Zone 54)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
SW4 - Gipsy Creek 1	471367	7744260	SW17 - Mt Margaret Creek	480232	7742322
SW5 - Gipsy Creek 2	471369	7745286	SW18- Mt Margaret Creek	490305	7745531
SW6 - Gipsy Creek 3	472029	7747557	SW19 - Mt Margaret Creek	491585	7745442
SW7 - Gipsy Creek East Branch	474091	7744439	Licensed Release Points		
SW8 - Eliza Creek Drainage Channel	472137	7736193	SW12 - Northern Release Point	468944	7741005
SW9 - Eliza Creek	473577	7735829	SW15 - Southern Release Point	470682	7737092
SW10 - Eliza Creek Downstream	476240	7735600			

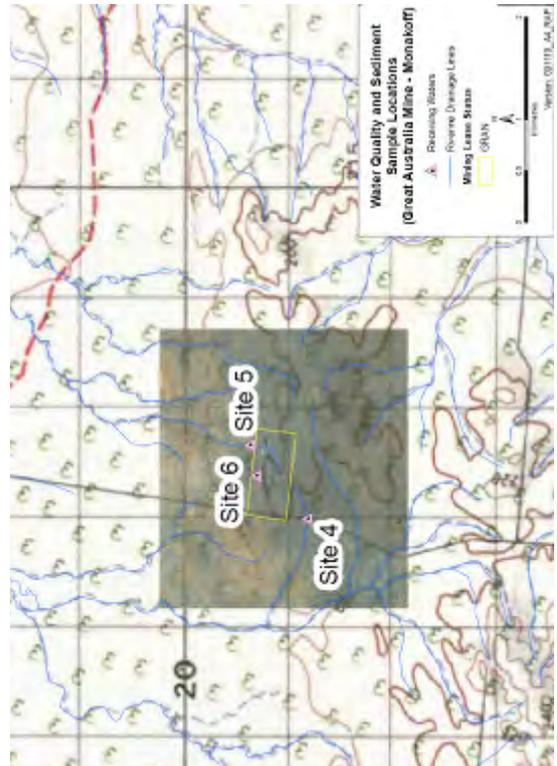
Onsite Storage Monitoring Points	Easting	Northing
PED - Production Evaporation Dam	471558	7741059
TED - Tailings Evaporation Dam	472808	7741030
TD - Tailings Storage Facility Decant Drain	472857	7739495
SW16 - Production Evaporation Dam Spillway	471022	7741097

GREAT AUSTRALIA MINE

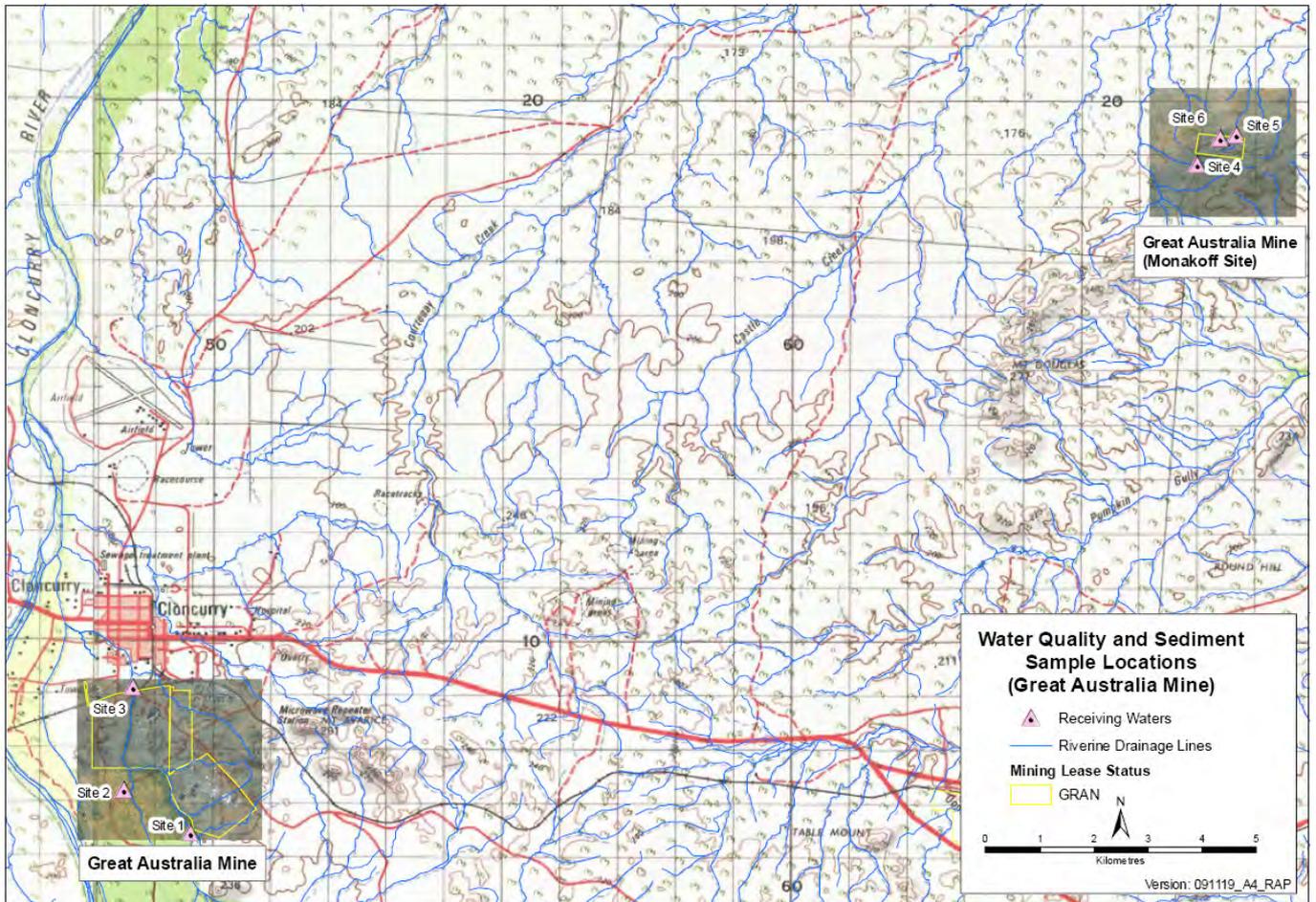
Site Water Movements and Discharge Points - GAM Site



GAM - Monakoff Site



Regional Locality Map



MINE CONTACTS

Great Australia Mine

██████████ (SSE)
Ph: ██████████ Mob: ██████████
E: ██████████

Registered Business Address:
Exco Cloncurry Operations Pty Ltd
Suite 1, Hillway House
141 Broadway
Nedlands WA 6009

Mine Site Address:

GAM Site: 1-2kms South of Cloncurry
Monakoff Site: Approx. 22km NE of Cloncurry (site under care & maintenance)

Residents & Landowners

Cloncurry Residents. Coppermine Creek runs along the southern side of Cloncurry and is used by the local population for swimming and drinking purposes. There is at least one resident living along Coppermine creek that extracts water for use on her garden.

No directly affected Landowners/Graziers. Coppermine Crk flows into the Cloncurry River which is a major river system for graziers in the gulf.

Resident	Location	Phone	Address	Comment
██████████	Dwnstrm Coppermine Creek	██████████	Cloncurry Qld 4824	Direct Neighbour
██████████	As above	unable to confirm phone number, may be ██████████ from the Saleyards on Palmer St	As above	Direct Neighbour
██████████	Dwnstrm Anabranh Creek	██████████	Depot Street CLONCURRY QLD 4824	
██████████	Dwnstrm Anabranh Creek	██████████	44 Burke Street CLONCURRY QLD 4824	
██████████ M. Mitchell	Cloncurry River	██████████	Payne Street CLONCURRY QLD 4824	

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94) *

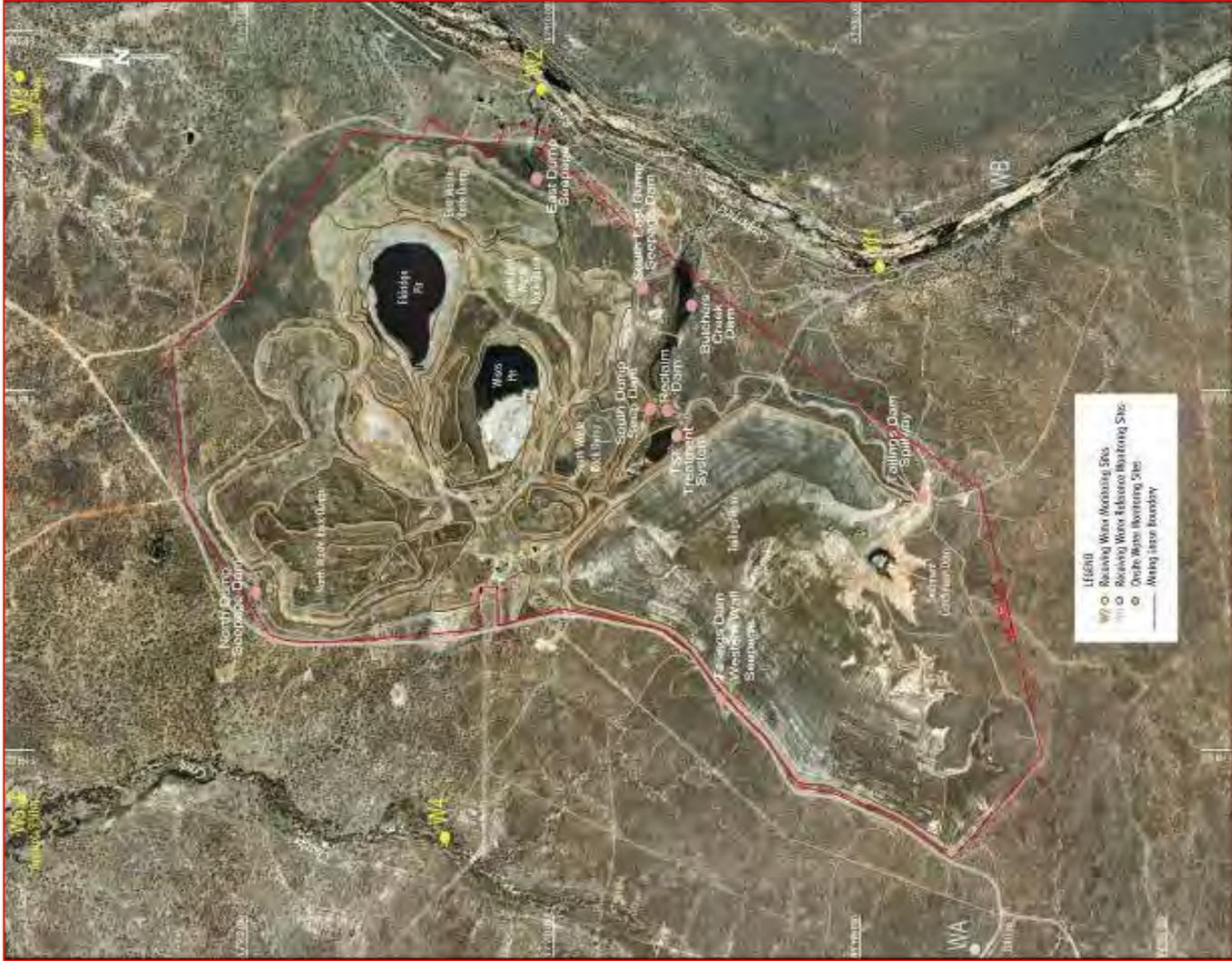
Monitoring point	Lat	Long	Monitoring point	Lat	Long
Receiving Waters			Reference Sites		
GAM Site 1 – upstream of the boundary of and directly down slope from the southern limit of the heap leach pad.	S20.73980	E140.51704	Orphan Shear (Upstream)	tbd	tbd
GAM Site 2 – at the point where Coppermine Creek enters ML90065, downstream from the process area.	S20.73254	E140.50602	Canteen (Upstream)	tbd	tbd
GAM Site 3 – the northern boundary of the mining lease where Coppermine Creek exits ML90065.	S20.71537	E140.50751	Bosca (Upstream)	tbd	tbd
Monakoff Site 4 – small creek crossing on road to ML downstream of stockpile.	S20.62797	E140.68427	Bosca West (Upstream)	tbd	tbd
Monakoff Site 5 – small creek just north west and downstream of existing waste rock dump.	S20.62293	E140.69069	Licensed Release Points		
Monakoff Site 6 – small creek north east and downstream of existing waste rock dump extension	S20.62350	E140.68799	None specified on EA		
Monakoff Site 7 – small creek north west and downstream of proposed waste rock dump extension (will not be monitored until 3 months before mining re-commences at Monakoff)	tbd	tbd			
Orphan Shear (Downstream)	tbd	tbd			
Canteen (Downstream)	tbd	tbd			
Bosca (Downstream)	tbd	tbd			
Bosca West (Downstream)	tbd	tbd			

Onsite Storage Monitoring Points	Lat	Long
Discharge from sediment traps dwnstrm of Great Australia Mine waste rock dump	tbd	tbd
Discharge from sediment trap dwnstrm of Monakoff waste rock dump	tbd	tbd
Discharge from sediment trap dwnstrm of Paddock Lode waste rock dump	tbd	tbd
Discharge from sediment trap dwnstrm of Orphan Shear waste rock dump	tbd	tbd

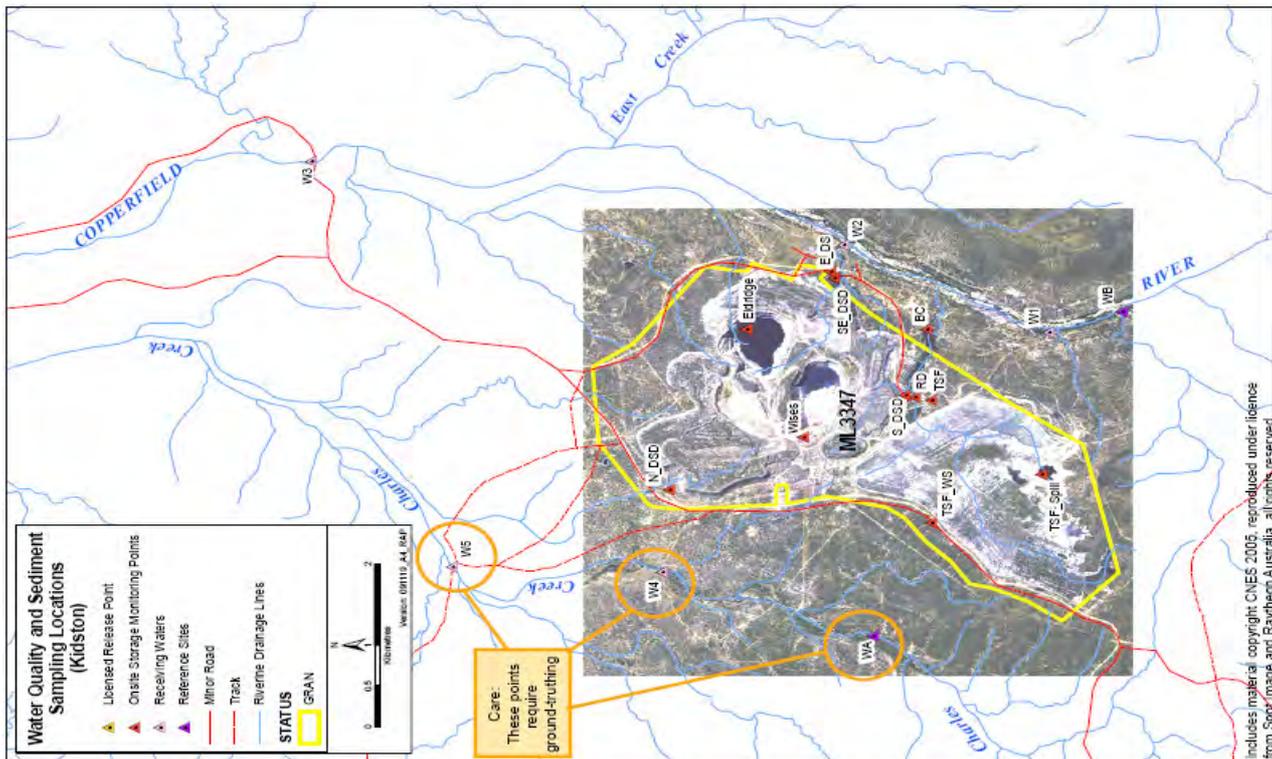
Note: tbd – to be determined; * Comparable with WGS84 on handheld GPS

KIDSTON MINE

Site Water Movements and Discharge Points



Regional Water Sample Locations



MINE CONTACTS

Kidston Mine

██████████ (Reclamation & Closure Manager)

Ph: (07) ██████████

Mob: ██████████

E: ██████████@barrick.com

Mine Site Address:

Situated on Oaks Rush Resort Station, 40km South of Einasleigh

Registered Business Address:

Kidston Gold Mines Ltd
Level 10, 2 Mill Street
PERTH WA 6000

Landowners

██████████ (Oaks Rush Station)

Ph: ██████████

E: ██████████

Address:

Lynd Road
KIDSTON QLD 4871

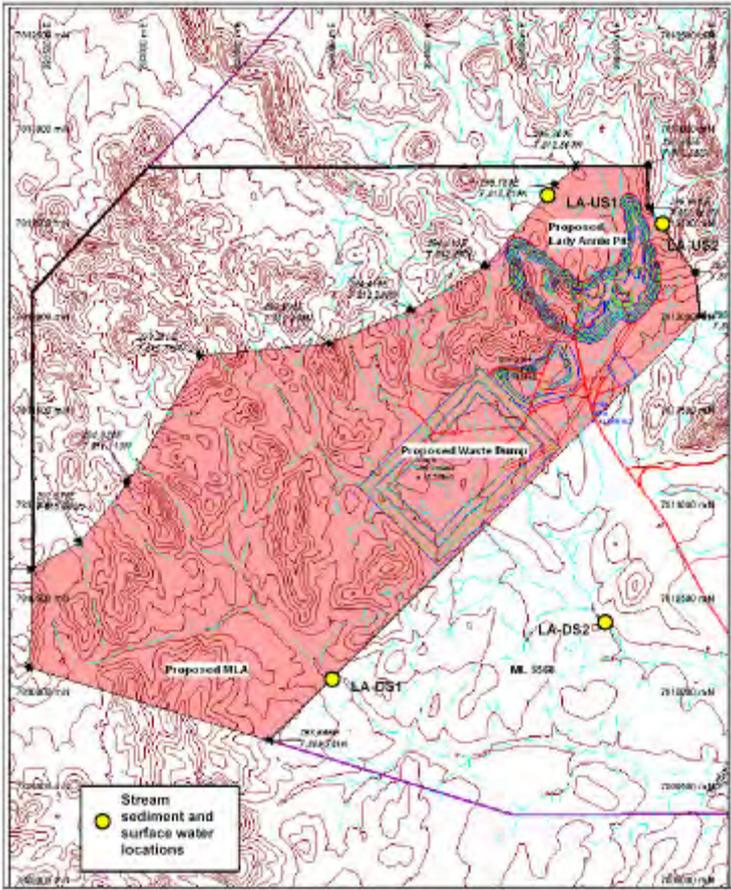
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (WGS84)

Monitoring point	Lat	Long	Monitoring point	Lat	Long
Receiving Waters			Reference Sites		
Site W1 Copperfield River downstream of TSF sediment dam discharge	S 18 53 52.9	E 144 09 35.9	Reference site ¹ (WB) - Copperfield River upstream (Site B)	S 18 54 18.2	E 144 09 44.0
Site W2 Copperfield River downstream of TSF treatment system (Managers Residence)	S 18 52 41.7	E 144 10 10.8	Reference site ¹ (WA) * - Charles Creek	S 18 52 52.0	E 144 07 34.7
Site W3 Copperfield River downstream of site (Site D)	S 18 49 36.9	E 144 10 44.0	Licensed Release Points		
Site W4 * Charles Creek downstream of TSF western seepage ponds	S 18 51 38.8	E 144 08 00.1	None		
Site W5 * Charles Creek downstream of Northern waste rock dump seepage treatment system	S 18 50 25.9	E 144 08 02.3			

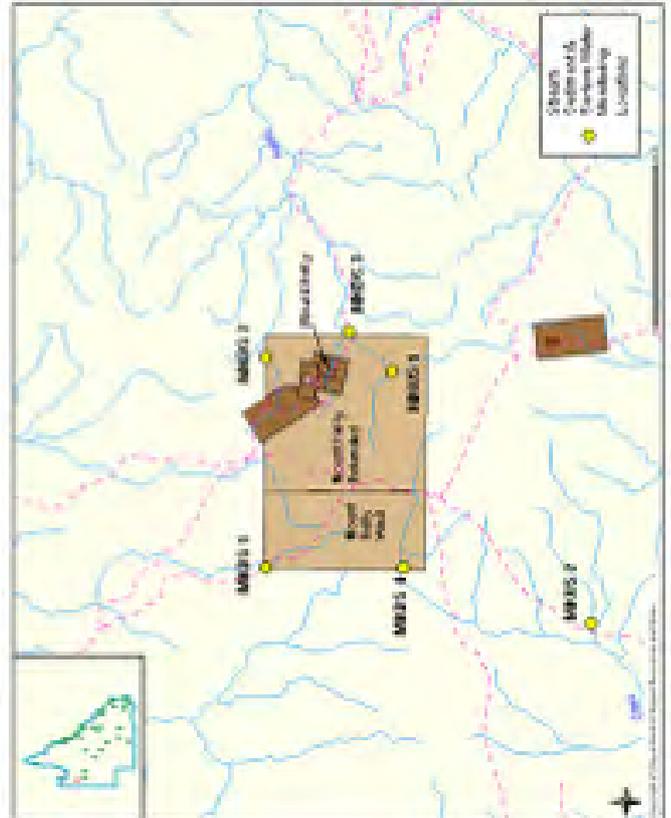
Onsite Storage Monitoring Points	Lat	Long
Tailings Dam Spillway	S 18 53 50.2	E 144 08 39.1
TSF Treatment System	S 18 53 12.2	E 144 09 08.9
Tailings Dam Western Wall Seepage	S 18 53 12.3	E 144 08 19.9
Butchers Creek Dam	S 18 53 10.4	E 144 09 37.3
Eldridge Pit	S18 52 07.9	E144 09 37.2
Wises Pit	S18 52 27.6	E144 08 53.8
Reclaim Dam	S 18 53 06.3	E 144 09 10.0
South East Dump Seepage Dam	S 18 52 38.5	E 144 09 57.6
South Dump Seepage Dam	S 18 53 03.2	E 144 09 10.9
North Dump Seepage Dam	S18 51 41.2	E 144 08 32.9
East Dump Seepage	S 18 52 37.3	E 144 10 00.0

LADY ANNIE MINE

Site Water Movements and Discharge Points

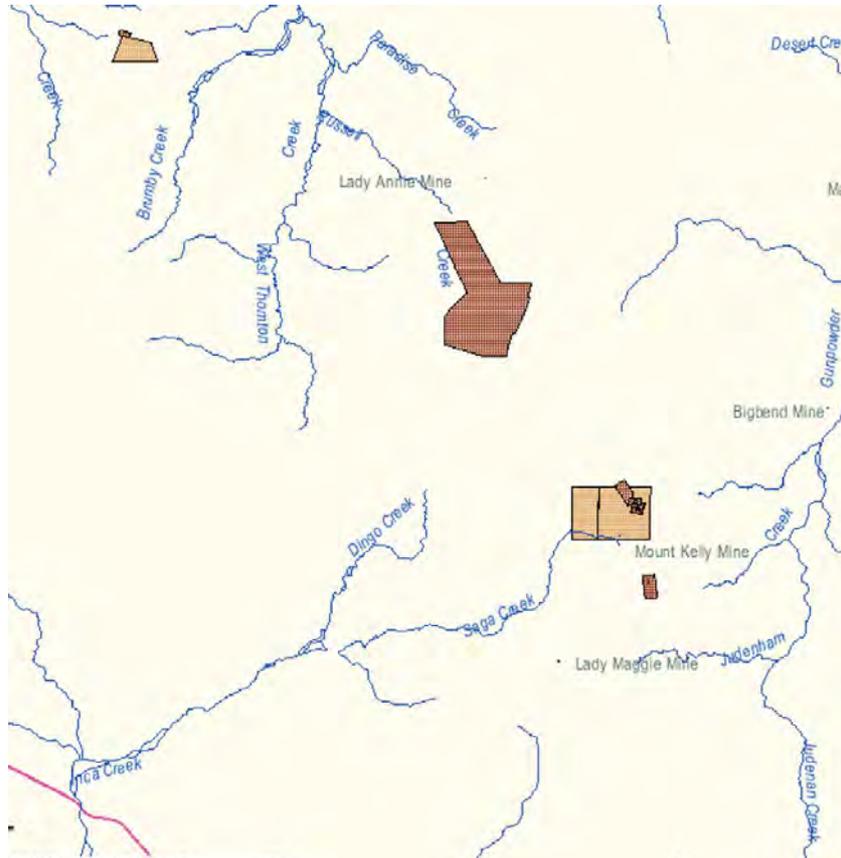


(Lady Annie Site)



(Mount Kelly Site)

Regional Map



MINE CONTACTS

Lady Annie Mine

[REDACTED] (Manager Health Safety & Environment)
 Ph: [REDACTED] Mob: [REDACTED]
 E: [REDACTED]@ladyannie.com.au

Registered Business Address:
 Cape Lambert Lady Annie Exploration Pty Ltd
 18 Oxford Close
 LEADERVILLE WA 6007

Landowners

Contact	Address	Phone	Email	Location
[REDACTED]	Calton Hills Lot 5 CP865892, Lockness/Tewinga	[REDACTED]		Downstream Receiver Saga & Inca Creeks
[REDACTED]	Yelvertoft Station Lot 6, SP162423, Yelvertoft/Brahe	[REDACTED]	[REDACTED]@bigpond.com	Downstream Receiver Saga & Inca Creeks
[REDACTED]	Flora Downs Station Lot 5, CP862287, Yanyeea/Brahe	[REDACTED]	[REDACTED]@bigpond.com	Downstream Saga, Inca & Buckley Creeks
[REDACTED]	Traditional Owner	[REDACTED]		TO

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (AMG84, Zone 54)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
MKDS 1- test site	301160	7800135	MKUS 1- reference site *	305625	7797450
MKDS 2- test site	306046	7800375	MKUS 2- reference site*	300451	7793920
MKDS 3- test site	306370	7798363	LA- US1- reference site*	295150	7812680
MKDS 4- test site	301300	7797255	LA- US2- reference site*	295750	7812480
LA- DS1- test site	294000	7810100	Licensed Release Points		
LA- DS2- test site	295500	7810400	None specified on license		

Onsite Storm Water Monitoring Points (end of pipe)	Easting	Northing
Mining Intermediate ROM area Sediment Dam	tbd	tbd
Mount Clarke Waste Rock Dump Sediment Dam	306060	7800370
Mount Kelly/Flying Horse Sediment Dam	tbd	tbd
Flying Horse Waste Rock Dump 2 Sediment Dam	tbd	tbd
Process Plant ROM Pad Sediment Dam 1	302870	7799040
Process Plant ROM Pad Sediment Dam 2	303170	7798700
Lady Annie Sediment Dam	TBD	TBD
Onsite Storage Monitoring Points	Easting	Northing
Stage 1 and 2 – PLS Ponds	302000	7797430
Stage 1 and 2 – ILS Pond	301865	7797430
Stage 1 and 2 – Raffinate Pond Pre-settler	301820	7797430
Stage 1 and 2 – Raffinate Pond	301750	7797430
Stage 3 – PLS Pond	tbd	tbd
Stage 3 – ILS Pond	tbd	tbd
Storm water Pond 1	301650	7797400
Storm water Pond 2	tbd	tbd
Storm water Pond 3	tbd	tbd

Note: tbd – to be determined

MINE CONTACTS

Leichhardt Operations

[REDACTED] (Deloitte Manager)
Ph [REDACTED] **Mob:**
E:

Mine Site Address:
 Approximately 150km North East of Mount Isa

Registered Business Address:
 Woodside Plaza Level 14
 240 St George Terrace
 PERTH WA 6000

Landowners

North Australia Pastoral Company Pty Ltd
 Delfine
Ph [REDACTED]
E [REDACTED] [@napco.com.au](mailto: [REDACTED]@napco.com.au)

Address: Colluah Station 117km North West of Cloncurry

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

(GDA94 – comparable to WGS84 on handheld GPS)

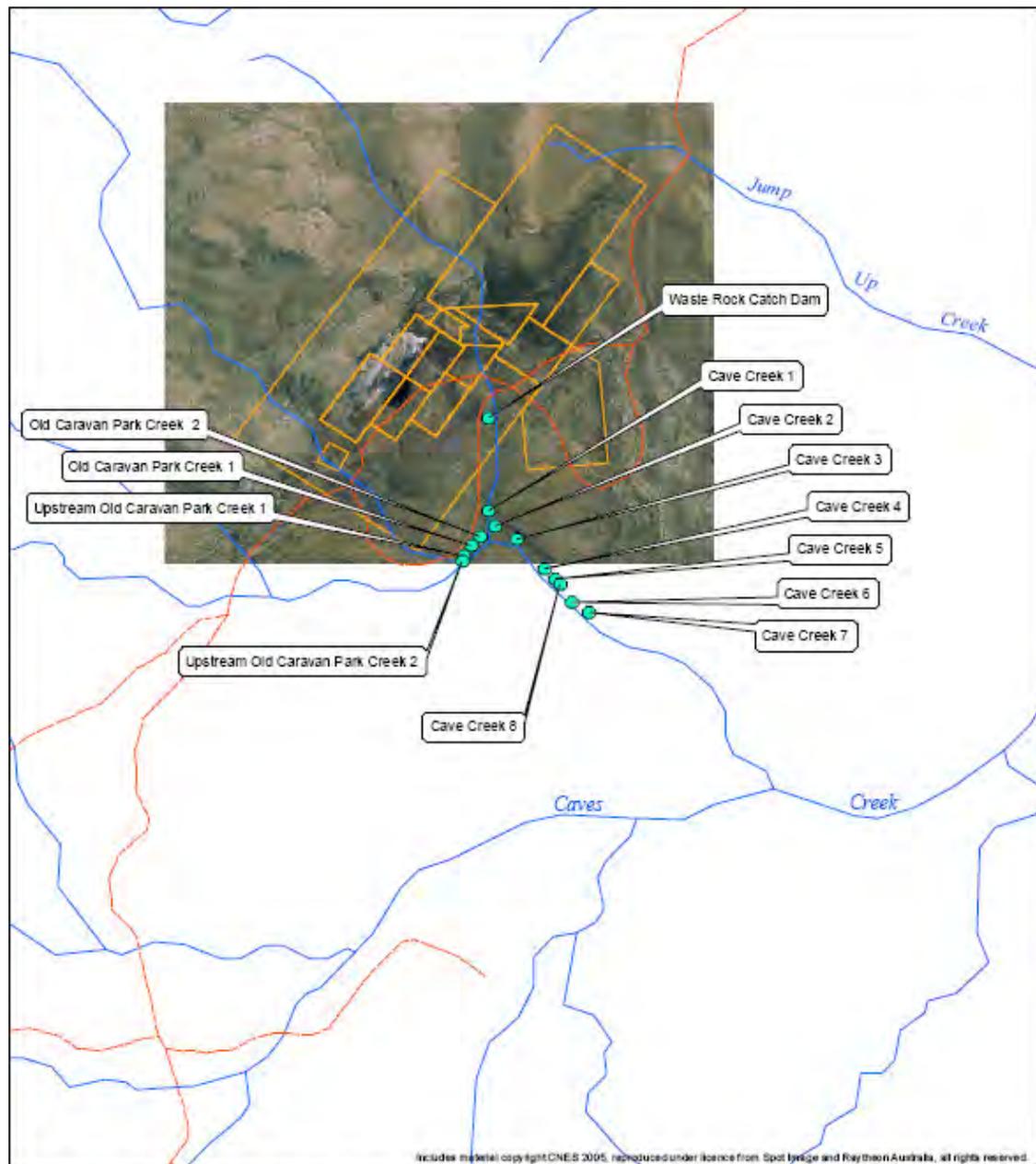
Monitoring point	Lat	Long	Monitoring point	Lat	Long
Receiving Waters			Reference Sites		
RC1 Downstream Mount Cuthbert	S19.98794	E139.91974	US1 Upstream Mount Cuthbert	S19.98311	E139.91447
RO1 Six Mile Creek Dam (downstream of discharge)	S19.99199	E139.92941	RC3 Upstream Mount Cuthbert	S19.98044	E139.91514
RC6 Downstream Mount Cuthbert	S19.99117	E139.92090	Licensed Release Points		
			Release Point 1	TBD	TBD

Note: There are a number of pits historically associated with the heap leach operation which have not been included in this information. These include Kalkadoon, Dobbyn, Warwick Castle, Crusader, Orphan & Mount Colin Pits. These are distributed widely around the Leichhardt Operations project site.

Onsite Storage Monitoring Points	Lat	Long
PLS Pond *	S19.99417	E139.91587
ILS Pond *	S19.99444	E139.91530
Raffinate Pond *	S19.99382	E139.91638
Stormwater Pond *	S19.99486	E139.91619

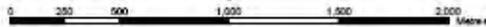
MOUNT OXIDE

Site Water Monitoring Points & Local Drainage



Water Quality and Sediment Sample Locations (Mount Oxide Mine)

- Legend
- Sample location
 - Track
 - Mining Lease Status
 - NC



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ACCURACY STATEMENT
Due to varying sources of data, spatial locations may not coincide when overlaid.

DISCLAIMER
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MAP PRODUCTION
Spatial Information Services North
Department of Environment and Resource Management
22 December 2009

Version: 221209_AA_RAP



(Note: Historical sampling program 2009 – only 4 sites selected for ongoing monitoring – see table over page)

MINE CONTACTS

Mount Oxide

██████████ (Chief Geologist)

Ph: ██████████ Mob: ██████████

E: ██████████

Mine Site Address:

Approximately 142km North West of Mount Isa along the gunpowder road heading up to Birla Mount Gordon mine EPM10313

Registered Business Address:

Hetherington Exploration & Mining Title Services Pty Ltd
Suite 41, Northpoint 231, North Quay
BRISBANE QLD 4001

Landowners

██ Chidna Station

Ph: ██████████

E: ██████████

Address:

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

(GDA94 comparable with WGS84 on handheld GPS)

Monitoring point	Lat	Long	Monitoring point	Lat	Long
Receiving Waters			Reference Sites		
Cave Creek 2	S19.48460	139.39320	Upstream Old Caravan Park Creek 1	S19.48593	139.39183
Cave Creek 5	S19.48700	139.39589	Licensed Release Points		
On Site Storage			None specified in EA with exception of sewage effluent discharge point		
Waste Rock Catch Dam	S19.47972	139.39291			

Note: No monitoring locations specified in EA, however monitoring of surrounding creeks required. Contaminants first enter Cave Crk, which flows into Gunpowder River.

The Mt Oxide site is an historical, surrendered mine site managed by DEEDI Mines & Energy. The old waste rock dump to the SE of the main pit potentially emits AMD contaminated runoff to Cave Creek following significant rain events.

MINE CONTACTS

Wolfram Camp

██████████ (Mining Superintendent)

Ph: ██████████ Mob: ██████████

E: ██████████@ores.com.au

██████████ (General Manager)

Ph: ██████████ Mob: ██████████

██████████@metallicaminerals.com.au

Mine Site Address:

Metallica Minerals
PO Box 1078
SPRING HILL QLD 4004

Site located 22kms NW of Dimbulah, 90km W of Cairns

Landowners

██████████ (Traditional Owner Representative, Wolfram Camp Area)

Ph:

E:

Address:

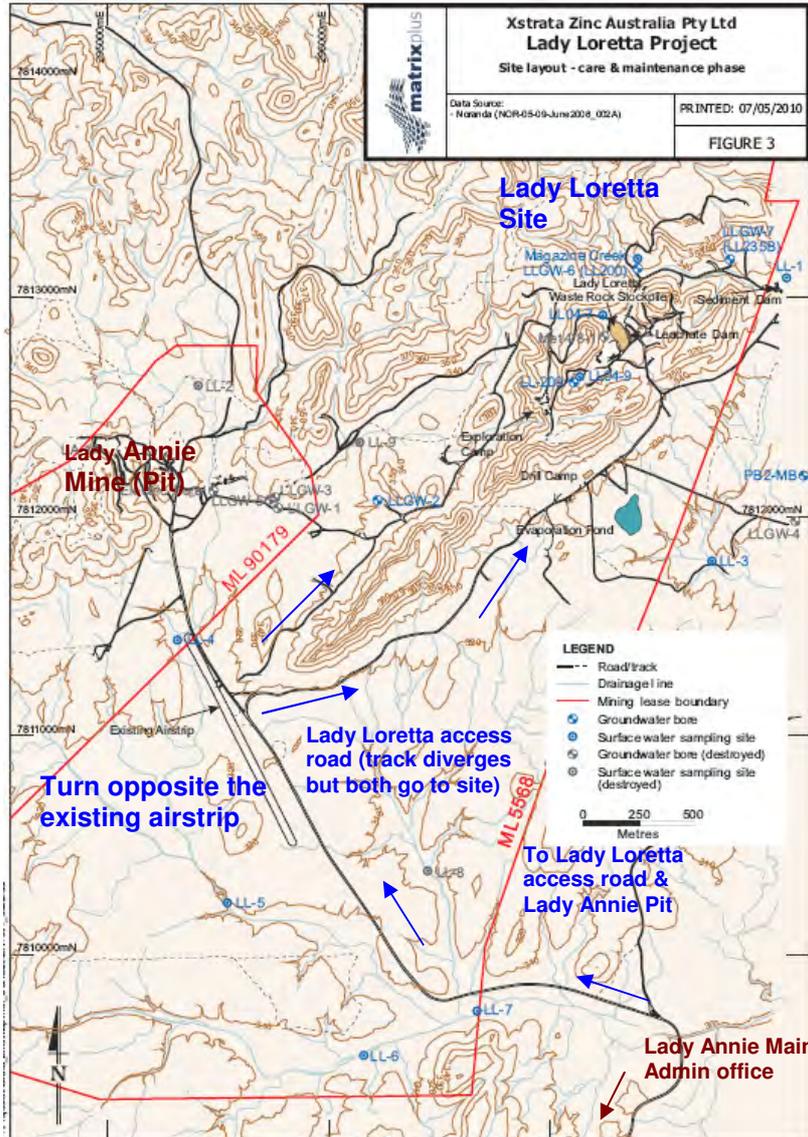
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

Monitoring point	Lat	Long	Monitoring point	Lat	Long
Receiving Waters			Reference Sites		
SW3c Downstream of water dam in Whiskey Gully in the vicinity of groundwater sampling site GW3	282750	8110310	SW1 Whiskey Gully	284166	8109411
SW6 100m downstream of Whiskey gully confluence with Bullaburrah Creek	283526	8110484	SW2 Alligator Creek	283157	8109613
SW7 Forget me not decline discharge	283324	8110012	Licensed Release Points		
SW8 100m downstream of Forget me not discharge confluence with Bullaburrah Creek	283246	8109949	SW3b Water dam discharge (water dam spillway)	283749	8110238
SW12 Bullaburrah Creek at the downstream lease boundary, 100m upstream of road crossing	282765	8109930			
SW16 Bullaburrah Creek downstream of Butchers Creek confluence	282280	8109300			

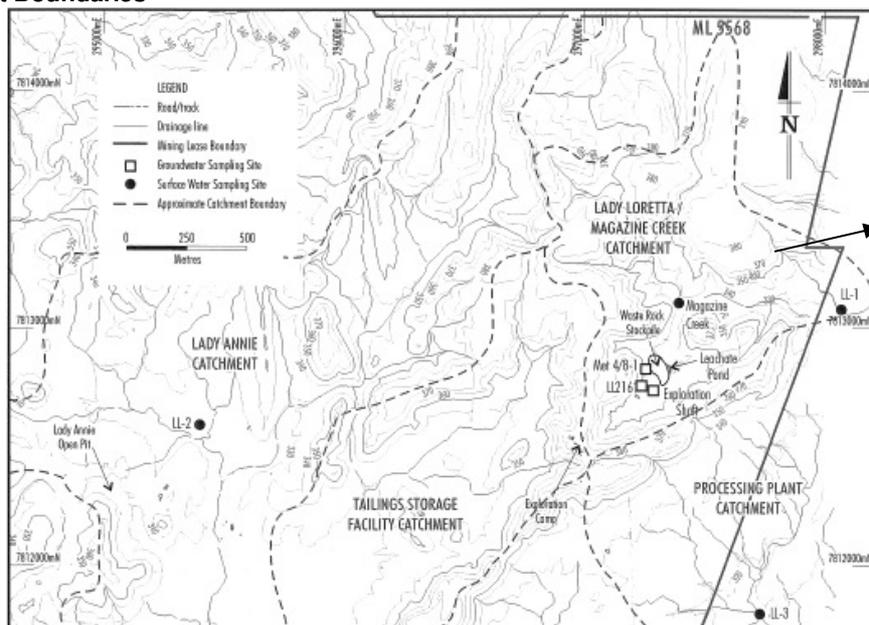
Onsite Storage Monitoring Points	Lat	Long
SW9 - 10 m Downstream of Waste rock dump	284126	8109776
SW3a - Water dam	283787	8110206
T2 - Treatment pond	283754	8110316
SW10 - Void	284068	9109565
SW11 - Tailings storage facility	283944	8110019
SW7 - Forget me not decline	283324	8110012

LADY LORETTA PROJECT

Lease Boundaries, Directions to Site, Surface Water Monitoring Points & Local Drainage



Catchment Boundaries



Site drains generally in easterly direction to Gunpowder Creek

MINE CONTACTS

Lady Loretta Project

██████████ (Xstrata Zinc)

Ph: ██████████ Mob: ██████████

E: ██████████@xstratazinc.com.au

Mine Site Address:

Lady Loretta lease (ML5568) is located approx. 140km northwest of Mount Isa. The site is accessed via the Lady Annie Mine Haul Road.

Registered Business Address:

Lvl 9, 123 Eagle St
GPO 1433
BRISBANE QLD 4001

Directions to Site

- It's advisable to contact the Lady Annie Mine site to let them know you will be travelling along their haul road to access the Lady Loretta site. The general Lady Annie Mine site number is 4748 0000.
- Head north out of Mt Isa on the Barkly Highway toward Camooweal.
- 22kms past the Gunpowder/Birla Mine turnoff (on the right) is the May Downs Road turnoff (on the left)
- Travel a further 4 kms past the May Downs Road turnoff, & then turn right at the Lady Annie/Paradise Phosphate Project sign
- Travel approx. 40kms along the road to the Lady Annie mine site. Heed the Lady Annie Mine radio call in signs on the Lady Annie access road.
- At the T intersection turn left toward Lady Annie mine. (note, right turn takes you to the camp)
- Travel past the rail loadout & several km's along, **before the main admin office**, take the **right turn** to the Lady Annie Mine (Pit). This is a major turnoff & is well signed.

Landowners

Contact	Address	Phone	Email	Location
██████████	Calton Hills Lot 5 CP865892, Lockness/Tewinga	██████████		Downstream Magazine Creek

SURFACE WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

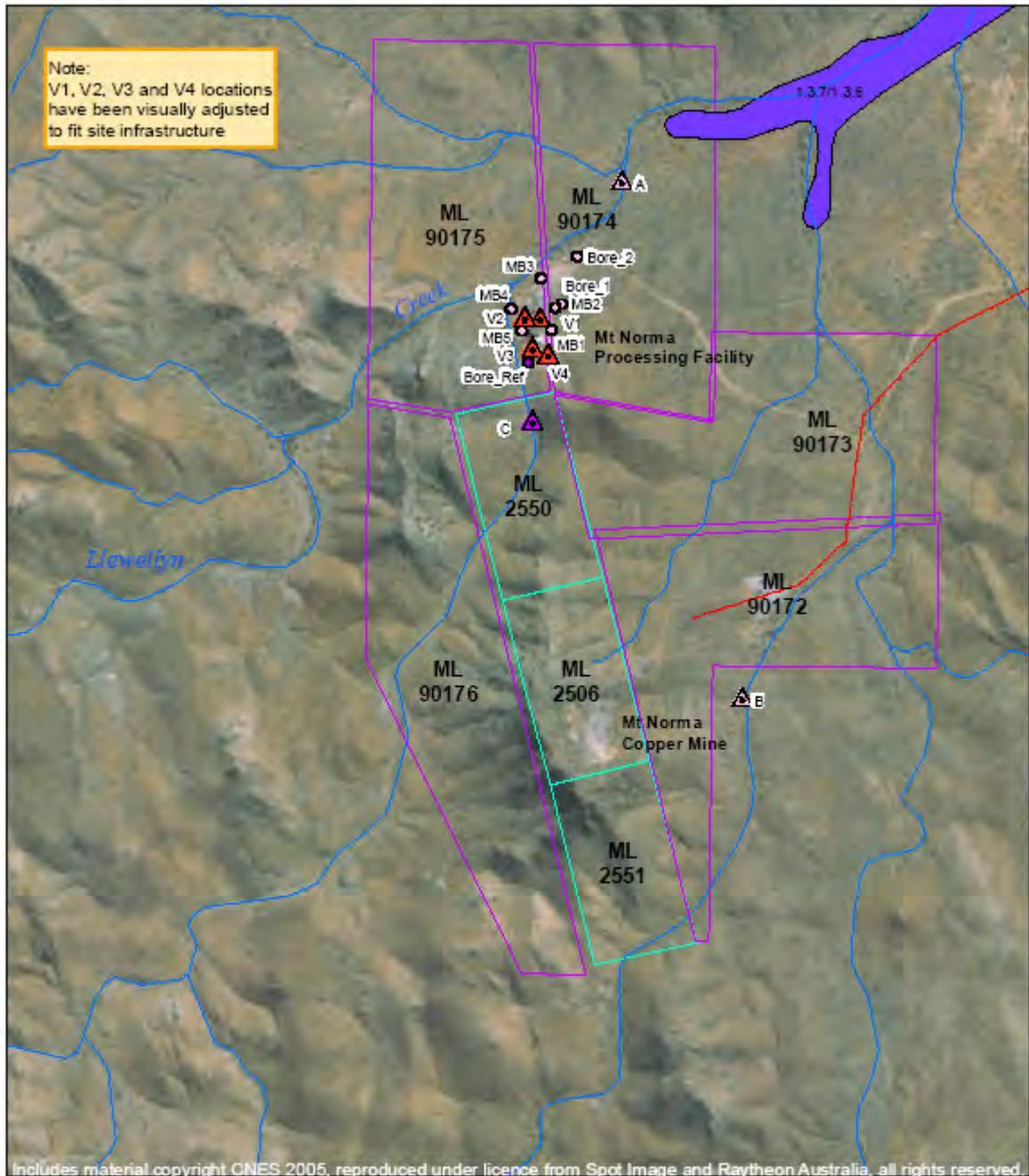
Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
LL-1	298080	7813065	Magazine Creek	297388	7813129
LL-2	Removed due to Lady Annie Mine Operations		LL04-7	297200	7812935
LL-3	297719	7811803	LL04-9	297211	7812660
LL-4	295318	7811450			
LL-5	295551	7810218			
LL-6	296165	7809545			
LL-7	296667	7809735			
LL-8	296448	7810388			
LL-9	296142	7812340			
On Site Storage					
WRD Leachate Management Dam*	297412	12186940			

Datum: All AMG84, Zone 54 except for * which is in GDA94

The only storage currently on site is the small WRD leachate management dam which is designed to store a 1 in 100, 72 hr storm event. The WRD is designed so that the majority of runoff is directed to the exploration shaft, with the dam intercepting a smaller amount of runoff from the northern side of the WRD. The dam is generally dry, however if required, the dam contents are pumped to the shaft to ensure sufficient wet season storage capacity.

MOUNT NORMA MINE

Lease Boundaries, Surface Water Monitoring Points & Local Drainage



MtNorma

Type

- Receiving Groundwater
- Reference Groundwater
- Onsite Storage Monitoring Points
- Receiving Waters
- Reference Sites

Track

- Track
- Riverine Drainage Lines

Regional Ecosystems Remnant Vegetation

- Endangered dominant

Mining Lease Status

- Granted (Mt Norma Mining Company Pty Ltd)
- Application (Cudexo Ltd)

This map product is
intended for internal
use only

ACCURACY STATEMENT

Due to varying sources and scales of data, spatial locations may not coincide when overlaid

DISCLAIMER

This map is compiled from information supplied to the Department of Environment and Resource Management (DERM). Whilst all care is taken in the preparation of this map, neither DERM nor its officers or staff accept any responsibility for any loss or damage which may result from inaccuracy or omission in the map from the use of the information contained therein.

Map Date: 15 December 2009



Version: 191109_AA_RAP

MINE CONTACTS

Mount Norma Mine

██████████ (Environmental Consultant)

Ph:

Mob:

E: ██████████@gil.com.au

Mine Site Address:

Approximately 25km south east of Cloncurry, off the A2 Landsborough Hwy (Cloncurry-McKinlay road). ML2550, 2551 & 2506

Registered Business Address:

Level 24, Royal Exchange Building
56 Pitt St
SYDNEY NSW 2000

Landowners

ML2551 (Lot 4640, Plan PH1434)

Andrew Jesse & Samuel Daniels & Gabrielle Kennedy & Others
Leasehold - Cattle grazing & breeding

Ph: (07)

E:

Address: PO Box 1
CLONCURRY QLD 4824

MI2506 (Lot 2823 & 2821 on B15722)

State Land (represented by DERM) – Vacant, large house site

Address: PO Box 266
CLONCURRY QLD 4824

SURFACE WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

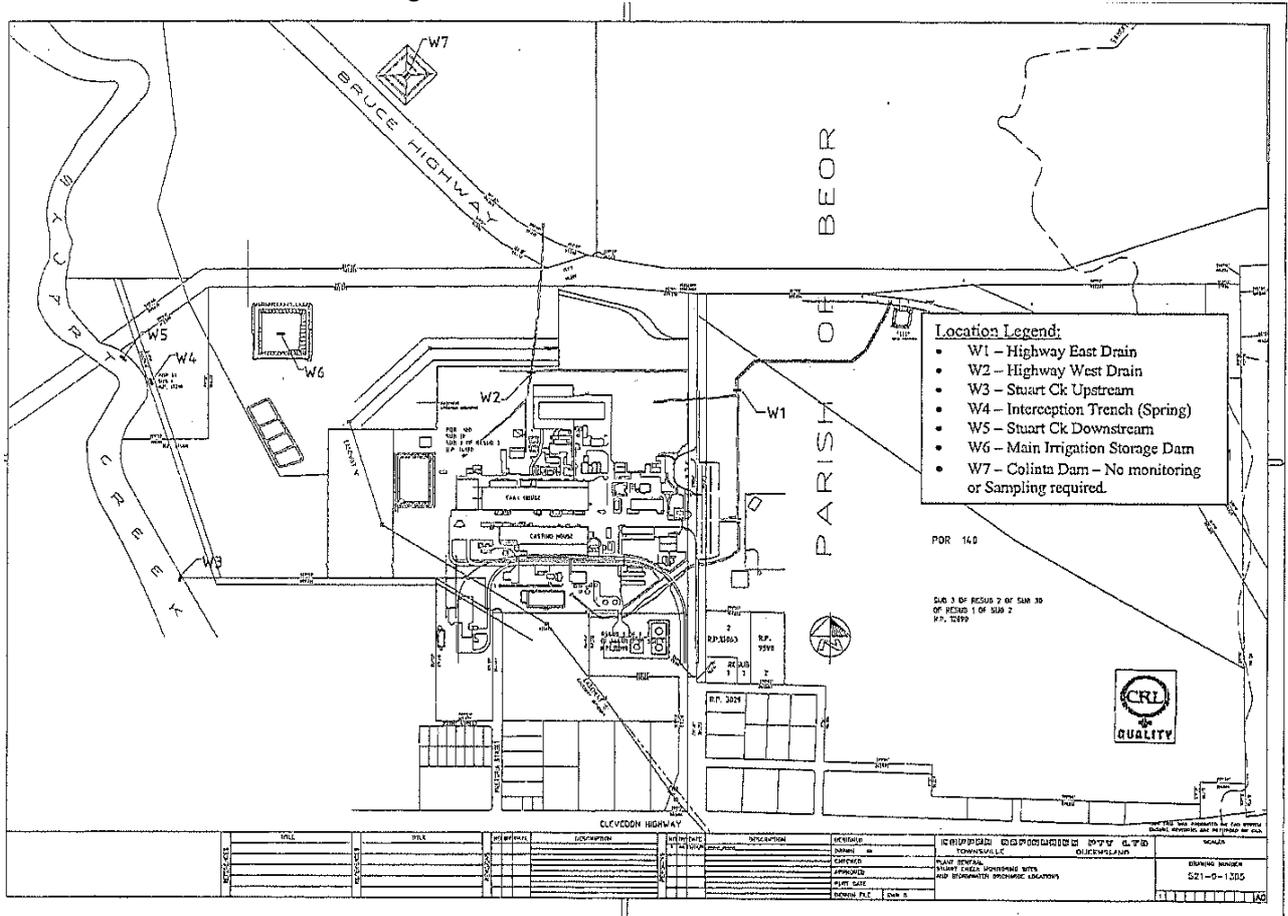
(GDA94 comparable with WGS84 on handheld GPS)

Monitoring point	Lat	Long	Monitoring point	Lat	Long
Receiving Waters			Reference Sites		
Monitoring Point A	S20.902	E140.698	Monitoring Point C	S20.908	E140.696
Monitoring Point B	S20.982	E140.702			
On Site Storage					
Hazardous Dams (V1, V2, V3 & V4)	S20.905	E140.696			

COPPER REFINERIES PTY LTD

EA Holder: Xstrata Copper

Site Water Movements and Discharge Points



Regional Water Sample Locations



MINE CONTACTS

Copper Refineries Limited

Ms [REDACTED]
 Environmental Superintendent
 Ph: [REDACTED]
 Fax: [REDACTED]
 Mob: [REDACTED]
 [REDACTED]@xstratacopper.com.au

Registered Business Address:
 Xstrata Queensland Limited
 Level 9 Riverside Centre
 123 Eagle Street
 BRISBANE QLD 4000

Mine Site Address:

Hunter Street
 STUART QLD 4811

Surrounding land users

TBA

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

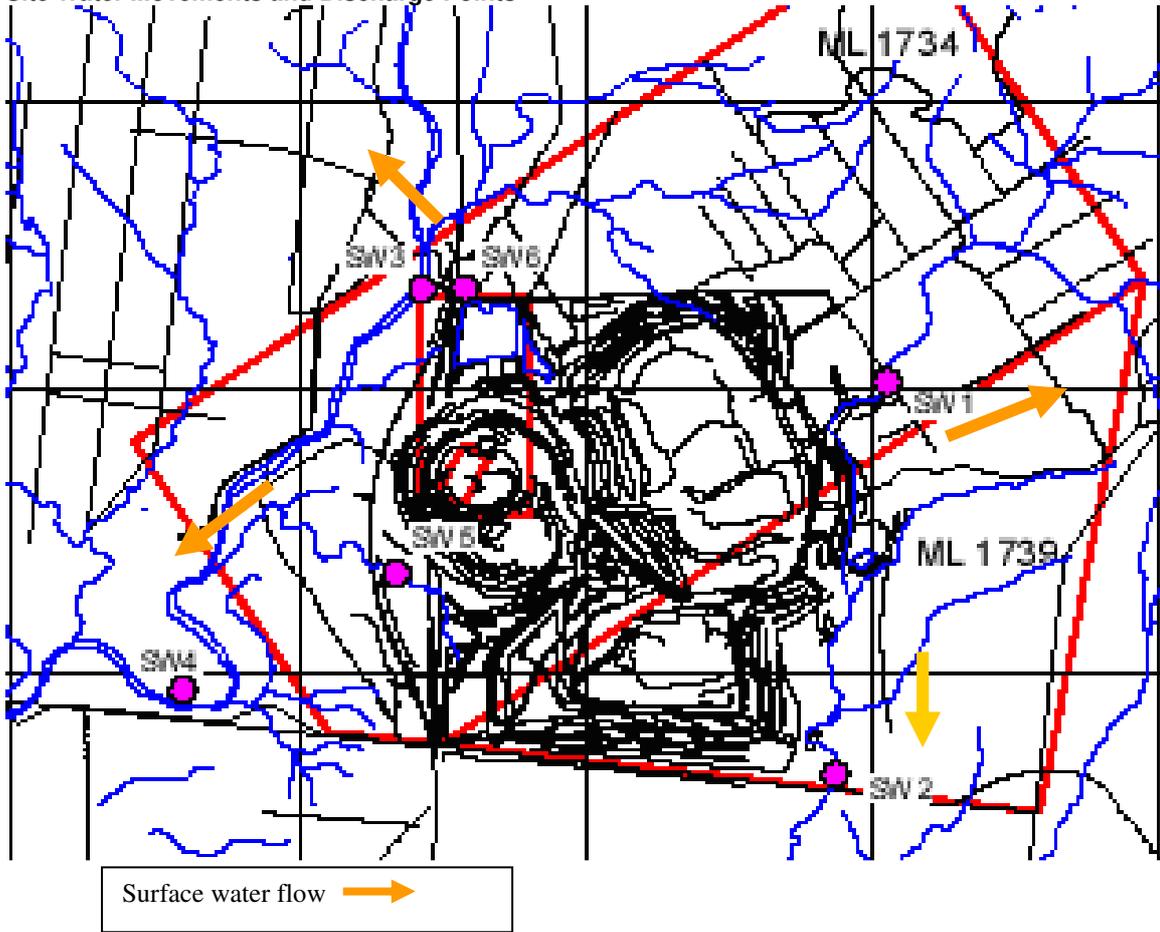
Monitoring point	Quality characteristics	Monitoring frequency
W3 & W5	pH	Weekly
W3 & W5	Total Ammonia (expressed as NH3 mg/l)	Weekly
W3 & W5	Total Copper (mg/l)	Weekly
W3 & W5	Total Nickel (mg/l)	Weekly
W3 & W5	Total Arsenic (mg/l)	Weekly
W4	pH	Not less than weekly when pumping interception trench
W4	Total Ammonia (expressed as NH3 mg/l)	Not less than weekly when pumping interception trench
W4	Total Copper (mg/l)	Not less than weekly when pumping interception trench
W4	Total Nickel (mg/l)	Not less than weekly when pumping interception trench
W4	Total Arsenic (mg/l)	Not less than weekly when pumping interception trench

Monitoring point	Quality characteristics	Monitoring frequency
W6	pH	Once per discharge
W6	Sodium Adsorption Ratio (SAR)	Once per discharge
W6	Electrical Conductivity (dS/m)	Once per discharge
W6	Oil and Grease (mg/l)	Once per discharge
W6	Total Copper (mg/l)	Once per discharge
W6	Total Nickel (mg/l)	Once per discharge
W6	Total Arsenic (mg/l)	Once per discharge

HIGHWAY REWARD PROJECT -

Mount Windsor Joint Venture Partners of:
Thalanga Copper Mines Pty Ltd and BML Holdings Pty Ltd

Site Water Movements and Discharge Points



Regional Water Sample Locations



Current As of December 2010

MINE CONTACTS

Highway Reward Project

██████████ (Environmental Manager)

Ph: ██████████
 Fax: ██████████
 Mob: ██████████
 Email: ██████████@cmt.com.au

Registered Business Address:

Mount Windsor Joint Venture Partners of:
 Thalanga Copper Mines Pty Ltd
 C/o Henry Davis York
 44 Martin Place
 SYDNEY NSW

Mine Site Address:

Locked Bag 1
 Queenstown, TAS 7467

Surrounding land users

Mt Farrenden Pastoral Holdings – Mt Windsor Joint Venture
 Coronation station.

Ph: ██████████
 Mob: ██████████
 Email: ██████████@cmt.com.au

Ploiceman Creek reports to Yarraman Creek located in the sub-catchment of the Burdekin River. Adjacent areas are used for cattle grazing.

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

Schedule C - Table 1 (Receiving water monitoring locations and frequency)

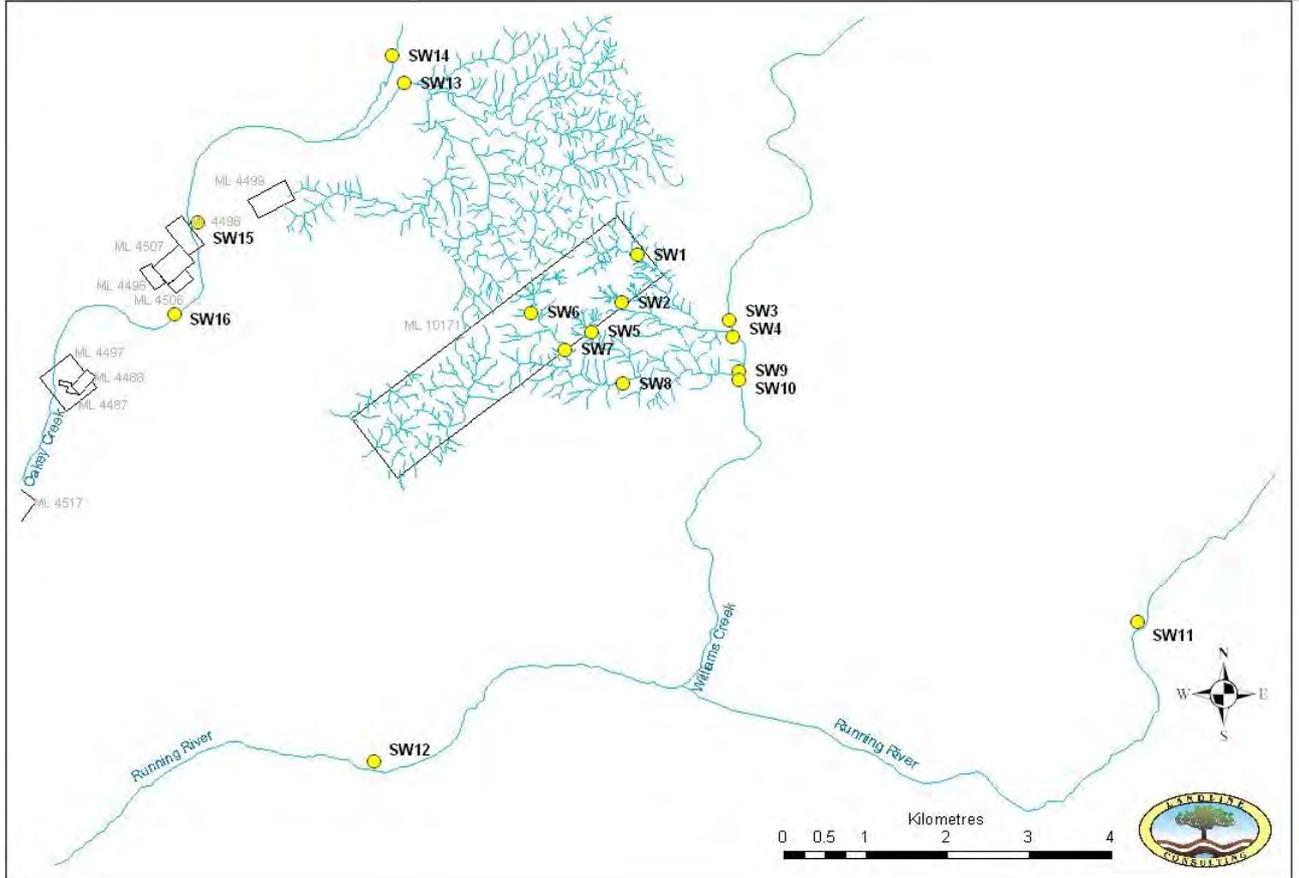
Monitoring point	Easting	Northing	Monitoring frequency
SW1	418050	7748020	Event
SW2	417871	7746641	Event
SW3	416430	7748344	Event
SW4	415644	7746879	Event
SW5	416340	7747350	Event
SW6	416580	7748350	Event

Schedule C - Table 7 (Receiving stream sediment monitoring locations and frequency)

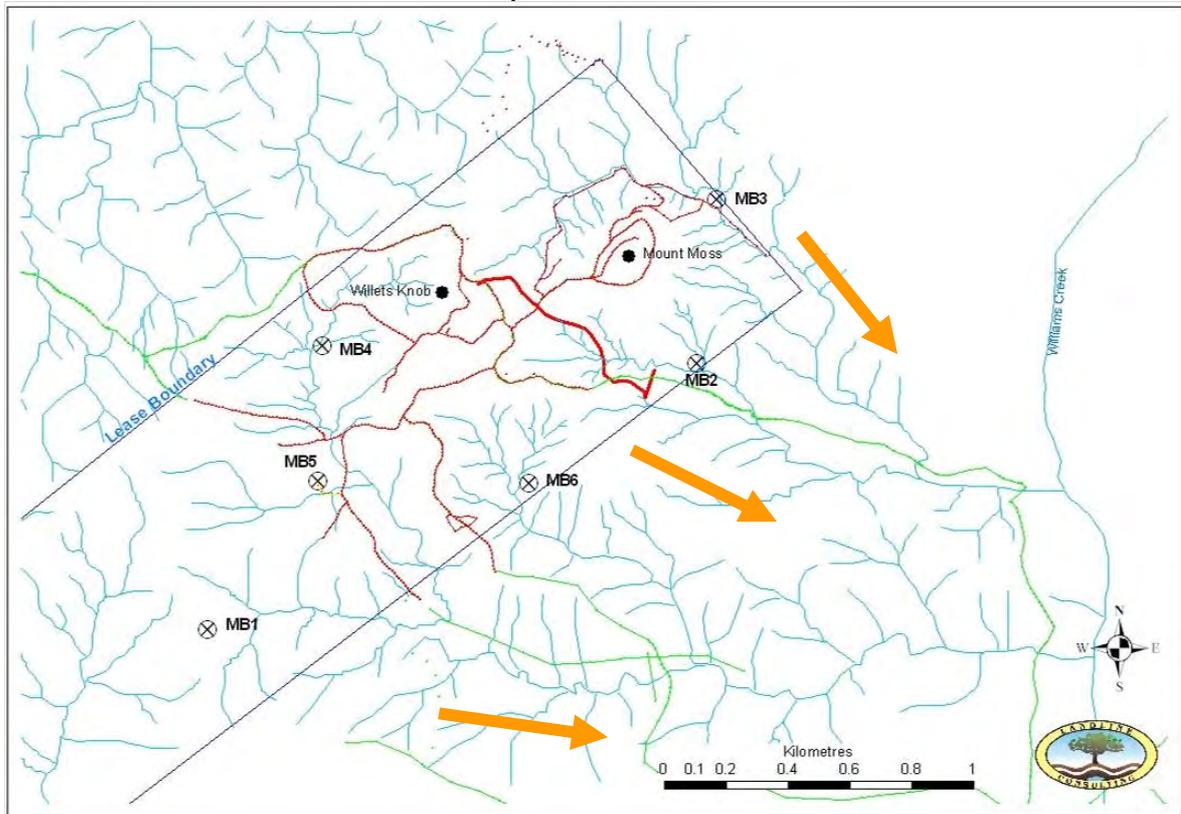
Monitoring point	Easting ²	Northing	Monitoring frequency
SS1	418104	7748097	Bi-Annually ¹
SS2	417810	7746510	Bi-Annually ¹
SS3	418185	7745648	Bi-Annually ¹
SS4	416409	7748581	Bi-Annually ¹
SS5	415650	7746880	Bi-Annually ¹
SS6	414797	7746122	Bi-Annually ¹
SS7	416350	7747310	Bi-Annually ¹

MT MOSS MINE

Site Water Movements and Discharge Points



Site water movement and Groundwater Sample Locations



Surface water flows →

MINE CONTACTS

Mt Moss Mine

██████████ (Site Manager)

Ph: ██████████

Fax: ██████████

Mobile: ██████████

Email: ██████████@curtainbros.com.au

Registered Business Address:

Mount Moss Mining Pty Ltd
22 Ross Street
South Townsville Qld 4810

Mine Site Address:

PO Box 7488
Garbutt, QLD 4872

Landowners

Ewan Hills Station - Ryan Jones

P & C C Jones

Ph: ██████████

Ewan Hills Station Hidden Valley 4816

Zigzag Station – I & S Hayman

W D & R A Milton

Ph: ██████████

Zig Zag Station Hidden Valley 4816

:

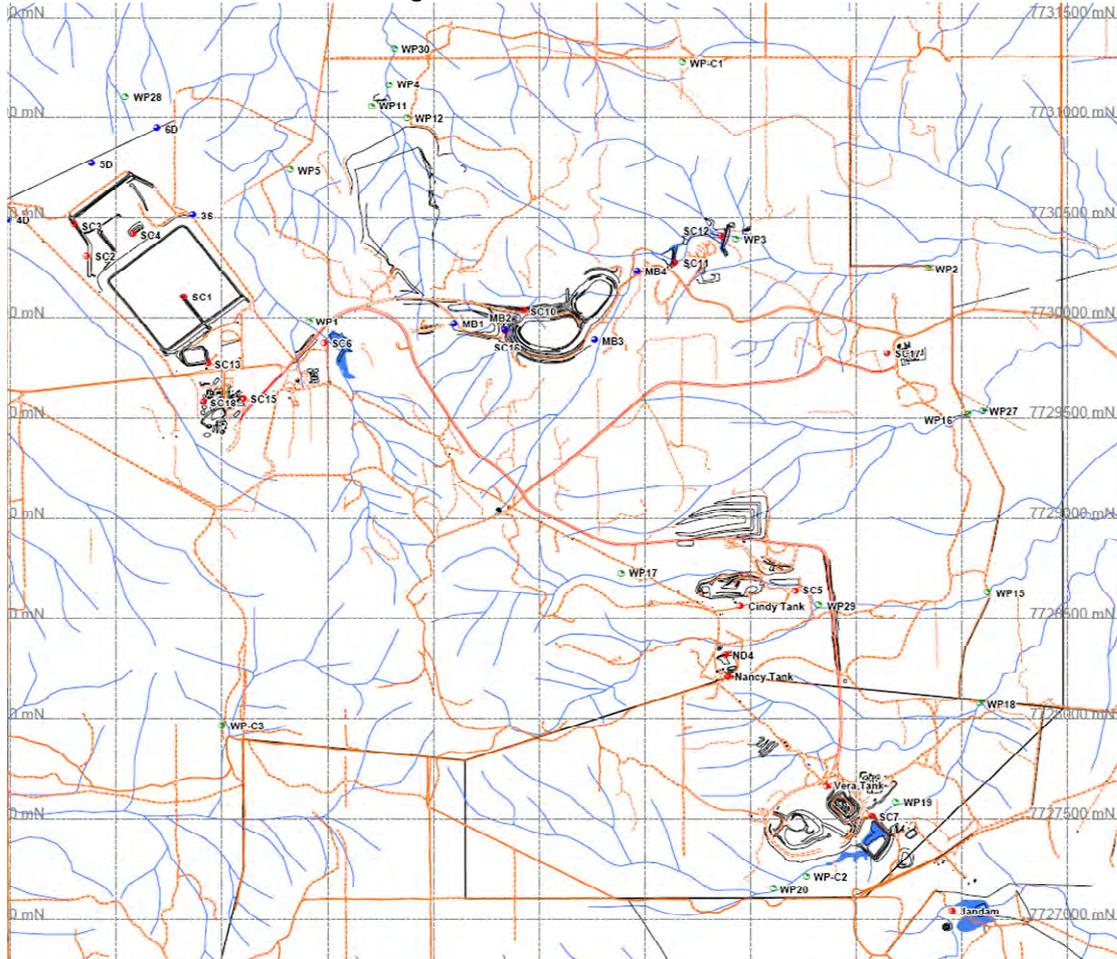
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

(Receiving water monitoring locations and frequency)

Site Code	Easting (GDA 94)	Northing (GDA94)	Monitoring frequency
<u>Reference Sites</u>			<u>Dry Season Monitoring*</u> : Monthly when surface water is present <u>Wet season monitoring*</u> : Daily for the first seven days when off site discharge commences, then weekly while surface water is discharging from site.
SW3	380104	7888640	
SW11	385091	7884915	
SW14	375994	7891912	
<u>Potentially Impacted sites</u>			<u>Dry season monitoring*</u> : Monthly when water is present <u>Wet Season monitoring*</u> : Daily for seven days when flow commences then weekly while surface water is present
SW1	378985	7889450	
SW2	378798	7888864	
SW4	380152	7888442	
SW5	378431	7888498	
SW6	377686	7888734	
SW7	378106	7888280	
SW8	378817	7887860	
SW9	380230	7888010	
SW10	380228	7887906	
SW12	375770	7883184	
SW13	376146	7891574	
SW15	373616	7889852	
SW16	373339	7888720	

PAJINGO PROJECT -

Site Water Movements and Discharge Points



Regional Water Sample Locations



MINE CONTACTS

Pajingo Project (EA Holder: Conquest Mining formerly a NQM Gold and Heemskirk Gold JV)

██████████ (Environmental Manager)

Ph: ██████████
 Fax: ██████████
 Mob: ██████████
 Email: ██████████@nqm.com.au

Registered Business Address:

NQM Gold 2 Pty Ltd
 Suite 46, Level 8,
 269 Wickham Street
 FORTITUDE VALLEY QLD 4006

Mine Site Address:

██████████
 Conquest Gold Pty Ltd
 PO Box 1435
 CHARTERS TOWERS. 4820

Surrounding Land users

Merricourt Station – John & Verna Webb Phone: ██████████
 Doongara Station/Britannia Station – David & Pam Healing Ph: ██████████ Fax: 4787 6064 Email: ██████████@bigpond.com
 Harvest Home – ██████████ Phone: ██████████
 Victoria Downs – ██████████ Phone: ██████████
 Slogan Downs – ██████████ Phone: ██████████
 Pallamana Station – ██████████ Ph: ██████████ Email: ██████████@bigpond.com

Policeman, Molly Darling Creeks & Yarraman Creek reports to the Burdekin River. Adjacent areas are used for cattle grazing.

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

Table C1 Contaminant Release, Sources Monitoring & Receiving Waters and monitoring

Monitoring point	Easting MGA (GDA 94)	Northing MGA (GDA 94)	Receiving waters description	Monitoring frequency	
WP2 ^	444342	7730256	Ephemeral stream	daily during release (the first sample must be taken within 2 hours of the discovery of the release)	
WP3^	443430	7730400	Ephemeral stream		
WP13	441660	7732939	Ephemeral stream		
WP15	444621	7728631	Ephemeral stream		
WP16	444529	7729520	Ephemeral stream		
WP18	444584	7728081	Ephemeral stream		
WP19	444187	7727586	Ephemeral stream		
WP27	444600	7729538	Ephemeral stream		
WP28^	440541	7731103	Ephemeral stream		
WP29	443822	7728570	Ephemeral stream		
WP30^	441815	7731348	Ephemeral stream		
NOTE: This does not apply to tailings dams ^ indicates sample point for WAD CN					
Receiving Waters - Reference Sites					
WP - C1	443180	7731280	Ephemeral stream		
WP - C3	441000	7727969	Ephemeral stream		

Table C2 (Contaminant Release Limits)

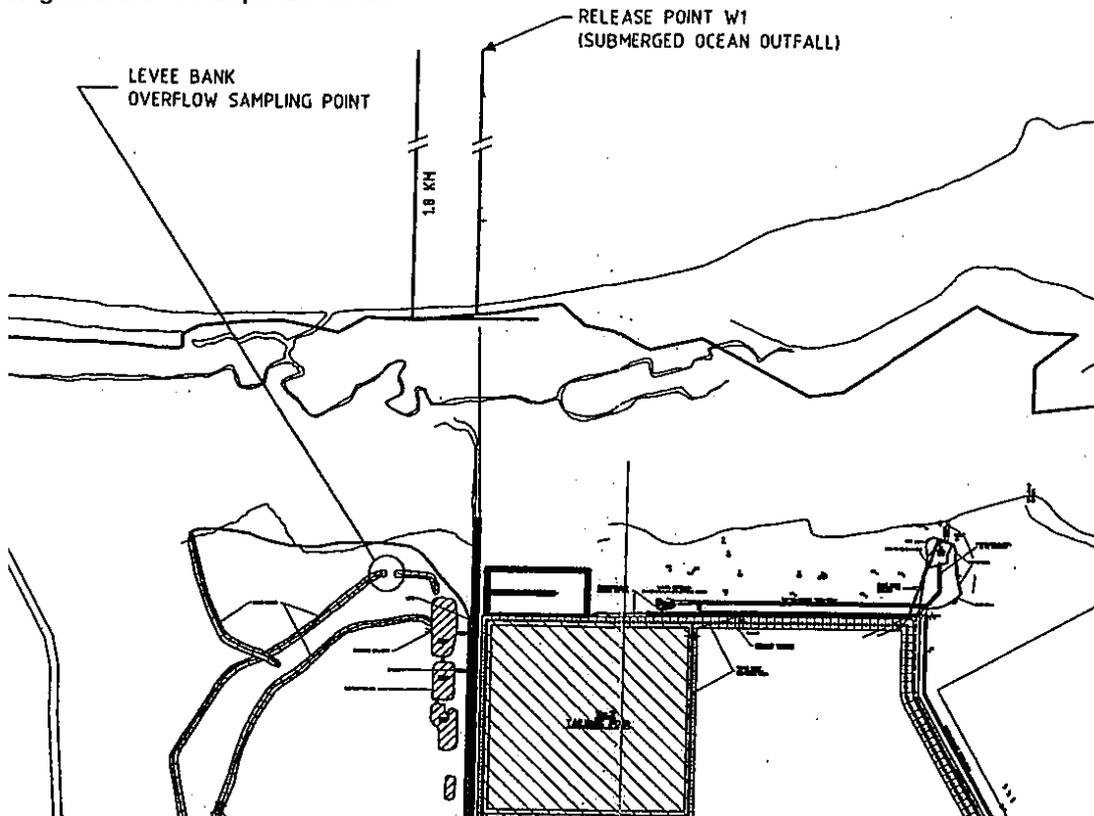
Quality / Characteristic	Units	Contaminant release limit	Limit Type
pH	pH units	5.5 – 9	Range
TDS ³	mg / L	4000	Maximum
Cd	mg / L	0.01	Maximum
SO ₄	mg / L	1000	Maximum
Cu	mg / L	0.5	Maximum
Ni	mg / L	1.0	Maximum
Pb	mg / L	0.1	Maximum
Zn	mg / L	20	Maximum
As	mg / L	0.5	Maximum
Hg	mg/L	0.002	Maximum
WAD CN ¹	mg / L	0.2	Maximum
Ag	µg/L	0.1	Maximum

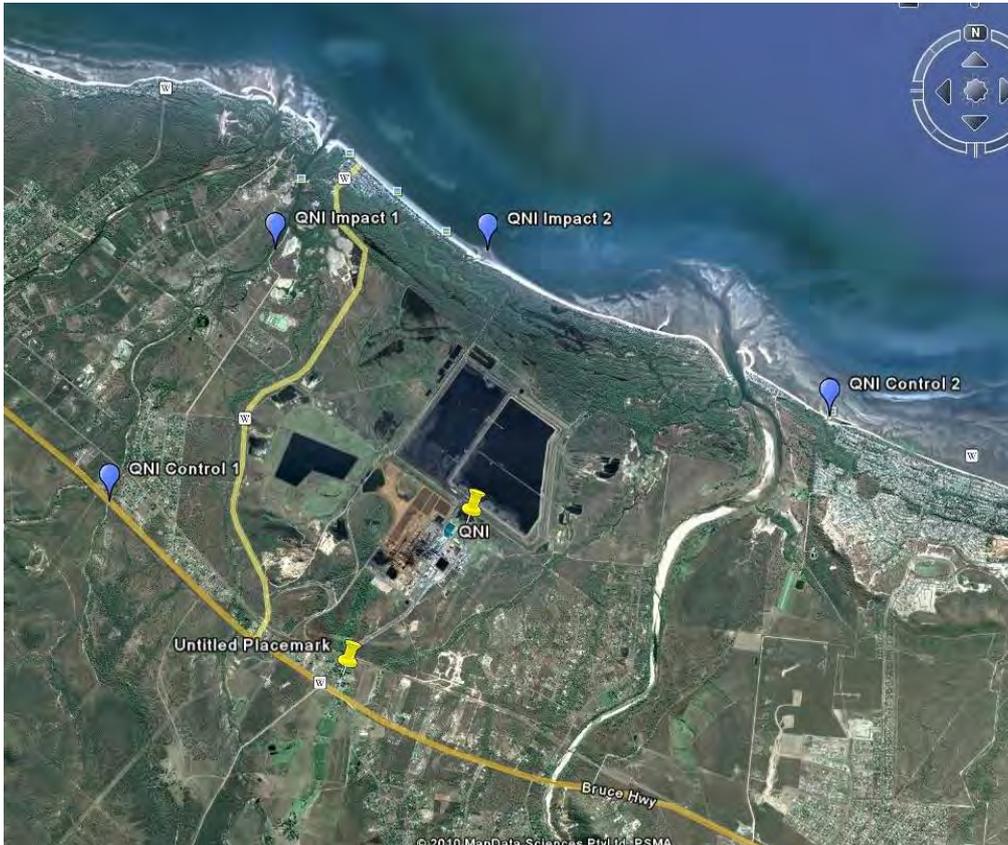
QUEENSLAND NICKEL REFINERY – YABULU

Site Water Movements and Discharge Points



Regional Water Sample Locations





Off lease sampling points:

QNI Control 1, -19.1943° 146.575° / 0457079, 7875965 Healy Creek

QNI Control 2, -19.1844° 146.664° / 0464522, 7878864 Cockatoo Creek

QNI Impact 1, -19.165° 146.596° / 0458281, 7881309 Causeway, Saunders beach road

QNI Impact 2, -19.1872° 146.634° / 0460179, 7880778 Blind Creek mouth

MINE CONTACTS

Queensland Nickel Refinery

██████████ (A/Environmental Superintendent)

Ph: ██████████

Fax: ██████████ 78

Mob: ██████████

Email: ██████████@qni.com.au

Mine Site Address:

Yabalu Refinery
Private Mail Bag 5
TOWNSVILLE QLD 4810

██████████ (General Manager)

Ph: ██████████ Mob: ██████████

Email: ██████████@qni.com.au

Registered Business Address:

Queensland Nickel Pty Ltd
Level 2
9 Ouyen Street
BUNDALL Qld 4217

Surrounding land users

Halifax Bay (Great Barrier Reef Marine Park).

The community of Saunders Beach is located to the north of the refinery.

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

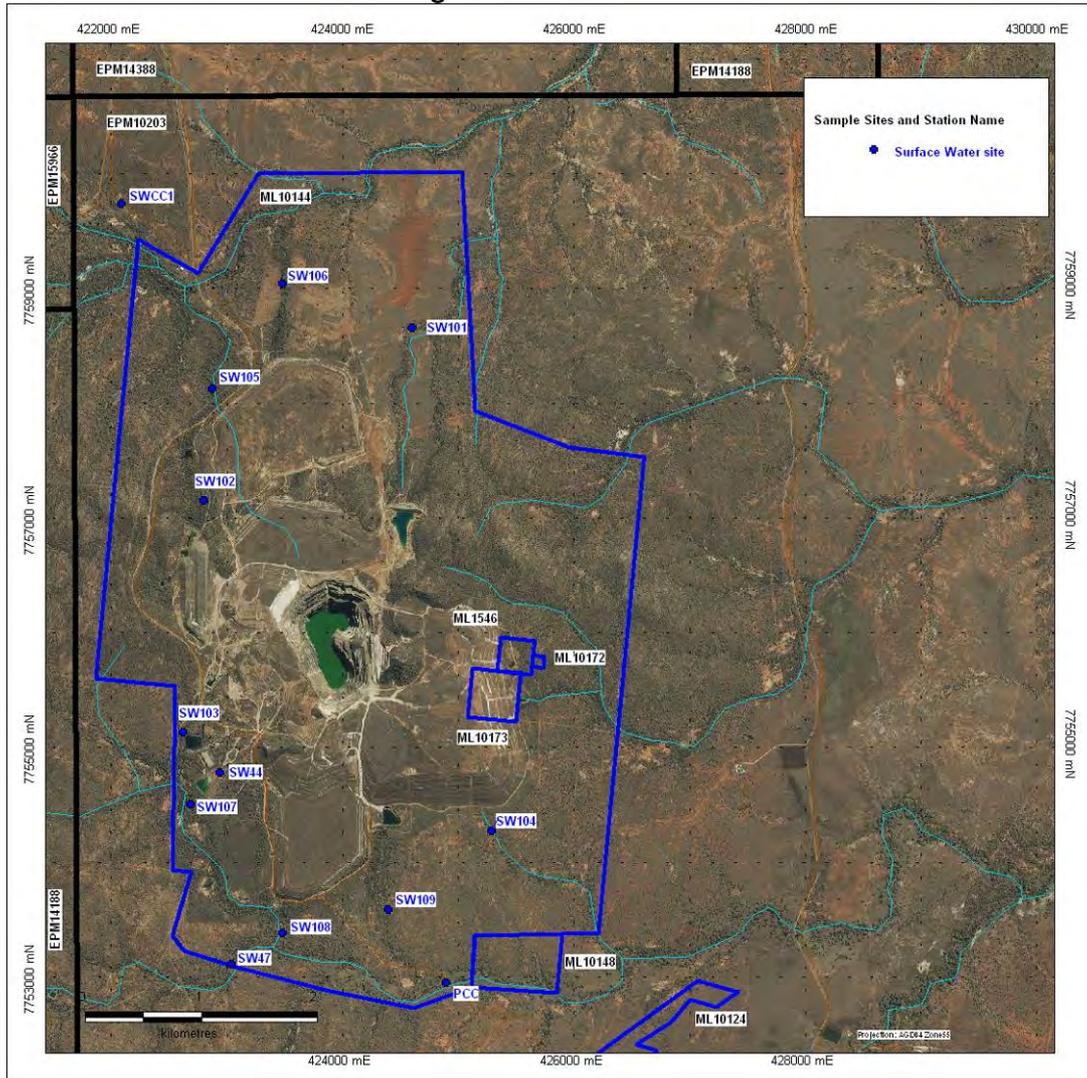
Release Point W1 - to waters described as Halifax Bay at a location described as the outlet of the existing submerged outfall approximately 1.8km from the shoreline, as shown in Schedule 4B – Figure 3 titled site plan 410-0000-024. Condition 1D7 states:

Bypassing of the stormwater storage pond must only occur:

- (a) when stormwater runoff from the plant area exceeds the capacity of the stormwater storage pond and the total pumping capacity of the stormwater storage pond pumps; or
- (b) if bypassing does not cause stormwater contained in the levee bank area when measured at the sampling point as described Schedule 4B Figure 3 site plan 410-0000-024 to leave the boundary of the premises unless the following quality criteria are met:
 - (i) the concentration of total ammonia must be less than 2mg/L.
 - (ii) the concentration of dissolved nickel must be less than 1mg/L.
 - (iii) the concentration of dissolved cobalt must be less than 1mg/L.
 - (iv) the concentration of suspended solids must be less than 30mg/L.

MT LEYSHON GOLD MINE

Mt Leyshon Site Surface Water Monitoring Locations



MINE CONTACTS

Mt Leyshon Gold Mine

██████████ (Site Senior Executive)

Ph: ██████████

Mob: ██████████

██████████
Senior Technical Advisor (Closure and Reclamation)

Mob: ██████████

Mine Site Location:

25 km South of Charters Towers

Registered Business Address:

Ms ██████████
Leyshon Resources Limited
Ground Floor
16 Ord Street WEST PERTH
WESTERN AUSTRALIA 6005

Surrounding landholders

Name	Station	Water Source	Water Use	Contact Number
	Latan	Clarke, Prices Cattle, Two Mile, Fenian Creeks	Stock	
	Merrilands	Tributaries of Seventy Mile Creek	Stock	
	Bellview	Puddler Creek and Tributaries of Seventy Mile Creek	Stock	
	Charelle	Eight Mile and Clarke Creek	Stock	
	Koolyn	Seventy Mile, Puddler and Fenian Creeks	Stock	
		Clarke Creek	Stock	
		Clarke Creek	N/A	
		Clarke Creek	N/A	N/A
		Broughton River	Household	
	Leyshon View	Seventy Mile Ck & Broughton River	Stock / Household	
		Broughton River	Household / Stock	
	Broughton Stud	Broughton River	Stock / Household / Drinking	
		Broughton River	Stock / Household	
		Broughton River	Stock	
		Broughton River	Stock / Household / Recreation / Irrigation	
		Broughton River	Stock / Household	
		Broughton River	Stock / Household / Drinking	
		Broughton River	Drinking / Household / Irrigation	
		Broughton River	Stock / Irrigation	

Receiving Water Monitoring Locations and Frequency

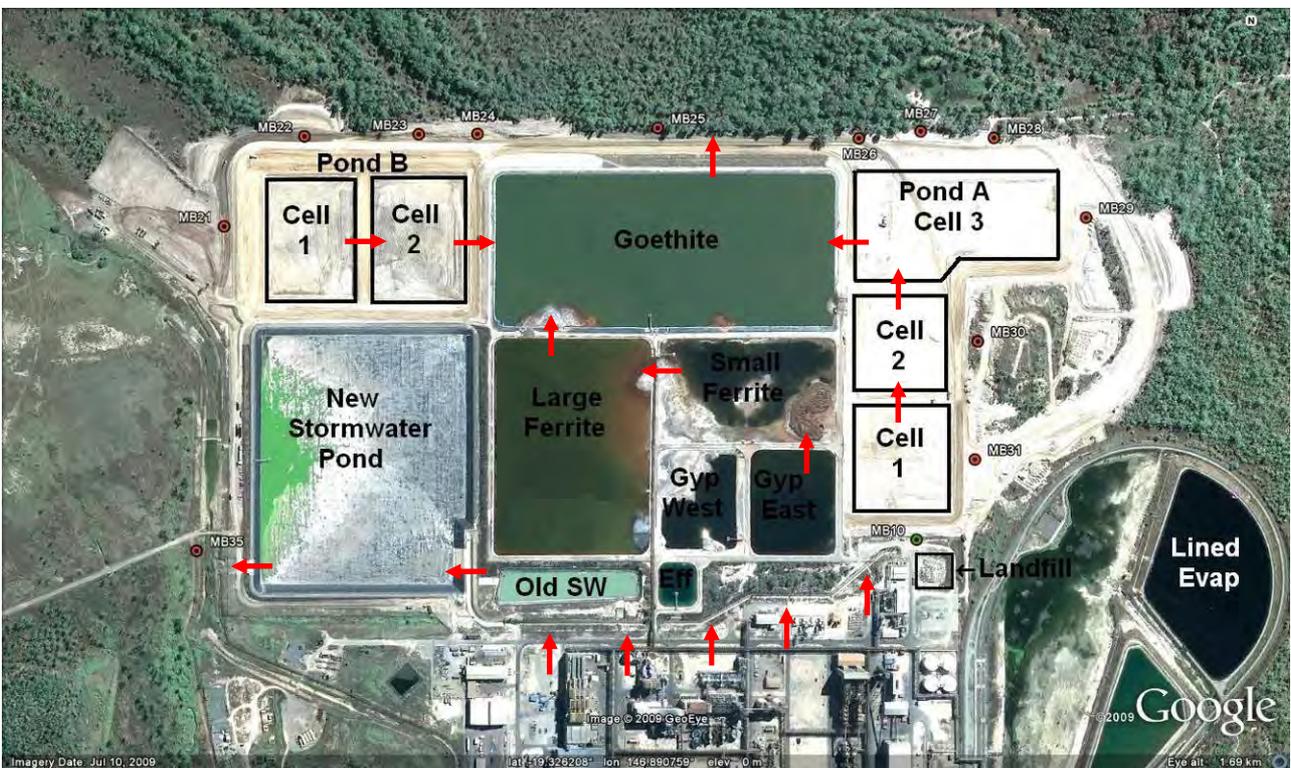
Monitoring point		Northing (GDA 94)	Easting (GDA 94)	Monitoring frequency
Clarke Creek upstream	SW CC1	7759031	422728	Determined by rainfall events (1)
Puddler Creek upstream	SW 47	7753116	423038	Determined by rainfall events (1)
Puddler Creek Crossing	PCC	7752951	424896	Determined by rainfall events (1)
New North Tailings Facility	SW101 SW105 SW106	7758659 7758130 7759047	424600 422872 423479	Determined by rainfall events (1)
Plant area and Heap Leach area	SW110 SW107 SW103	7754704 7754503 7755136	423113 422687 422623	Determined by rainfall events (1)
Scats Dump	SW102	7757152	422802	Determined by rainfall events (1)
Southern Tailings Facility	SW108 SW109	7753388 7753590	423474 424394	Determined by rainfall events (1)
East Waste Rock Dump	SW104	7754279	425284	Determined by rainfall events (1)
Northern Boundary	RSSCC	7760004	424230	Each flow event
Eastern Boundary	RSSMM	7755211	426315	Each flow event
Southern Boundary	RSSPC	7752978	425650	Each flow event

A Flow Event is defined as measurable flow or water body at the monitoring point.

(1) Sample to be collected that reflects the water quality associated with the first rainfall event after November 1 that is of sufficient volume to result in a flow that can be sampled at the majority of sampling points. A further sampling event for all sampling points is also required following any rain event that results in a discharge from a water containment structure (other than Borefields Dam and Stormwater Dams). A majority is defined as 10 of the 16 monitoring points.

SUN METALS ZINC REFINERY

Site Water Discharge and Surface Water Monitoring Locations



SITE CONTACTS

Sun Metals Site Contacts

Chief Executive Officer:

██████████
 Ph: ██████████
 Fax: ██████████
 Mob: ██████████
 ██████████@sunmetals.com.au

Environmental Superintendent:

██████████
 Ph: ██████████
 Fax: ██████████
 Mob: ██████████
 ██████████@sunmetals.com.au

Postal Address:

PMB 10
 Townsville MC 4810

Registered Business Address:

1 Zinc Avenue,
 STUART QLD 4810

Surrounding Landuse / Landholders

The refinery is situated next to a Culturally Sensitive Area and tidal wetlands with creeks flowing into Cleveland Bay which has been declared as a Fish Habitat Area. There are no residential communities immediately adjacent to the refinery. The majority of surrounding land uses are commercial or industrial.

Adjoining (Downstream) Landholder: State of Queensland (QPWS)

Contact: ██████████
 Ph: ██████████
 Mob: ██████████

Stormwater Pond System Release Limits

Quality Characteristic	Monitoring Point Location	Limit type	Release Limit	Frequency
pH	Stormwater Pond	range	6 to 9	Daily during the period of the release
Total Zinc	Stormwater Pond	maximum	15 mg/L	
Total Lead	Stormwater Pond	maximum	0.15 mg/L	
Total Copper	Stormwater Pond	maximum	0.1 mg/L	
Total Cadmium	Stormwater Pond	maximum	0.3 mg/L	

Surface Water Monitoring

Quality Characteristic	Monitoring Point Location (see note1)	Sample Type	Frequency
pH	1. Upstream of the release (approx 100m) 2. Exit of the pond spillway 3. MS1 (at the weir in the drainage channel next to the stormwater pond) 4. MS2 (in the creek system of the Muntalunga range) 5. Downstream of the release (approx 100m) (see note 3)	Flow weighted composite at MS1 and MS2 Grab samples at other points	Daily during the period of the release
Conductivity			
Suspended Solids			
Salinity			
Dissolved Oxygen			
Calcium, Sodium and Magnesium			
Arsenic, Cadmium, Cobalt, Copper, Iron, Lead, Mercury and Zinc (Total)			
Arsenic, Cadmium, Cobalt, Copper, Iron, Lead, Mercury and Zinc (Dissolved)			
Sulphate			
Chloride			
Total Dissolved Solids			
Hardness as CaCO ₃ (see note 2)			

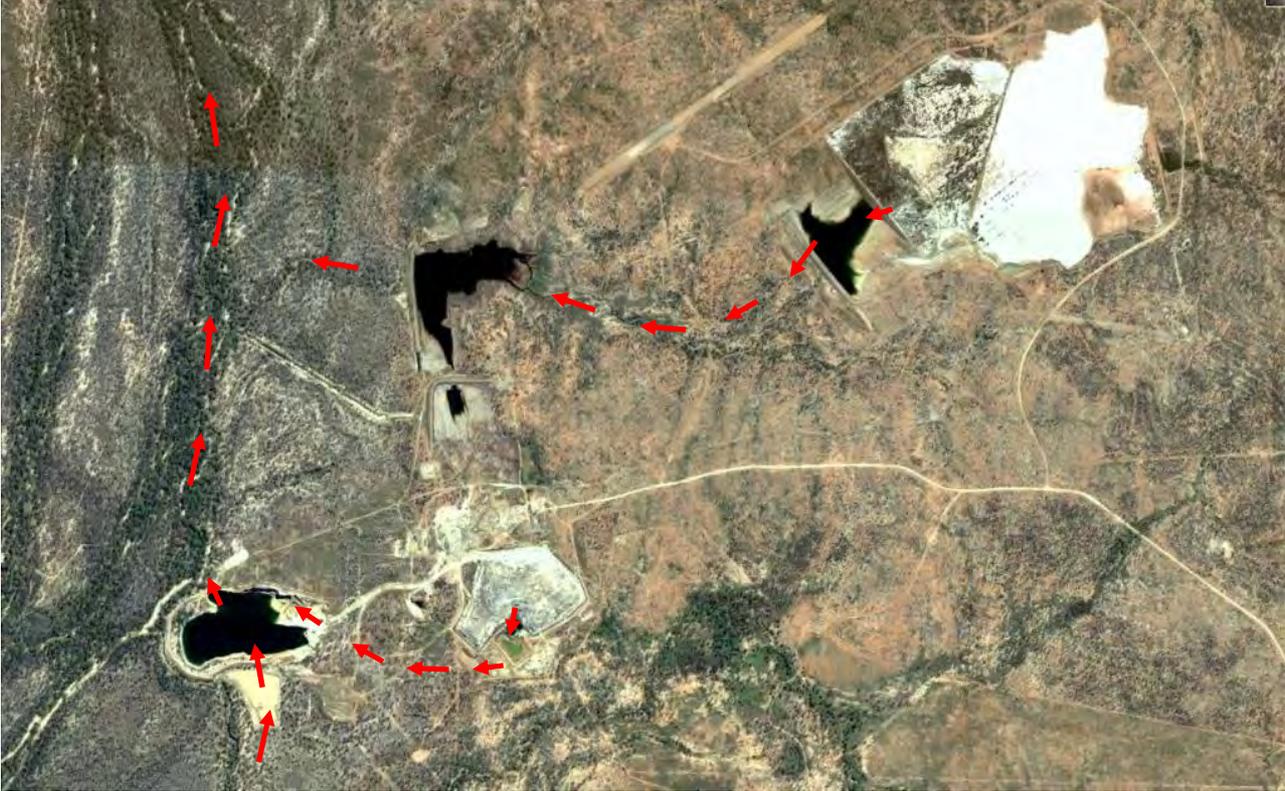
Note 1: Monitoring points are indicated on Figure 1.

Note 2: Monitoring for CaCO₃ at sites 1,4 and 5 only

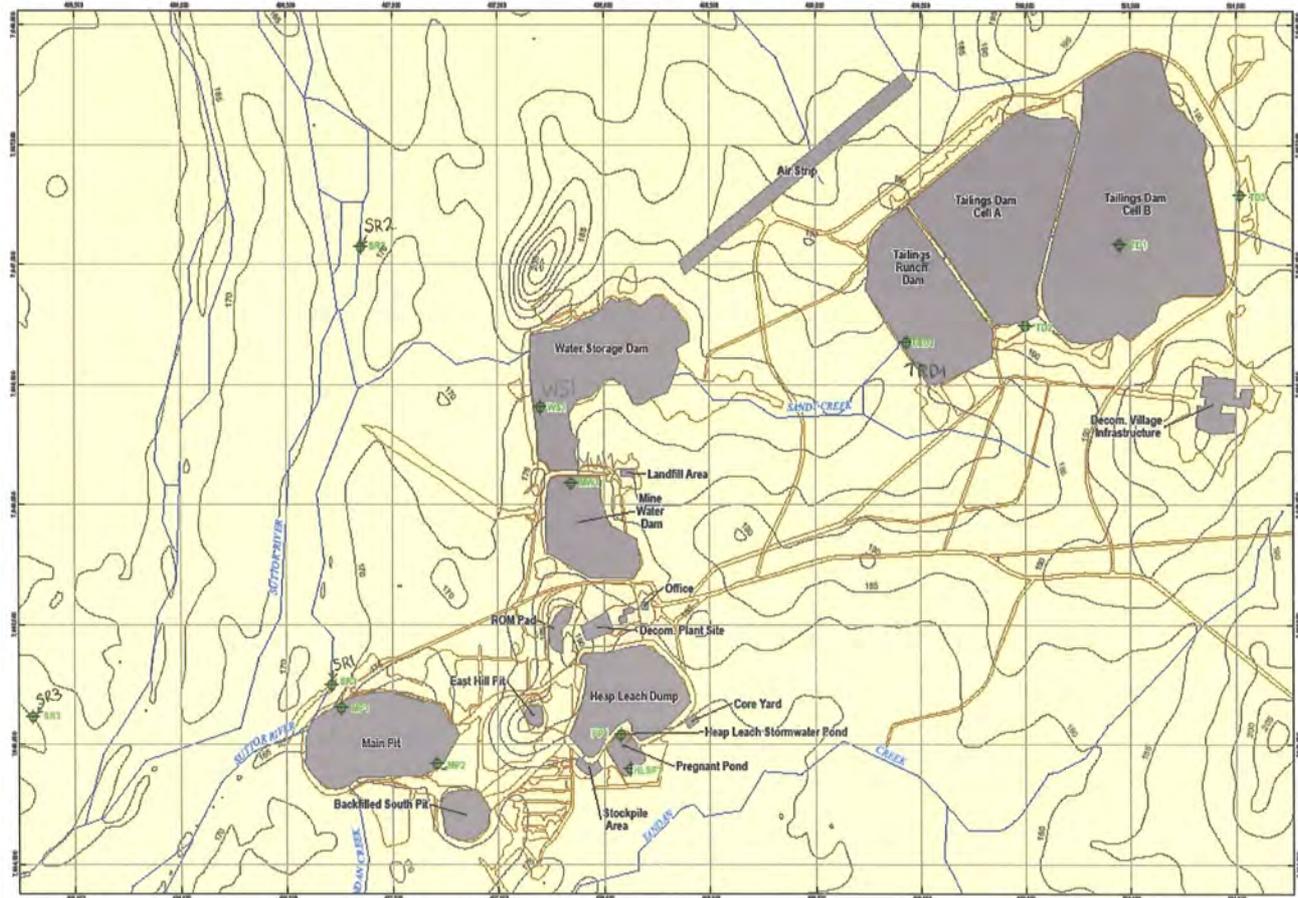
Note 3: Except for a release from the New Stormwater Pond at the spillway in which case the monitoring point location is at the end of the MS1 drain as depicted in figure 2

STRAITS GOLD –YANDAN MINE

Yandan Site Water Movements



Yandan Flood Sampling Locations (SR1) is the only statutory monitoring point



MINE CONTACTS

Mine Site Contacts

Exploration Manager:

██████████
██████████

Environmental Consultant (Coffey SA):

██████████
PH: ██████████

Mine Site Address:

PO Box 1641
WEST PERTH WA 6872

Registered Business Address:

Straits Gold Pty Ltd
Level 1, 35 Vendor Street
WEST PERTH WA 6005

Surrounding Landuse / Land holders

Mrs ██████████
St Anns Station - Hanging Rock Pastoral Company

Ph: ██████████

Address:

PO Box 228
CHIRN PARK QLD 4215

Surrounding land use is primarily grazing. Sutter River reports to the Burdekin dam.

(Receiving water monitoring locations and frequency)

Monitoring point	AMG North	AMG East	Monitoring frequency
Yandan – Suttor River adjacent to Main Pit	7645134	496641	Six monthly

NOTE: This does not apply to dams containing hazardous waste

Receiving water contaminant limits

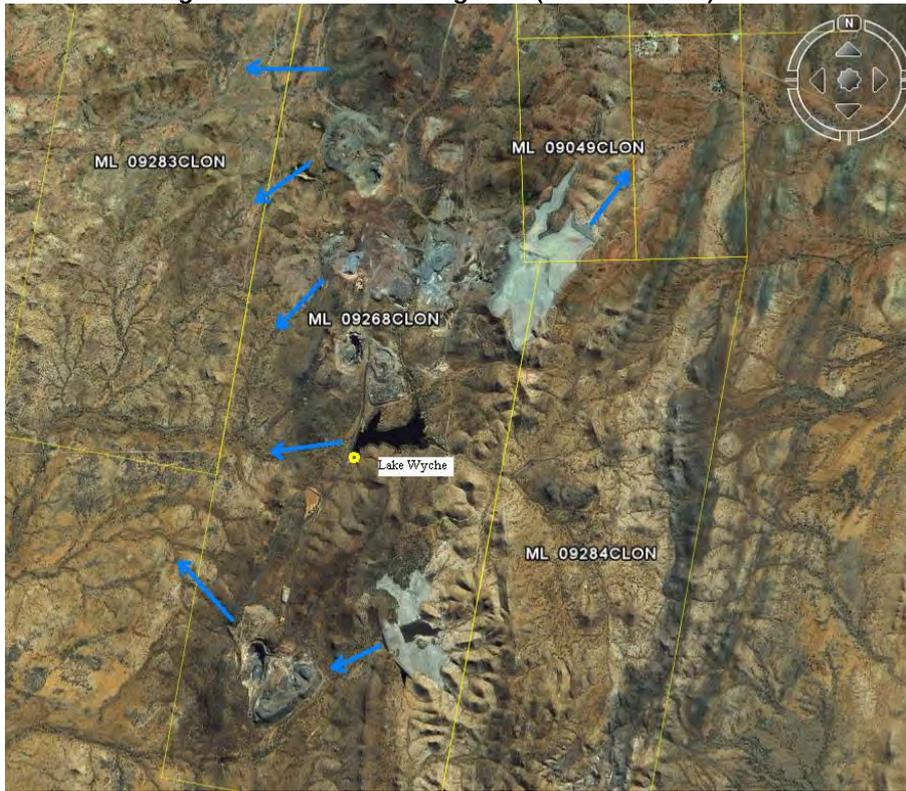
Parameter	Units	Limit type	Limit
pH		Range	6 – 9
Total Dissolved Solids	mg/L	Maximum	4000
Sulfate	mg/L	Maximum	1000 ¹
Arsenic	mg/L	Maximum	0.5 ¹
Cadmium	mg/L	Maximum	0.01 ¹
Copper	mg/L	Maximum	0.5 ¹
Lead	mg/L	Maximum	0.1 ¹
Mercury	mg/L	Maximum	0.002 ¹
Molybdenum	mg/L	Maximum	0.05 ¹
Selenium	mg/L	Maximum	0.02 ¹
Zinc	mg/L	Maximum	20 ¹

¹ Measured as a total unfiltered concentration

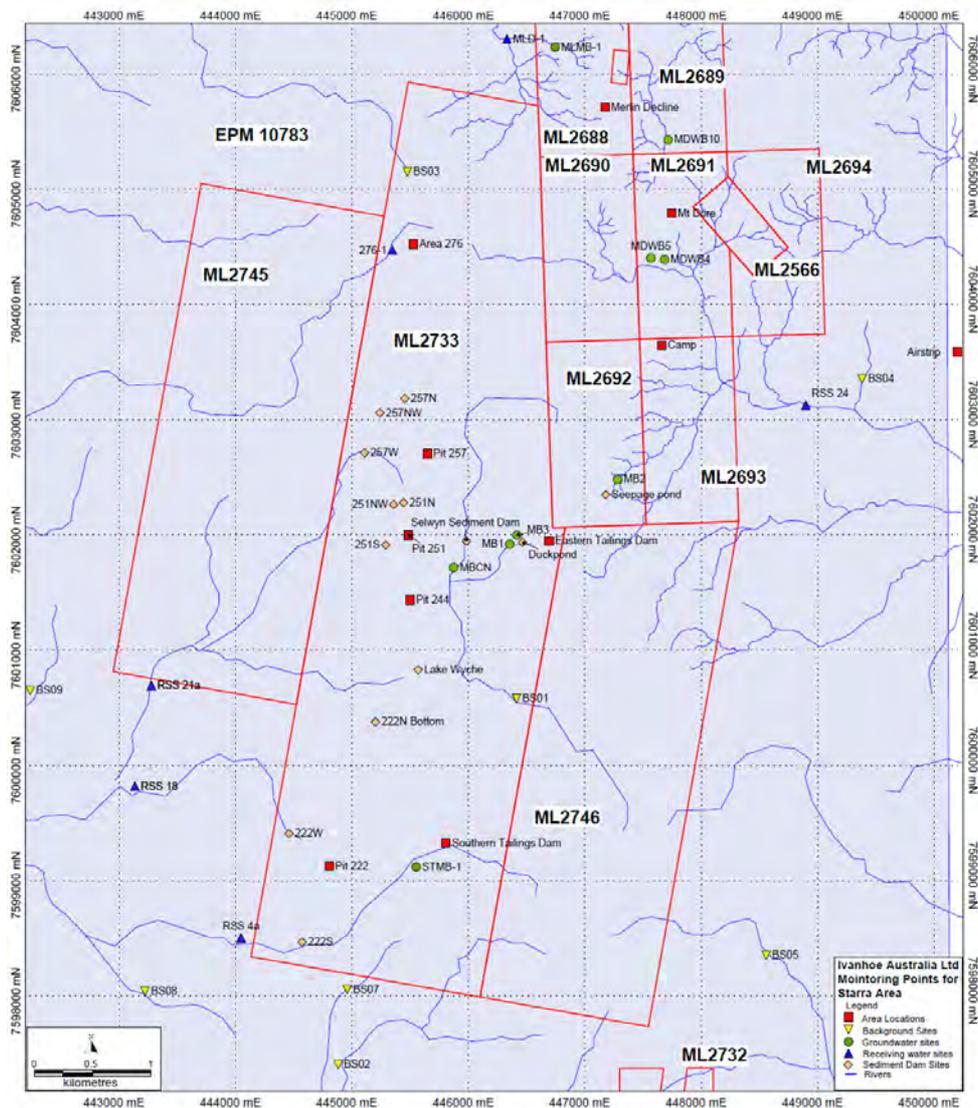
NOTE: This does not apply to dams containing hazardous waste.

SELWYN MINE

Site Water Movements and Discharge Points – Starra Mining Area (Merlin Decline)



Regional Locality Map – Monitoring Points



MINE CONTACTS

Selwyn Mine

██████████
Safety, Health, Environmental and Community Manager

Ph: ██████████

Mob: ██████████

E: ██████████@lvancorp.net

Registered Business Address:

Ivanhoe Cloncurry Mines Pty Ltd

Level 9

479 St Kilda Road

MELBOURNE VIC 3004

Mine Site Address:

Starra Mining Area: 100kms south of Cloncurry

Residents & Landowners

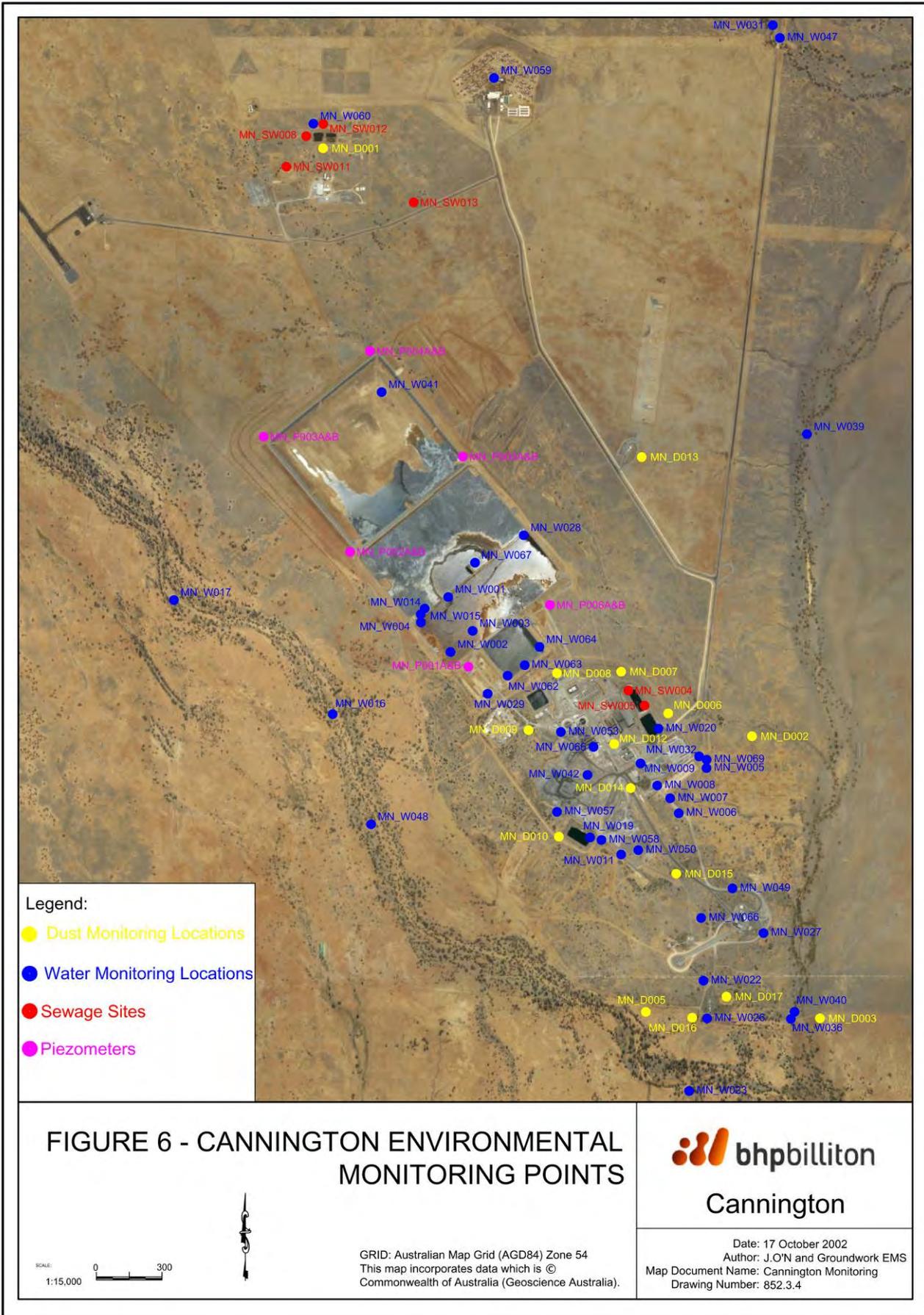
N/A - Ivanhoe Australia is the owner of the underlying Pastoral Lease

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

Monitoring Point	Latitude MGA (GDA 94)	Longitude MGA (GDA 94)
Receiving Waters		
4a – Stream leaving 222 pit area near southern boundary of ML2733	444048	7598501
12 – Stream leaving Mt Elliott Area near southern boundary of ML2736	448817	7617316
14 – Stream leaving Mt Cobalt area	447780	7595861
18 – Stream leaving main mining area, west of western boundary of ML2733	443136	7599817
21a – Stream leaving main mining area south of southern boundary of ML2745	443278	7600691
24 – Stream leaving area downstream of tailings dam, south of southern boundary of ML2694	448898	7603123
26 – Stream leaving Victoria mine area	445714	7591145
276-1 Stream leaving Area 276	445349	7604470
28 – Stream leaving Lady Ella mine area	446881	7612050
MLD-1 – Stream leaving Merlin mine area	446332	7606304
Reference Sites		
BS01	446413	7600581
BS04	449382	7603354
BS06	447922	7596029
BS10	446692	7612746
BS12	448688	7617074
Release Points		
Lake Whyche	445521	7600644

BHP CANNINGTON MINE

Water Sampling Locations (Cannington)



MINE CONTACTS

Cannington Mine

██████████ (Environmental Superintendent)

Ph: (██████████)

E: ██████████@bhpbilliton.com

Mine Site Address:

PO Box 5874
Townsville QLD 4810

Registered Business Address:

37 Winifred Street
Townsville QLD 4810

Landowners

Mining Lease No.	Landholder
90059	BHP Billiton
90060	██████████ (deceased)
90077	██████████

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

Monitoring Point	Easting	Northing
Receiving Waters (Cannington)		
Upstream Hamilton River Rising stage sampler	489444.9	7582471.7
Upstream Trepell Creek Rising stage sampler	492208.9	7585784.7
Downstream Hamilton River Rising stage sampler	492585.9	7580601.7
Upstream Emu Creek Rising stage sampler	493207.0	7585057.0
Receiving Stream Sediments		
Hamilton River Downstream Cannington Mine	492585.9	7580601.7
Background Sediment Monitoring		
Upstream Hamilton River (MN 017)	To Be Advised	To Be Advised
Upstream Trepell Creek (MN_W039)	To Be Advised	To Be Advised
Upstream Emu Creek Rising Stage Sampler	To Be Advised	To Be Advised
End of Pipe Monitoring		
Southern Environmental Catch Dam Spillway	492049.9	7581358.7
Eastern Environmental Catch Dam Spillway	491688.9	7582541.7

BHP YURBI LOADING FACILITY

Water Sampling Locations (Yurbi)

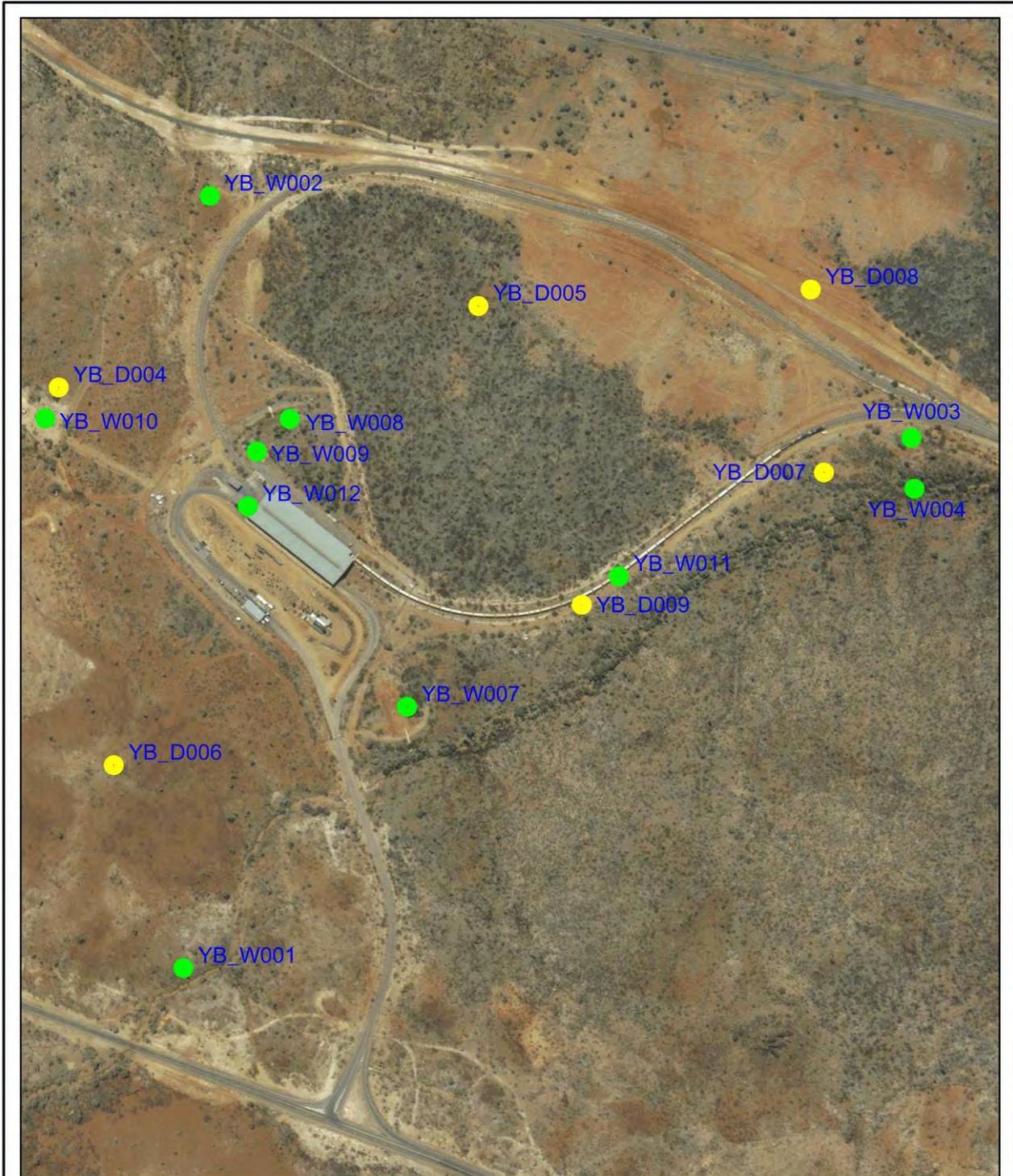


FIGURE 7 - YURBI ENVIRONMENTAL MONITORING POINTS

Legend:

- Water Monitoring Locations
- Dust Monitoring Locations

SCALE: 1:4000
0 80

GRID: Australian Map Grid (AGD84) Zone 54
This map incorporates data which is © Commonwealth of Australia (Geoscience Australia).



Cannington

Date: 17 October 2002
Author: J.O'N and Groundwork EMS
Map Document Name: Yurbi Monitoring
Drawing Number: 852.3.6

MINE CONTACTS

Yurbi Facility

██████████ (Environmental Superintendent)

Ph: ██████████

E: ██████████@bhpbilliton.com

Mine Site Address:

PO Box 5874
Townsville QLD 4810

Registered Business Address:

37 Winifred Street
Townsville QLD 4810

Landowners

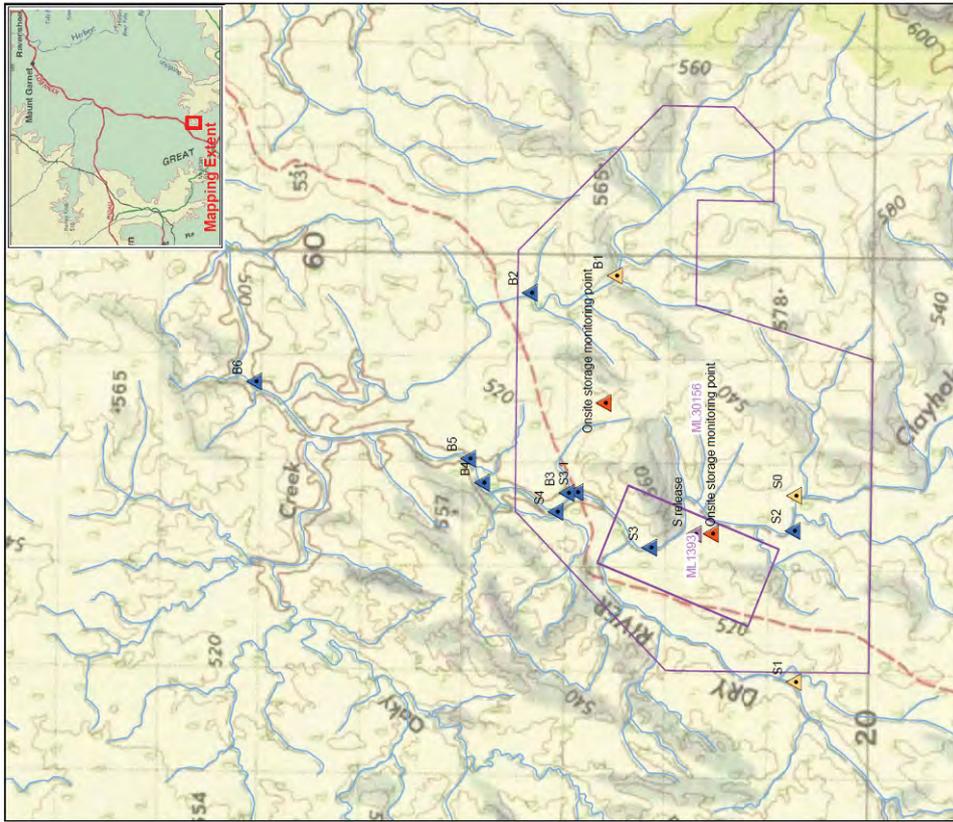
Mining Lease No.	Landholder
90059	BHP Billiton
90060	██████████ (deceased)
90077	██████████

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

Monitoring Point	Easting	Northing
Receiving Waters (Yurbi)		
Upstream Gum Creek (Yurbi 1) rising stage sampler	463750.1	7706085.1
Downstream Gum Creek (Yurbi 2) Rising stage sampler	463602.1	7707047.1
Upstream Yurbi Bore Creek Rising stage sampler (YB_RSS07)	463562.1	7706533.1
Dowstream Yurbi Bore Creek Rising stage sampler (YB_RSS02)	463678.1	7706854.1
Receiving Stream Sediments		
Gum Creek Downstream (Yurbi 2) Rising stage sampler	463602.1	7707047.1
Yurbi Bore Creek Downstream Rising stage sampler (YB_RSS02)	463678.1	7706854.1
Background Sediment Monitoring		
Upstream Gum Creek (YB_S010)	To Be Advised	To Be Advised
Upstream Yurbi Bore Creek (YB_S016)	To Be Advised	To Be Advised
End of Pipe Monitoring		
Yurbi North-Eastern Environmental Catch Dam	To be advised	To be advised
Yurbi South-Western Environmental Catch Dam	To be advised	To be advised

KAGARA – Mount Garnet, Surveyor and Balcooma

Site Water Movements and Discharge Points

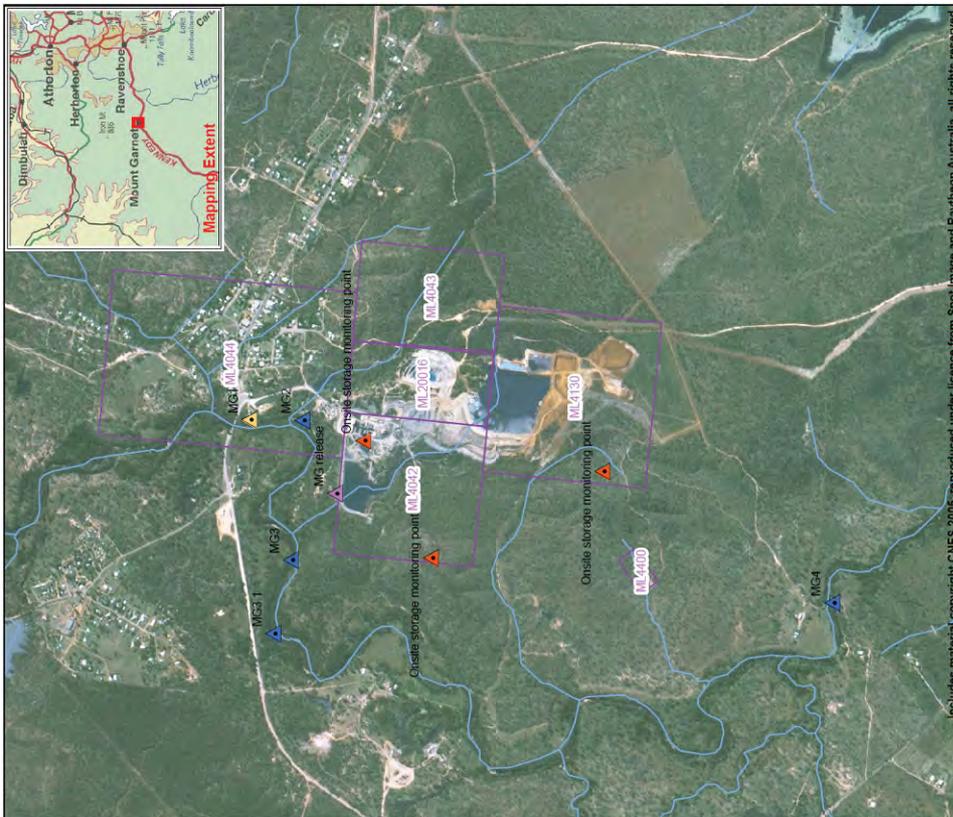


Kagara (Water Monitoring Sites)

- Receiving waters
- Reference site
- Licensed release point
- Onsite storage monitoring point
- Mining Lease
- Riverine Drainage Lines

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Queensland Government



Mount Garnet (Water Monitoring Sites)

- Receiving waters
- Reference site
- Licensed release point
- Onsite storage monitoring point
- Mining Lease
- Riverine Drainage Lines

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Queensland Government

MINE CONTACTS

Kagara Mine

██████████ Operations Manager)

Ph: ██████████

E: ██████████@mtgarnet.kagara.com.au

Registered Business Address:

Second Floor
24 Outram Street
West Perth WA 6005

Mine Site Address:

Mt Garnet Operations and Central Office
Rutile Street
Mount Garnet QLD 4872

Ph: ██████████

Fax: ██████████

Landowners

Mt Garnet Mine Site:

██████████
Coolgarra Road
Mount Garnet Q 4872

Ph: ██████████

██████████
Gecko Gully Road
Mount Garnet Q 4872

Ph: ██████████

Surveyor/Balcooma Mine Site:

██████████
Conjuboy Station
Mount Garnet Q 4872

Ph: ██████████

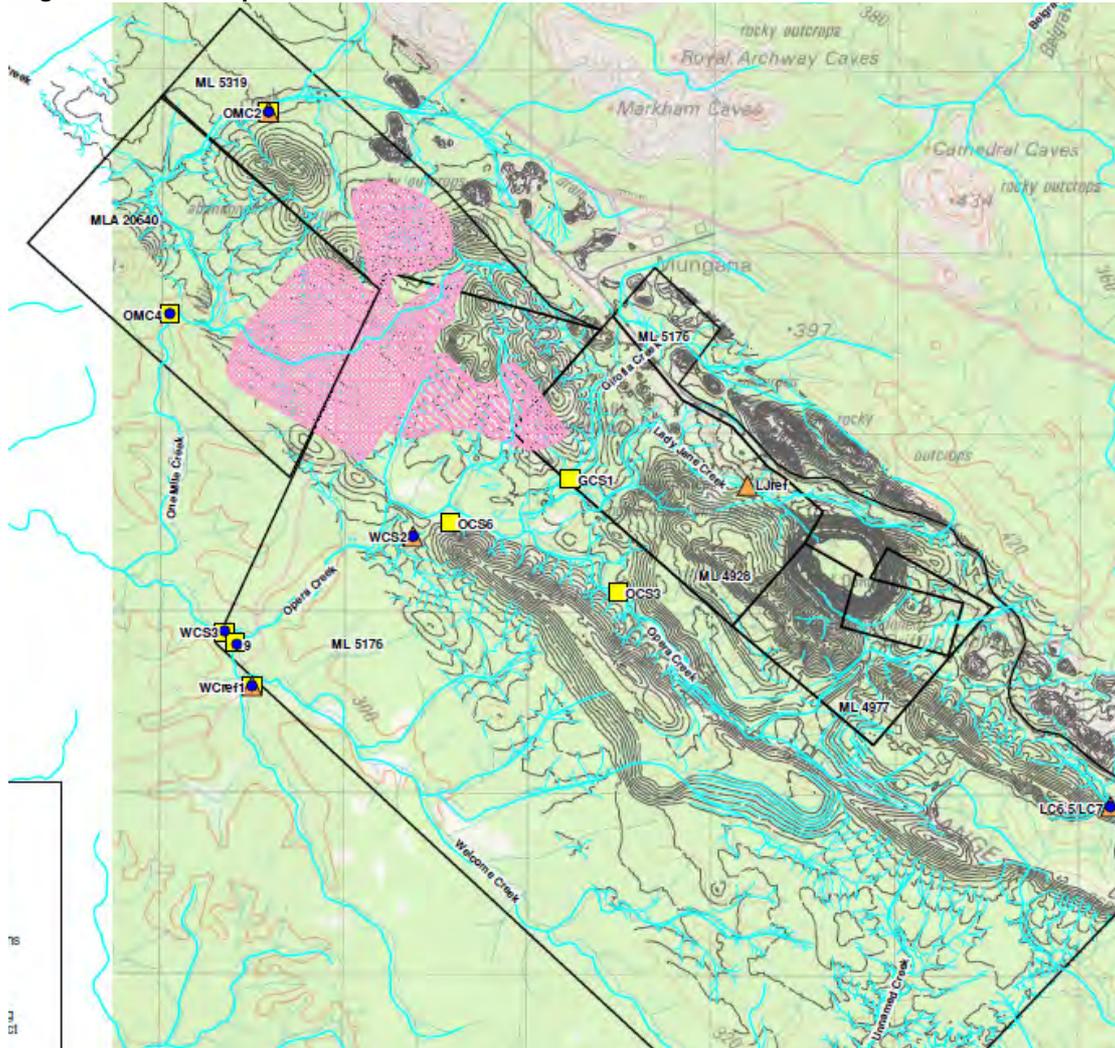
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (AGD84 Zone 55)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
MG2	299446	8044202	MG1	299447	8044464
MG3	298770	8044253	S0	257675	7920764
MG3.1	298414	8044336	S1	255892	7920744
MG4	298590	8041579	B1	259757	7922554
S2	257340	7920772	Licensed Release Points		
S3	257161	7922180	MG release	299095	8044038
S3.1	257680	7922910	S release	257297	7921745
S4	257492	7923108			
B2	259584	7923388			
B3	257671	7923000			
B4	257760	7923834			
B5	257990	7923971			
B6	258700	7926085			

Onsite Storage Monitoring Points	Easting	Northing
Tailings Storage Facility	299332	8042899
Sediment Dam Mt Garnet	298905	8043740
Process Water Dam Mt Garnet	299470	8044080
Evaporation Pond Surveyor	257419	7921755
Sediment Dam Balcooma	258655	7922825

Mungana Gold Mine

Regional Water Sample Locations



SEDIMENT SAMPLING LOCATIONS

Monitoring point	Easting (GDA 94) Zone 55	Northing (GDA 94) Zone 55	Monitoring frequency
WCS 2: Opera Creek, 100 metres downstream of the Raw Water Dam spillway	221493	8105587	Twice a year (Once at the end of the wet season, and once at the end of the dry season)
LC 7: Lily Creek tributary, 350 metres downstream from Tailings Storage Facility spillway release point	225292	8104120	Twice a year (Once at the end of the wet season, and once at the end of the dry season)
OMC 2 ¹ : One Mile Creek proper	220700	8107924	Twice a year (Once at the end of the wet season, and once at the end of the dry season)
Ljref ¹ : Lady Jane Creek, upstream of mining disturbance	223311	8105879	Twice a year (Once at the end of the wet season, and once at the end of the dry season)

MINE CONTACTS

Mungana Mine

██████████ (SSE)
Ph: ██████████ **Mob:** N/A
E: ██████████@mungana.kagara.com.au

██████████ (Environmental Officer)
Ph: ██████████ **Mob:** ██████████
E: ██████████@mtgarnet.kagara.com.au

Mine Site Address:
 PO Box 4
 Mt Garnet QLD 4872

Registered Business Address:
 24 Outram St
 West Perth WA 6005

Landowners

DERM
 PO Box 156
 MAREEBA QLD 4880

Queensland Rail
 Property Division
 GPO Box 1429
 Brisbane QLD 4000

R & C Ferguson
 Marble Creek Station
 Chillagoe QLD 4871
Ph: ██████████

Ron Ferguson
 C/- Rookwood Station
 CHILLAGOE QLD 4871
Ph: ██████████

Dale Crossland
 Chillagoe Station
 Chillagoe QLD 4871

Tableland Regional council
 65 Rankin Street
 MAREEBA QLD 4880

WATER QUALITY SAMPLING LOCATIONS

Monitoring point	Easting (GDA 94) Zone 55	Northing (GDA 94) Zone 55
Impacted Sites		
WCS 2: Opera creek – 100 metres downstream of the Raw Water Dam spillway.	221493	8105587
WCS 3: Welcome Creek – 50 metres downstream of the confluence with Opera Creek.	220468	8105058
LC 6.5: Lily Creek tributary – 350 metres downstream from old Red Dome Tailings Storage Facility spillway release point.	225292	8104120
TBA (by 30 June 2009): Welcome Creek – 500 metres downstream of the Mungana TSF spillway	TBA (by 30 June 2009)	TBA (by 30 June 2009)
Reference Sites¹		
TBA (by 30 June 2009) - Reference site: upstream of any (historical) mining disturbance	TBA (by 30 June 2009)	TBA (by 30 June 2009)
OMC 2: One Mile Creek proper	220700	8107924

PHOSPHATE HILL MINE

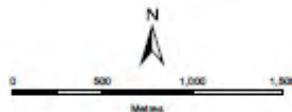


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Phosphate Hill (Water monitoring points)

Legend

- Riverine Drainage Lines
- ▭ Mining Lease Boundaries
- Water monitoring Points**
- ▲ Reference sites
- ▲ Receiving waters
- ▲ Aquifer de-watering program



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 Queensland Wetland Data - Wetlands v2.0, 2008
 © Department of Environment, Economic Development
 and Innovation
 Mining Leases, 1/10/10

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 locations may not coincide when overlaid.

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 Spatial Information Services Unit
 Department of Environment and Resource Management,
 Cairns, Queensland
 21 October 2010
 Version: 101010_LAA_RMP



MINE CONTACTS

Phosphate Hill Mine (Southern Cross Fertilisers Pty Ltd)

██████████ (Senior Environmental Advisor)
 Incitec Pivot Limited
Ph: ██████████ **Mob:** ██████████
E: ██████████@incitecpivot.com.au

Chantel Mackenzie (Environmental Advisor)
 Incitec Pivot Limited
 ██████████ **Mob:** ██████████
E: ██████████@incitecpivot.com.au

Mine Site Address:
 Phosphate Hill Mine
 146 kilometres south of Mount Isa

Registered Business Address:
 Level 3, 19 Stanley Street
 TOWNSVILLE QLD 4810

Landowners

██████████ (Chatsworth Station)
Ph: ██████████
E: ██████████@bigpond.com

Address:
 MS 760
 BOULIA QLD 4829

██████████ (Brightlands Station)
Ph: ██████████
E: ██████████@bigpond.com

Address:
 Brightlands, via
 DUCHESS QLD 4825

██████████ (Stradbroke Station)
Ph: ██████████

Address
 PMB 61
 DAJARRA QLD 4825

WATER QUALITY SAMPLING LOCATIONS (AMG66 Zone 54)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
Kolar Creek	394864	7577008	Dead Horse Creek	391591	7579097
Railway Creek	394811	7578149	Galah Creek	393012	7581502
Aquifer dewatering program					
Kolar Creek discharge point	393900	7577760			
Kolar Creek at lease boundary	394825	7577080			
End of flow	N/A	N/A			

Solomon's Copper Mine – Tartana Copper Project

Regional Water Sample Locations



MINE CONTACTS

Solomon's Copper Mine

██████████ (Owner)
Ph: ██████████ Mob: na
E: ██████████@bigpond.com

Mine Site Address:

PO Box 28
Chillagoe QLD 4871

Landowners

██████████n
C/- Rookwood Station
CHILLAGOE QLD 4871
Ph: ██████████ / ██████████

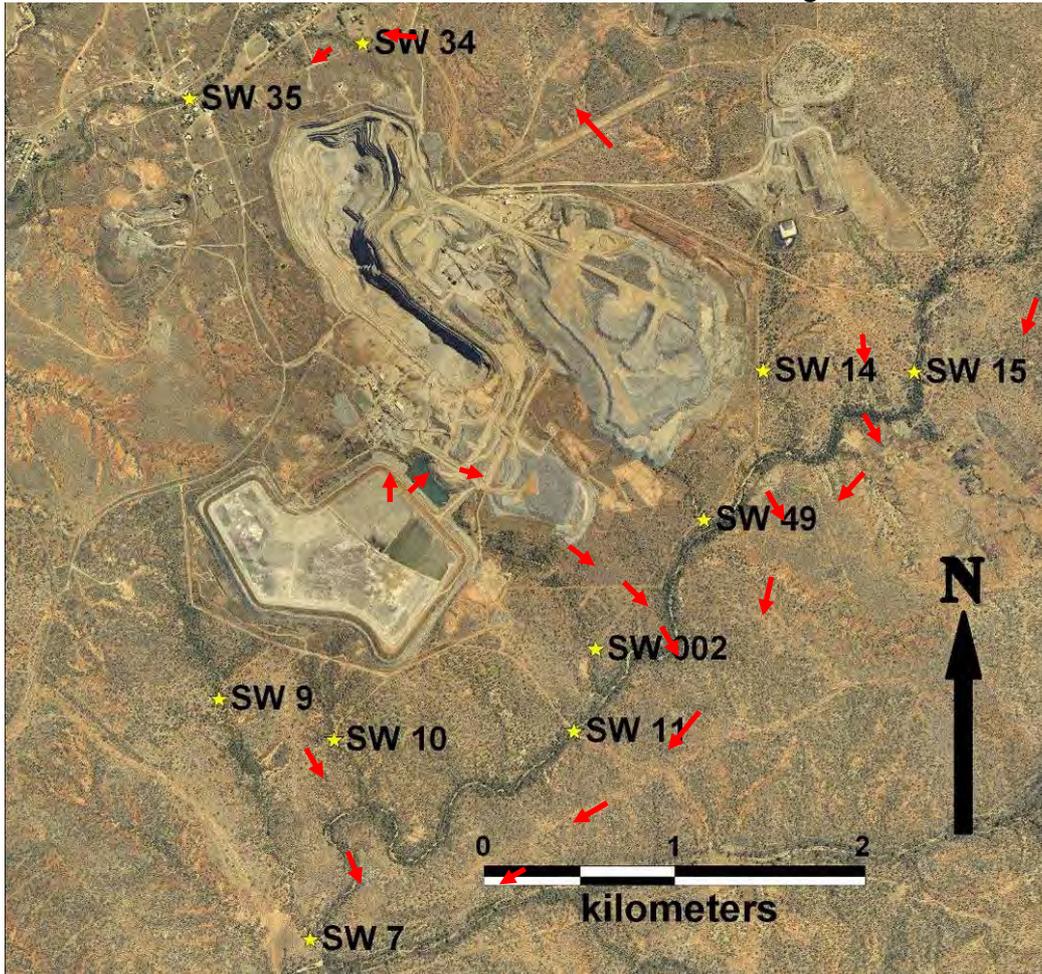
R & C Ferguson
Marble Creek Station
Chillagoe QLD 4871
Ph: ██████████

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

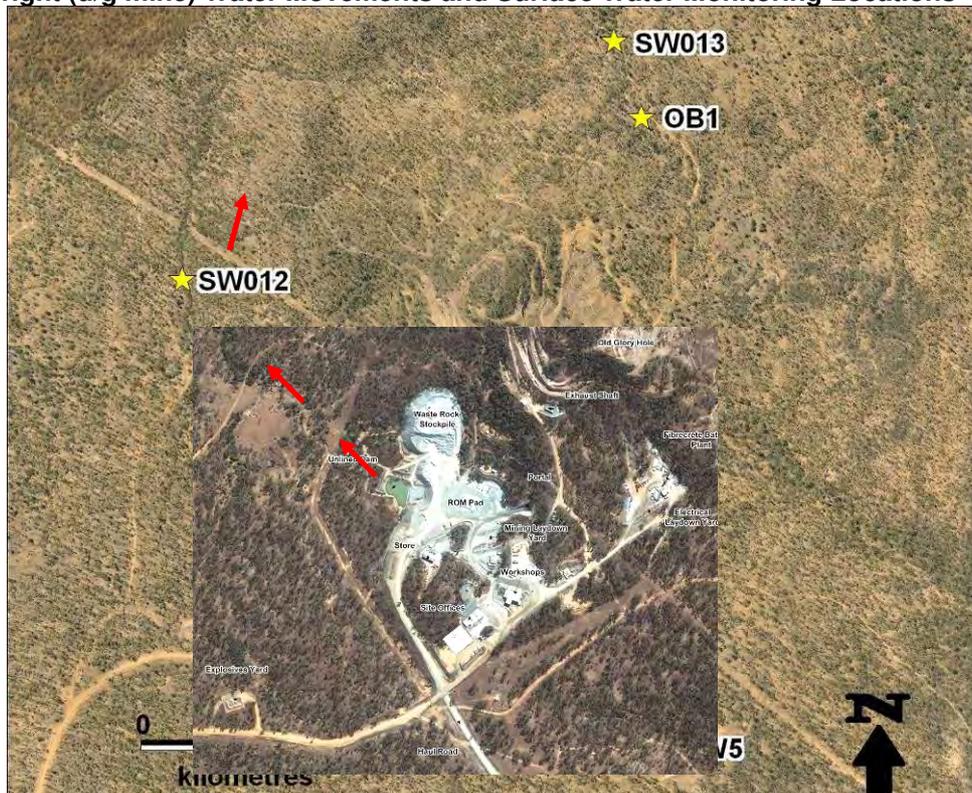
Bowler Creek downstream of Tartana Hill – E1441539.6, S165612.4
Bowler Creek upstream of existing livestock dam – E1441533.7, S165603.2

Carpentaria Gold - Ravenswood

Ravenswood Site Water Movements and Surface Water Monitoring Locations



Mt Wright (u/g mine) Water Movements and Surface Water Monitoring Locations



MINE CONTACTS

Mine Site Contacts

**Operations
Manager:**

██████████
██████████

HSE Manager:

██████████
Ph: ██████████
Mob: ██████████

**Environmental
Officer:**

██████████
PH: ██████████
FAX: ██████████

**Environmental
Officer:**

██████████
PH: ██████████
FAX: ██████████

Mine Site Address:

Macrossan Street
Ravenswood QLD 4816
PO Box 5802, MC
Townsville Qld 4810

Registered Business Address:

Carpentaria Gold Pty Ltd
4th Floor The BGC Centre
28 The Esplanade
PERTH WA 6000

Surrounding Landholders/ Landuse

The project is located adjacent to the town of Ravenswood. The residents of Ravenswood live adjacent to the North and West of the mine. The local water ways are ephemeral creeks, the main creek is Sandy Creek that eventually reports to the Burdekin river upstream of the Burdekin Dam. Adjacent areas are primarily used for cattle grazing.

██████████
Kirkton and Silver Valley
██████████

██████████
Curr
Connolly
██████████

██████████
██████████
Avoca Vale, Kirk River, Bettridge &
Easton
██████████

██████████
Evlinton
██████████

██████████
Four Mile
██████████

██████████
Mt Wright Holding_CMooore
██████████

██████████
Boori
██████████

██████████
██████████
Plumwood
██████████

██████████
Mt Wright Holding_PMooore
██████████

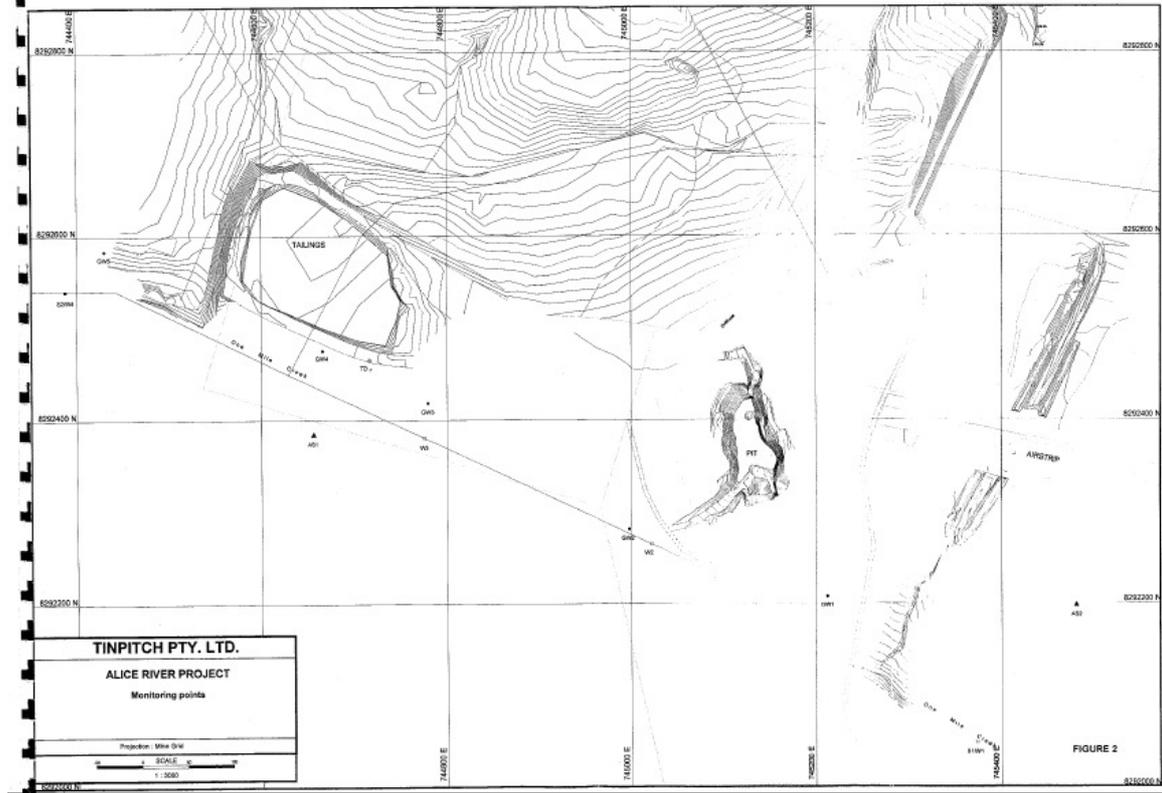
Receiving Water Monitoring Locations and Frequency

Monitoring point	Location Description	Easting (AMG)	Northing (AMG)
Mt Wright SW5	Farm dam downstream of Adit.	482810	7783100
Mt Wright SW013	Drainage line downstream of old waste dump footprint on lease boundary	482690	7784730
Mt Wright SW012	Drainage line downstream of new adit on lease boundary	481700	7784180
Nolan's SW7	Lower Sandy Creek before confluence with Plumwood Creek	489138	7772980
Nolan's SW9	Western seepage collection sump	488600	7774270
Nolan's SW10	Eastern seepage collection sump	489207	7774092
Nolan's SW11	Sandy Creek at Plumwood Road crossing	490446	7774109
Nolan's SW002	Nolans Creek downstream of Waste Rock Runoff Pond	490400	7774250
Sarsfield SW34	OCA/SYC Waste Dump runoff	489337	7777676
Sarsfield SW35	Elphinstone Creek at Post Office	488391	7777445
Sarsfield SW49	Teatree Creek before confluence with Sandy Creek	491130	7775240
Sandy Ck SW14	Drainage line downstream of ROW 1 & 2 at Sandy Creek	491411	7775987
Sandy Ck SW15	Sandy Creek at Evlinton on Sandy Creek Road	492237	7776001

NOTE: This does not apply to tailings dams

ALICE RIVER GOLD MINE

Site Water Movements and Discharge Points



MINE CONTACTS

Alice River Gold Mine

Tinpitch Pty Ltd
 [REDACTED] – Managing Director
 Ph: [REDACTED]
 Fax: [REDACTED]
 E: [REDACTED]@ausgoldcorp.com

PO Box 944N
 North Cairns QLD 4870

Landowners

Dixie Station
 Wulpan Holding
 Maramie QLD 4890
 Kym Doreen and Robert James Whelan
 PO Box 704
 Emerald QLD 4720

Imooya Station
 Dixie QLD 4871
 Allison Kay and David Ian Woodside
 PMB 74
 Cairns QLD 4870

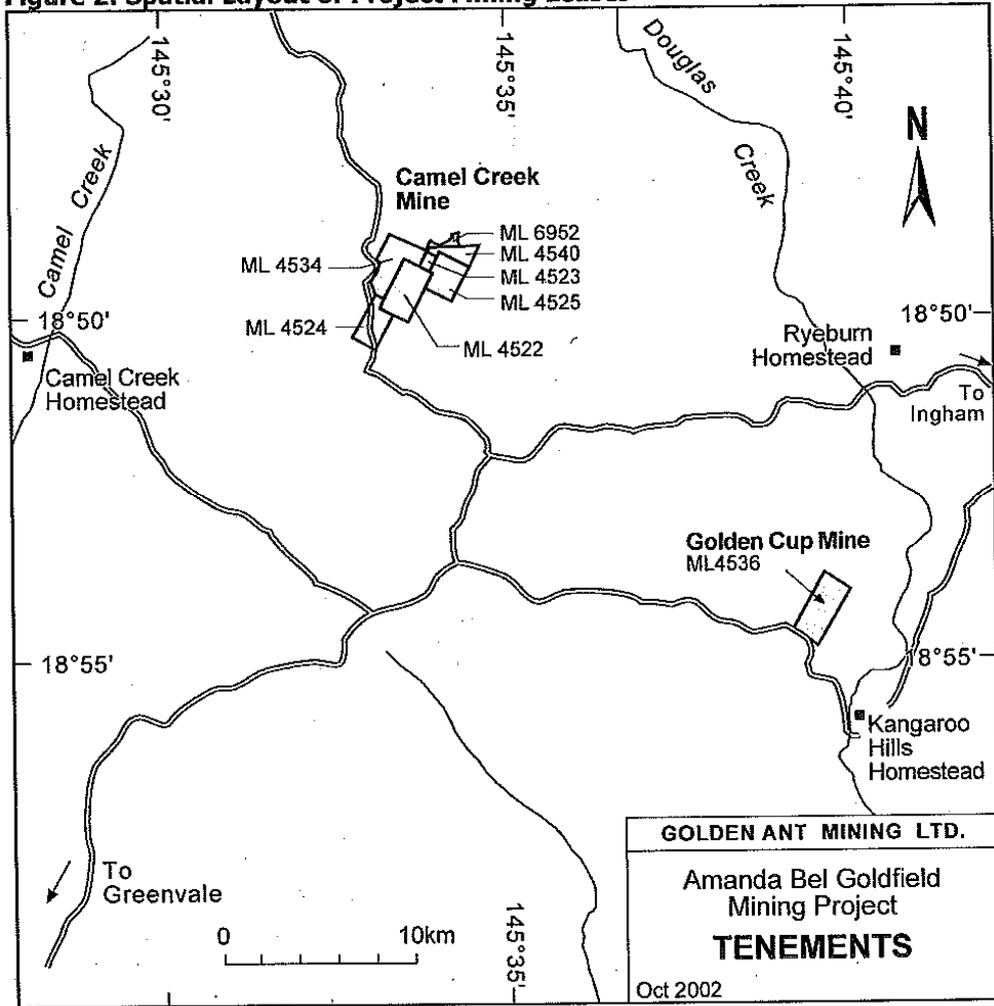
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (AMG)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
W2 - ~70m downstream of open pit	143° 16'58.6"	15° 26'05.8"	W1 – ~300m upstream of open pit	143° 17'07.3"	15° 26'09.2"
W3 - ~80m downstream of WRD	143° 16'48.6"	15° 26'01.0"			
W4 - ~300m downstream of TSF	143° 16'37.6"	15° 25'56.2"			
Receiving Stream Sediment Monitoring Locations			Licensed Release Points		
S1 – reference site ~300m upstream of open pit	143° 17'07.3"	15° 26'09.2"	Release Point TD _{release}	143° 16'49.4"	15° 25'59.1"
S2 - ~300m downstream of TSF	143° 16'37.6"	15° 25'56.2"			

AMANDA BEL MINE

Site Layout

Figure 2: Spatial Layout of Project Mining Leases



MINE CONTACTS

Amanda Bel Mine

SSE – Terry Delahunty Curtain Bros QLD

Mob: [REDACTED]

Townsville office:

Ph: [REDACTED]

EA Holder – Lynch Mining

Contact:

[REDACTED]

Ph: ([REDACTED])

E: [REDACTED]@lynch.net.au

Registered Business address:

GOLDEN ANT MINING PTY LTD

8 Maud Street

PO Box 3199

Newstead, QLD 4006

Landowners

Camel Creek Station

[REDACTED]

Ph: ([REDACTED])

E: [REDACTED]@bigpond.com

Kangaroo Hills Station

Dino Penna

Ph: [REDACTED]

Kilclooney station

[REDACTED]

Ph: [REDACTED]

Owners: WD & Rosemary Milton

Ph: ([REDACTED])

Kilclooney Station

MS 702

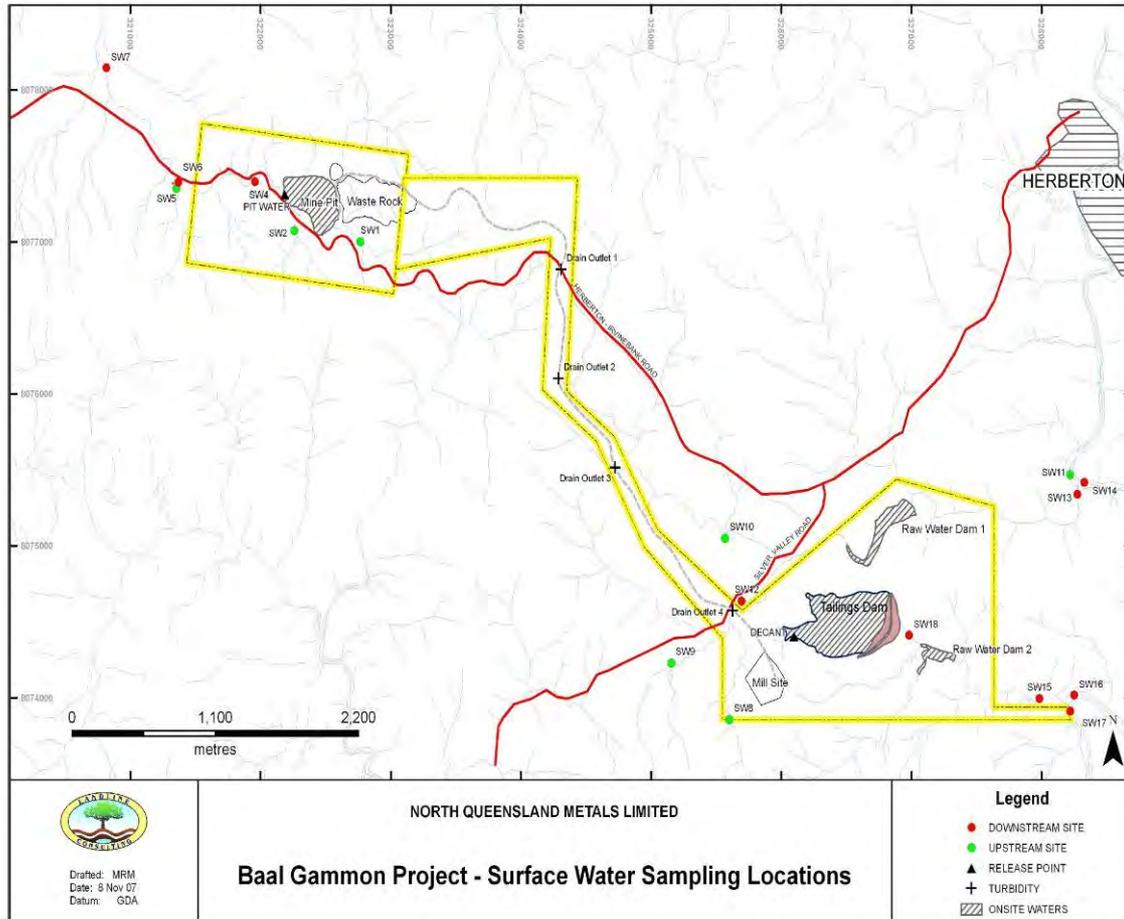
Ingham QLD 4850

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

Monitoring point	Easting	Northing
Receiving Waters		
Black Cow Dam	18°48.971	145 34.318
Black Snake Creek	18 54.230	145 39.688

BAAL GAMMON MINE

Site Water Movements and Discharge Points



MINE CONTACTS

Baal Gammon Mine

North Queensland Metals Ltd
Main Office:
Suite 63 & 64, Level 11
269 Wickham Street
Fortitude Valley QLD 4006
PO Box 291
Fortitude Valley QLD 4006

Site Office:
[REDACTED] – General Manager
1 Denbigh Street
Herberton QLD 4887
PO Box 72
Herberton QLD 4887
Ph: [REDACTED]
Fax: [REDACTED]
Mob: [REDACTED]
E: [REDACTED]@nqm.com.au

Landowners

[REDACTED] (Jr)
 and [REDACTED]
 331 D R Walker Drive
 Herberton QLD 4887
 Ph: [REDACTED]

[REDACTED]
 Denbigh Road
 Herberton QLD 4887
 Ph: [REDACTED]

[REDACTED]
 c/- "Fernbank"
 via Wondecla QLD 4887
 Ph: [REDACTED]

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
SW4 – Lower Jamie Ck	321957	8077397	SW1 – Upper Jamie Ck	322769	8076998
SW6 – downstream of open pit	321369	8077392	SW2 – Tin Mine Gully, dam 60m upstream of open pit	322255	8077077
SW7 - Watsonville	320801	8078136	SW5 – downstream of open pit	321348	8077351
SW12 – Silver Valley Rd at intersection haul road	325695	8074636	SW8 – Antisocialist Mine Ck, 150m upstream of mill site	325604	8073857
SW13 – Lower Slaughteryard Ck, 50m above intersection with Wild River	328276	8075416	SW9 – Upper Slaughteryard Ck, 200m upstream of intersection with haul road	325155	8074229
SW14 – downstream Wild River	328329	8075416	SW10 – Upper Slaughteryard Ck, 400m above Silver Valley Rd	325569	8075049
SW15 – Lower Wild Dog Gully, 150m above intersection with Wild River	327983	8075416	SW11 – Upper Wild River, 50m upstream of confluence with Slaughteryard Ck	328222	8075468
SW16 – upstream of Wild River	328252	8074018	Licensed Release Points		
SW17 – downstream of Wild River	328222	8073913	Decan Dam Spillway	TBA	TBA
SW18 – below TSF	326976	8074415	Jamie Ck Diversion Drain	TBA	TBA

Onsite Storage Monitoring Points	Easting	Northing
Tailings Decant Dam	326250	80774400
TSF Spillway	326570	8074305
Baal Gammon Pit (base of ramp)	322341	8077305
Raw Water Dam 1	326915	8075225
Raw Water Dam 2	327150	8074305

MINE CONTACTS

Croydon Gold Mine

Mob: [REDACTED]
E: [REDACTED]@barrick.com

Registered Business Address:

Barrick (Kalgoorlie) Ltd
 Level 10
 2 Mill Street
 Locked Bag 12
 Cloisters Square WA 6850
 Perth WA Australia
Ph: [REDACTED]
Fax: [REDACTED]

Landowners

[REDACTED]
 and [REDACTED]
 PO Box 51
 Croydon 4871
Ph: [REDACTED]

Tagalaka Croydon Reserve Land Trust
 C/- Lance Owens – Chairperson
 PO Box 4
 Croydon QLD 4871
Ph: [REDACTED]

Queensland Rail
 c/- Facilities Asset Manager
 PO Box 242
 Hughenden QLD 4821
Ph: [REDACTED]

[REDACTED]
 PO Box 5
 Croydon QLD 4871
Ph: [REDACTED]

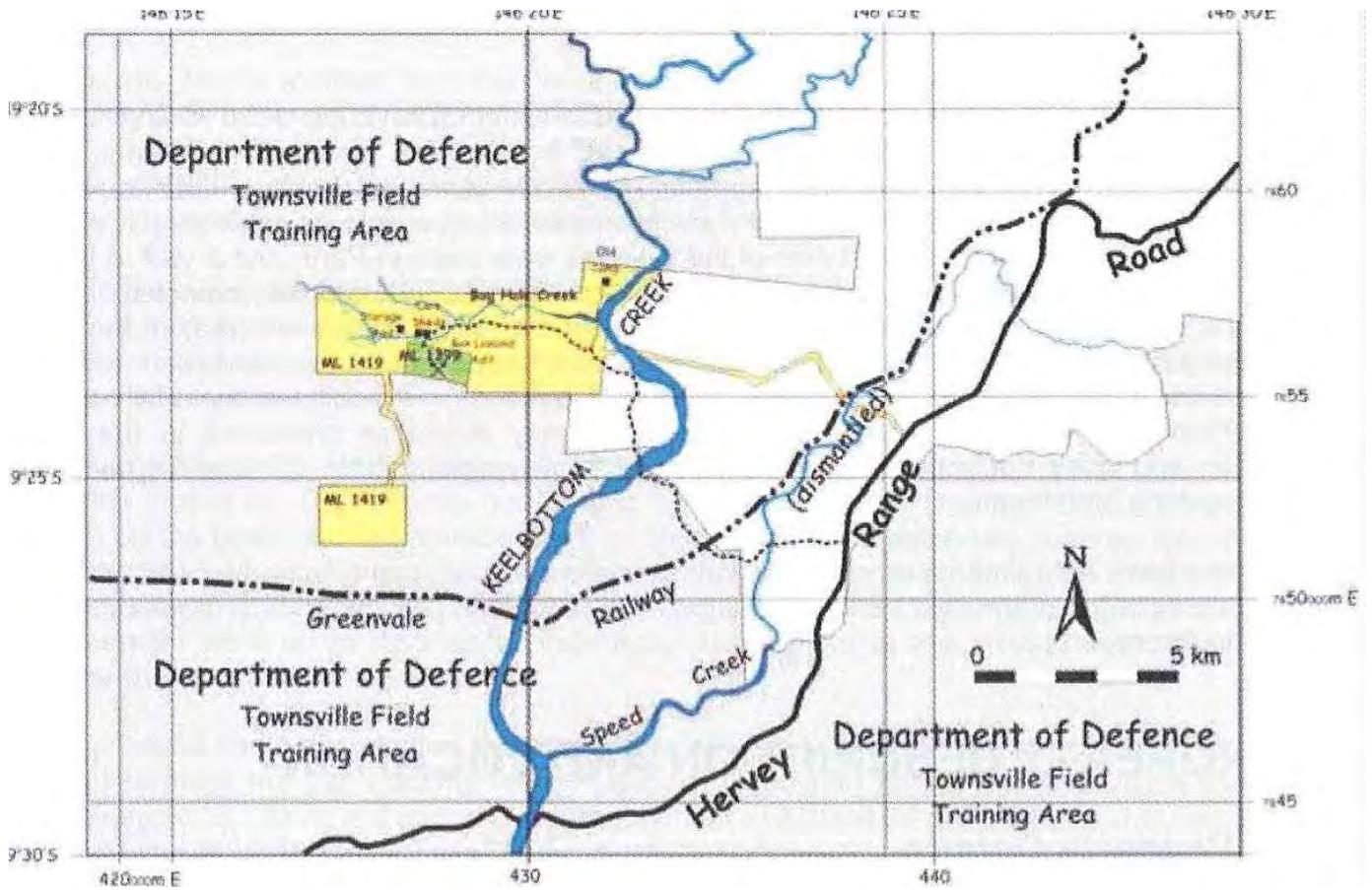
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (MGA (GDA 94))

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
SW1 - Lower Slaughteryard Creek	630350	7986405	SW3b - Reference point for Slaughteryard creek	613208	7988220
SW2 - Slaughteryard West Tributary at the ML boundary	630197	7987640	SW7 - Reference point for Belmore Creek	630447	7989568
SW3 - Slaughteryard Creek upstream of the Golden Butterfly WRD	631080	7988157			
SW6 - Belmore Creek borrow pit / stock dam	627908	7989454			

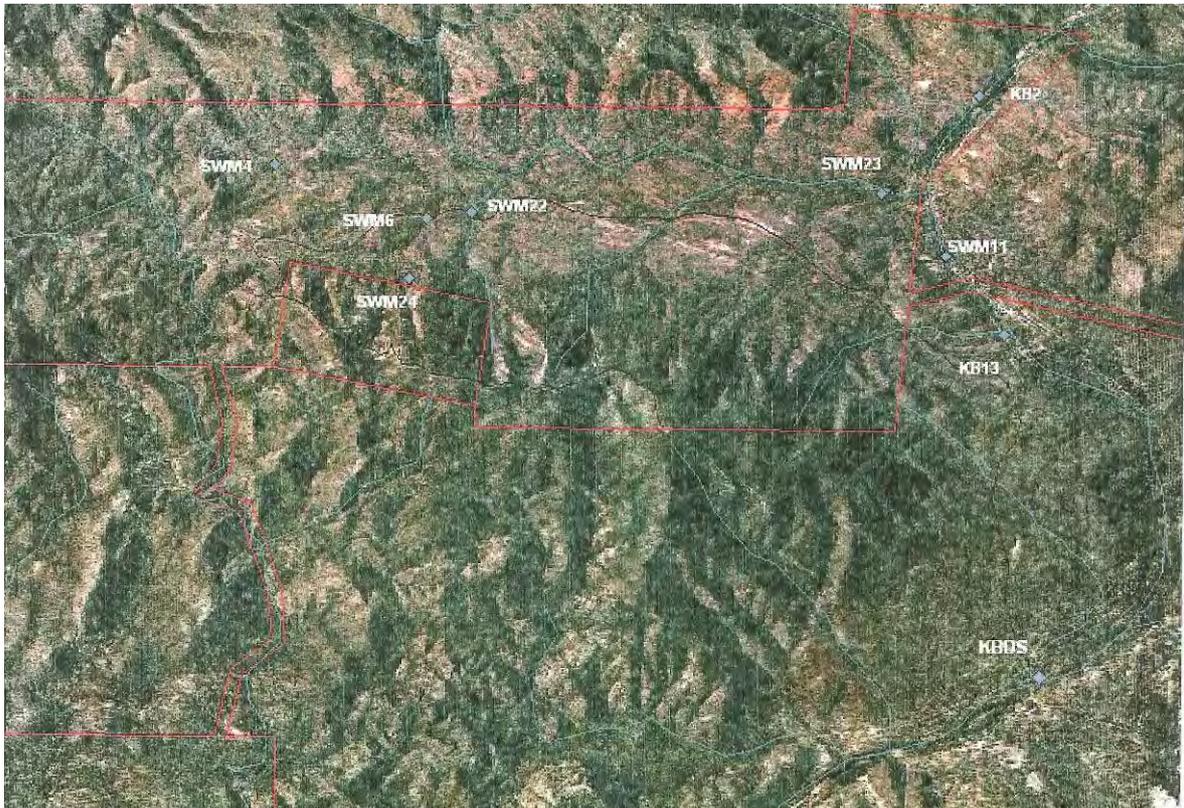
Onsite Storage Monitoring Points	Easting	Northing
Golden Butterfly Pit (base of ramp)	631140	7987525
Golden Butterfly North Pit (base of ramp)	630545	7987921
Lady Isabella Pit (base of ramp)	629473	7990023
Content Pit (base of ramp)	629048	7990435
SW3a - Golden Butterfly WRD toe drain	630913	7988253
SW4 - Stock water dam	631049	7987892
SW5 - Sediment dam at lease boundary	628691	7990012

BEN LOMOND MINE SITE

Site Layout



Surface Water Monitoring Locations



Ben Lomond Mine

Registered Business address:

Uranium Mineral Ventures Incorporated
Suite 4, 230 Rokeby Road
Subiaco, WA 6000

Ph: [REDACTED]

Fax: [REDACTED]

Site address:

Off Herveys Range Road

Landowners

The site is wholly situated within the catchment of Boghole creek, an ephemeral stream. Boghole creek drains into Keelbottom creek which has permanent water holes. Keelbottom creek drains into the Burdekin river approx 55km downstream.

ML1399 is wholly contained within real property Lot 110 on Unallocated State Land (USL) Plan number 42207. With the exception of its eastern extremity, which is on an adjacent grazing property (lot 35 on CP894595), ML1419 is contained within Lot 110. Apart from its border with the grazing lease, Lot 110 is completely surrounded by Australian Department of Defence Property known as Townsville Field Training Area ("High Range").

Landowners

Fairview Station

[REDACTED],
Lot 17 Hervey Range Rd

Ph: [REDACTED]

Ph: [REDACTED]

Peter also works at Range Control for the Townsville Field Training Area -

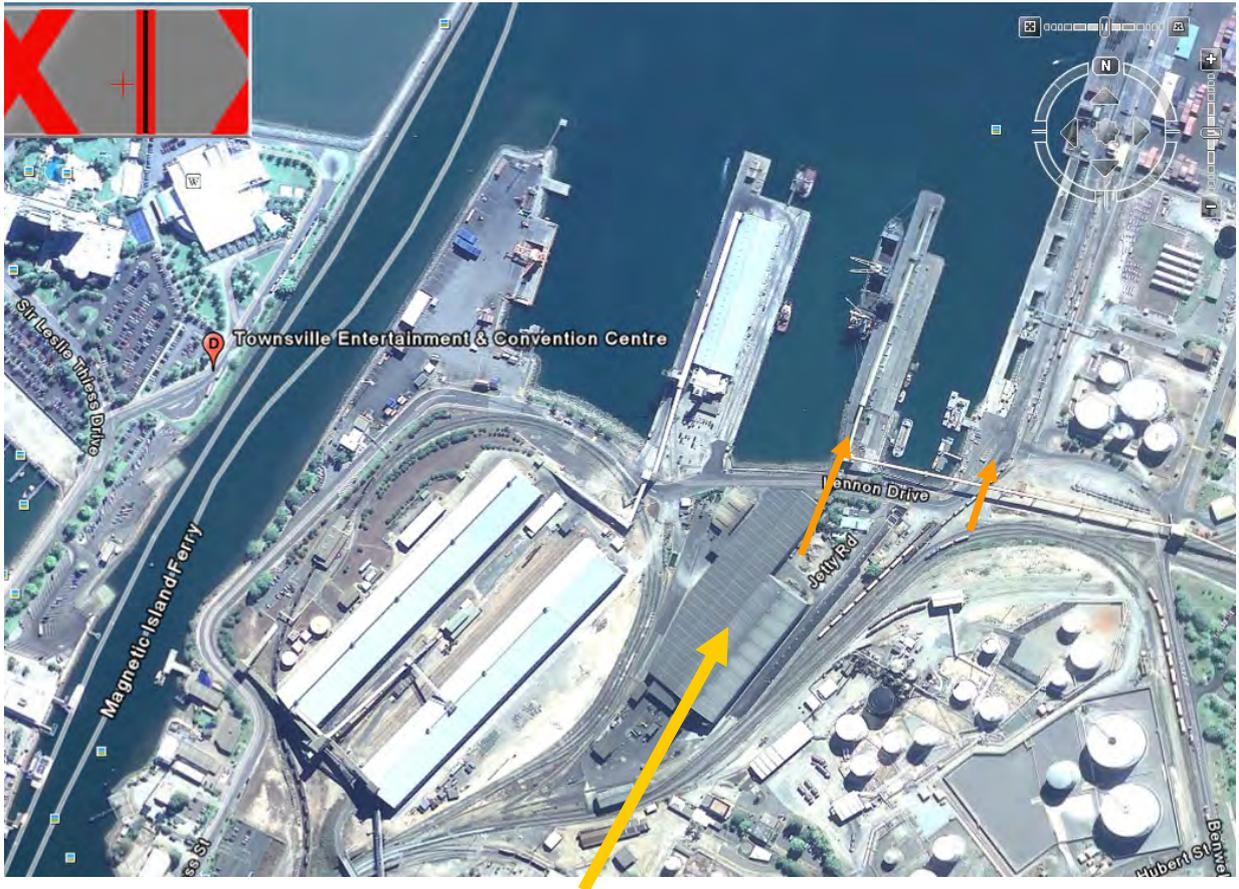
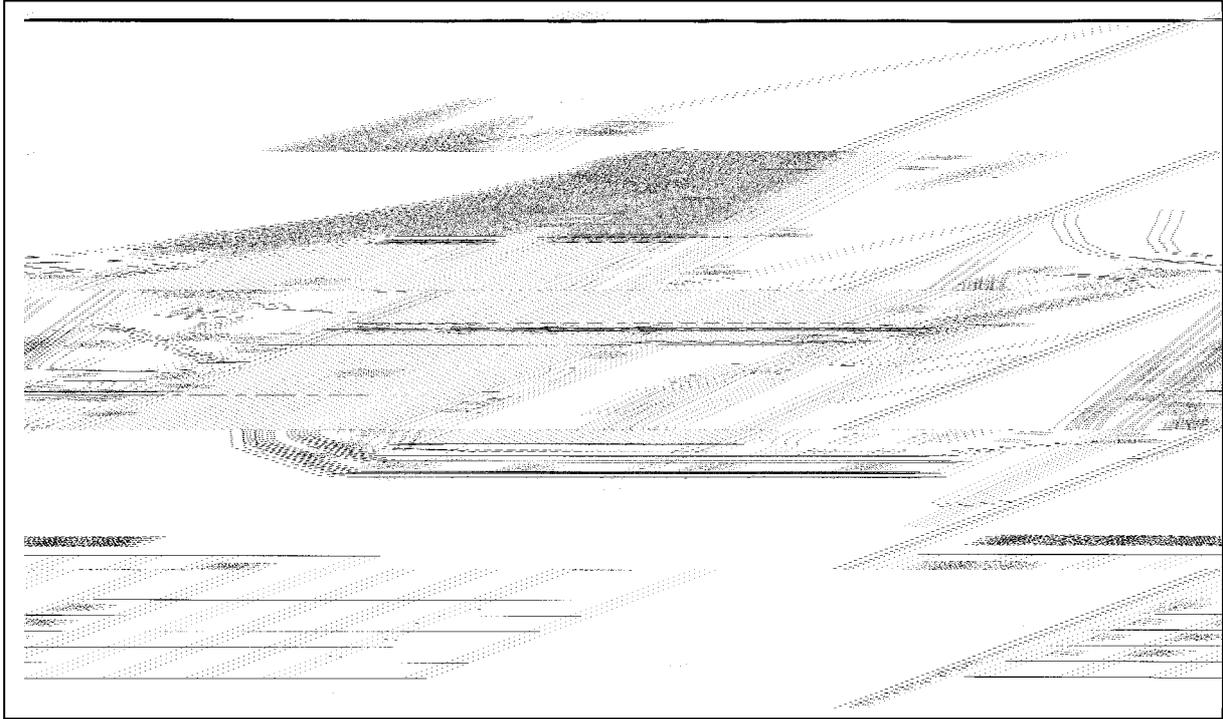
Command Control High Range Training Area [REDACTED]

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
KB13	432548	7855781			
KB2	432355	7857623			
SWM22	428486	7856706			
SWM23	431606	7856867	Licensed Release Points		
SWM11	432101	7856378			
SWM24	428008	7856200			
SWM4	426987	7857073			
SWM6	428143	7856661			
KB3	430075	7844750			

BERTH 7 PORT OF TOWNSVILLE

Site Water Movements and Discharge Points



PORT BERTH 7

Xstrata loading-unloading facility

██████████ (Safety & Environmental
Superintendent)

Ph. ██████████

Fax: ██████████

Mob: ██████████

E: ██████████@xstratacopper.com.au

Registered Business Address:

Xstrata Copper Ltd
PO Box 5484 Townsville 4810

Site Address:

Greg O'Shea
Xstrata Copper
Berth 7 Port of Townsville
Townsville. 4810

Surrounding land users

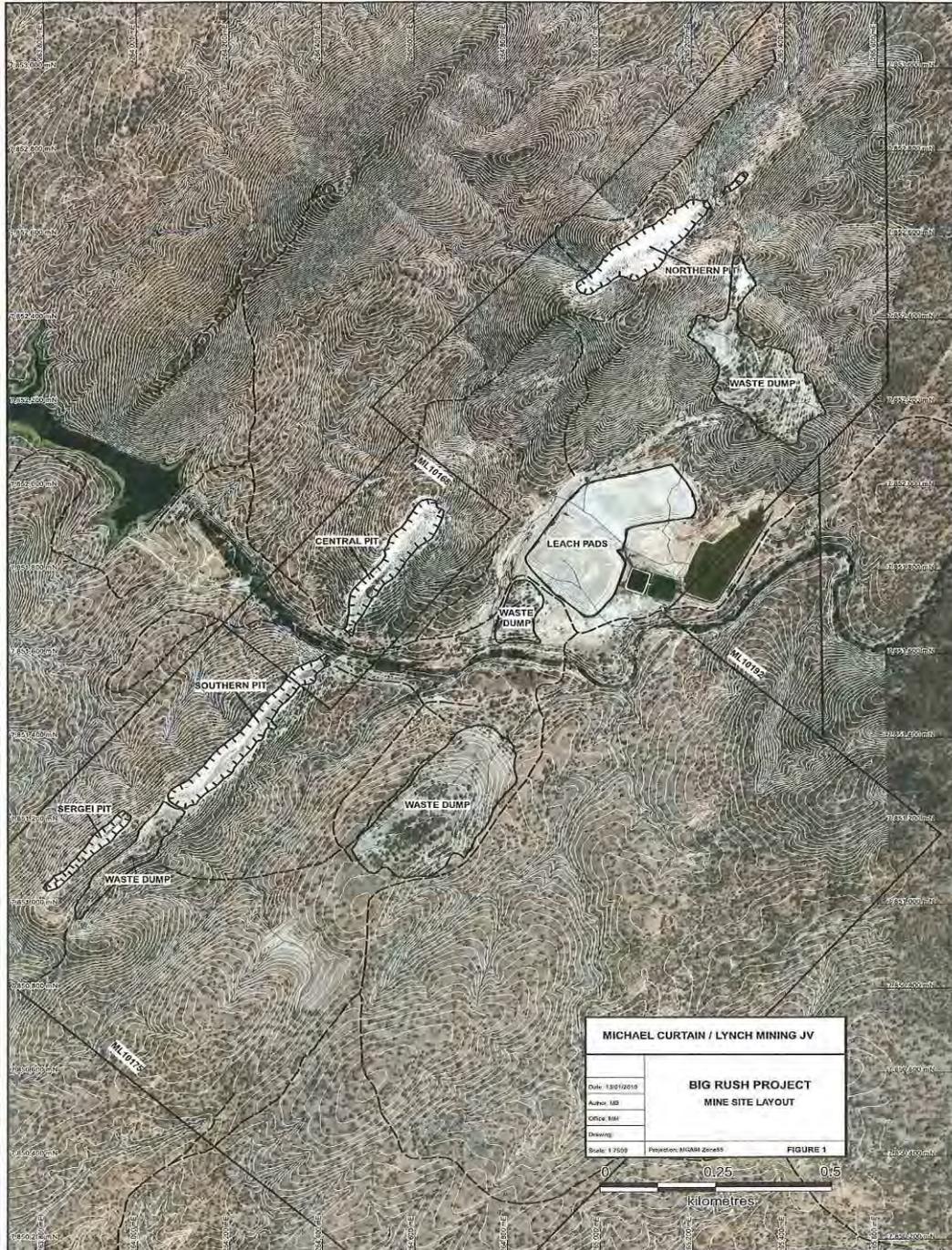
Port of Townsville
Great Barrier Reef Coastal Marine Park
Great Barrier Reef Marine Park

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

None Provided

BIG RUSH MINE SITE

Site Layout



MINE CONTACTS

Big Rush Mine

SSE – Terry Delahunty Curtain Bros QLD

Mob: [REDACTED]

Townsville office:

Ph: [REDACTED]

EA Holder – Lynch Mining

Contact: [REDACTED]

Ph: [REDACTED]

E: [REDACTED]@lynch.net.au

Landowners

The site is within grazing areas. Gorge creek is an ephemeral stream.

Underlying tenure contacts:

[REDACTED]

Mob: [REDACTED]

Ph: [REDACTED]

Unknown station name

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA94)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
Gorge Creek Lease Boundary (GC-LB)	19° 25.025' S	144° 46.084' E	Gorge Creek Upstream (GC- US)	19°24.967' S	144° 45.296' E
Diggers Creek (Dck)	19° 25.076' S	144° 46.478' E			

Onsite Storage Monitoring Points	Easting	Northing
Raw Water Dam (RWD)	19°24.969' S	144°45.171' E

CAPE FLATTERY SILICA MINE

Site Water Movements and Discharge Points

Schedule 1 - Map 1: Water Monitoring Locations



MINE CONTACTS

Cape Flattery Silica Mine

Cape Flattery Silica Mines Pty Ltd
Garry Bartholdt
Level 1, 14 Shields Street
Cairns QLD 4870
Ph: [REDACTED]
E: [REDACTED]@cfsm.com.au

Natural Resource Assessments Pty Ltd
(Consultant)
[REDACTED]
PO Box 5678
Cairns QLD 4870
Ph: [REDACTED]
E: [REDACTED]@natres.com.au

Mailing address:

PO Box 6212
Cairns QLD 4870

Landowners

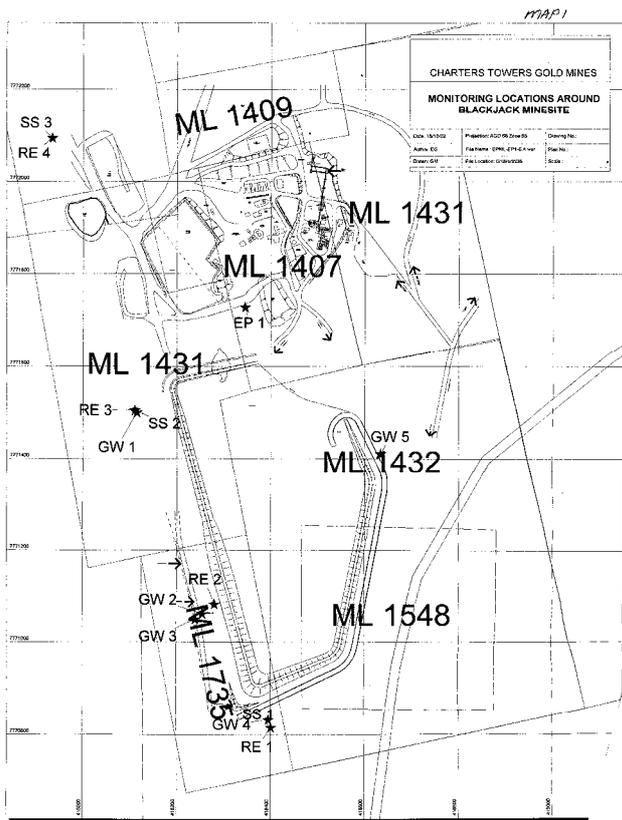
Hope Vale Aboriginal Shire
C/- Muni Street
Via Cooktown QLD 4875
Hope Vale QLD 4895
Ph: [REDACTED]
Ph: [REDACTED]
E: [REDACTED]@hopevale.org.au

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (WGS84)

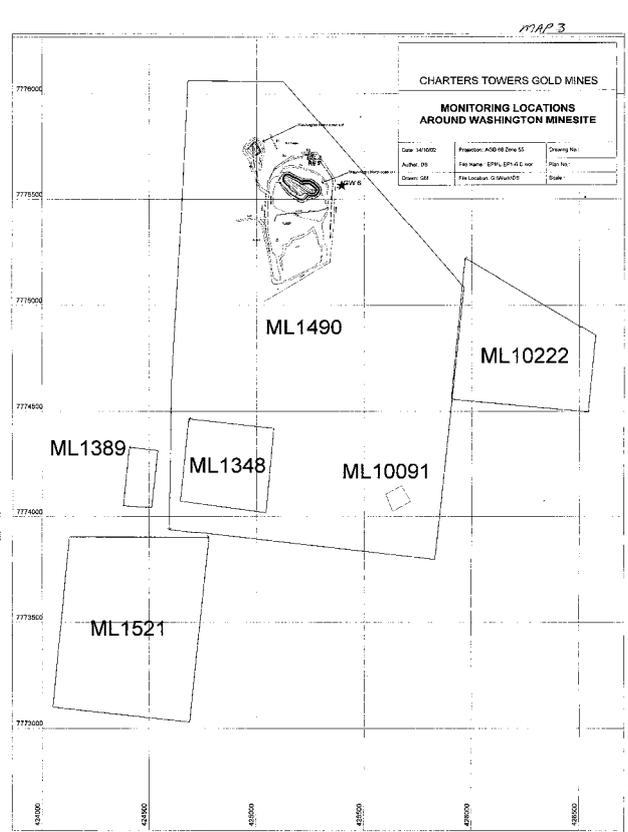
Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
SWL001	318396	8341636	SWL003	321928	8342811
SWL002	319972	8343430	SWL004	315932	8341660
SWS001	321888	8342533	SWS002	315246	8335059

CITIGOLD – Corporation – Blackjack and Warrior Sites

Blackjack and Warrior water sampling locations



BLACKJACK PLANT SITE



WARRIOR SITE

MINE CONTACTS

Citigold Blackjack/Warrior Mine

[REDACTED]
 Charters Towers Gold Pty Ltd
 [REDACTED]
Ph: [REDACTED]
Fax: [REDACTED]
Mob: [REDACTED]
E: [REDACTED]@citigold.com
 PO Box 10
 Charters Towers Qld 4820 Australia

Registered Business Address:

Head Office:
 Citigold Corporation Limited
 Level 15, IBM Centre
 348 Edward Street
 BRISBANE QLD 4000 Australia
Ph: [REDACTED]

Mine Site Address:

Gregory Developmental Road,
 10km South of Charters Towers

Landowners

The local water ways are ephemeral creeks, small properties with minor grazing livestock surround the site. The drainage around the Plant site flows down Balls Gully into the Broughton River. Any flows to the west of the site enter 6 Mile creek, then into Stannet creek then into the Broughton river.

[REDACTED] (c/- Citigold) owns the freehold immediately under the plant site.

[REDACTED] ([REDACTED]) owns land under and downstream of the plant site.

[REDACTED] ([REDACTED]) owns land downstream of the plant site before any discharge enters the Broughton River.

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (AMG (unknown datum))

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
RE1 (Blackjack)	0418401	7770816			
RE2 (Blackjack)	0418281	7771083			
RE3 (Blackjack)	0418111	7771505			
RE4 (Blackjack)	0417934	7772094	Licensed Release Points		
RE5 (Warrior)	0425247	7775708			

DEUTSCHE ROHSTOFF MINE

Site Water Movements and Discharge Points



Plant Site Monitoring Sites

- Legend**
- Surface Water Monitoring Sites
 - Monitoring Bores
 - Deutsche Rohstoff Australia Pty Ltd's Leases
 - Track

Current AS of December 2010

MINE CONTACTS

Deutsche Rohstoff Mine

██████████ - Project Manager

Mob: ██████████

██████████ (Environmental Consultant)

Landline Consulting

1 Jack Street

Atherton QLD 4883

Ph: (██████████)

Fax: ██████████

Mob: ██████████

Registered Business Address:

Deutsche Rohstoff Australia Pty Ltd

143 Crosby Road

Hamilton QLD 4007

Landowners

Mistletoe Station

██████████ ni

Forsayth Road, Georgetown QLD 4871

PO Box 142

Deeragun QLD 4818

Ph: ██████████

Mob: ██████████

Van Lee Station

██

██████████

Abingdon Downs QLD 4871

Ph: (██████████)

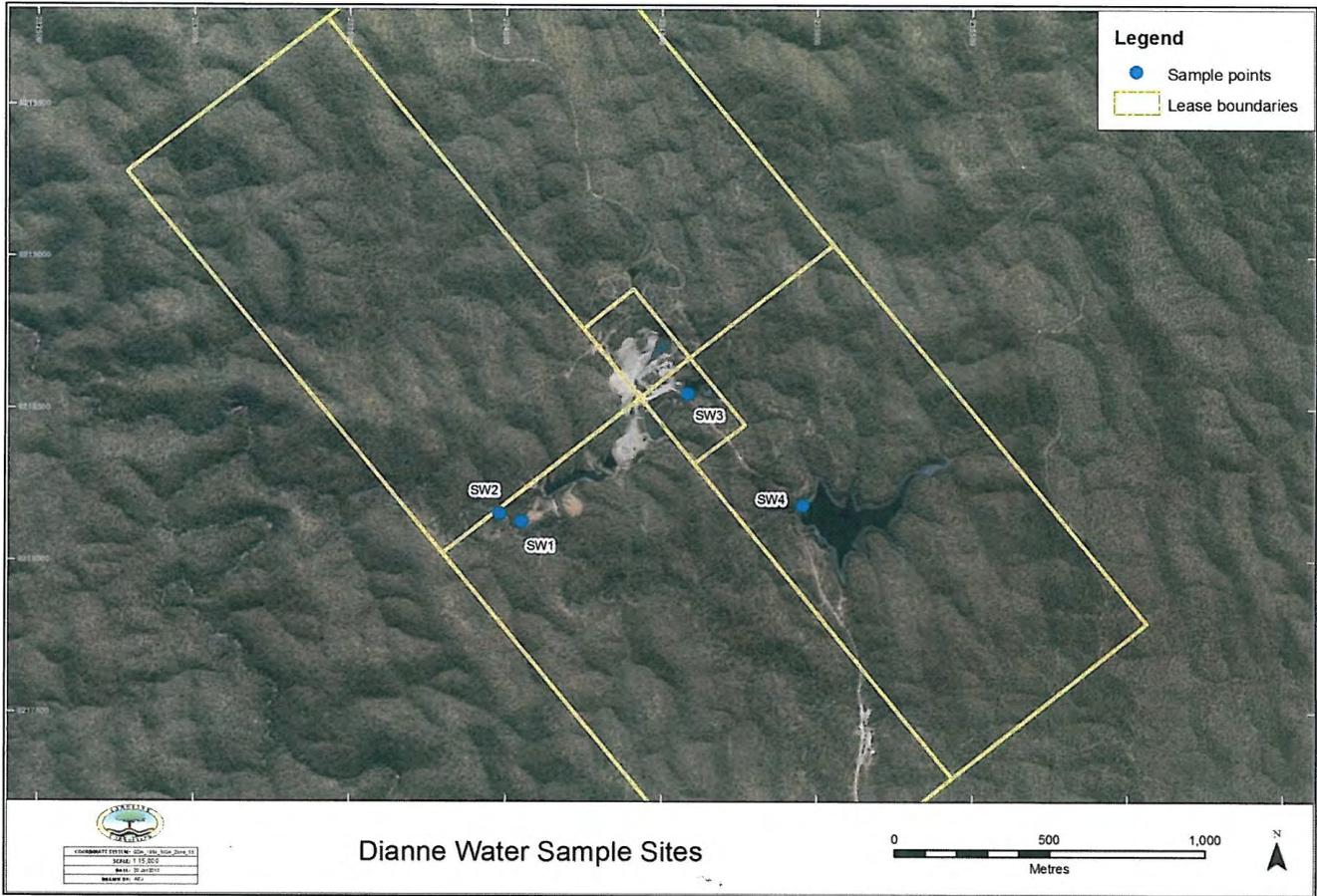
Ph: ██████████

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA 94 MGA Zone 54)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
PSSW2 - Downstream towards the North West	762965	7971670	PSSW1-Reference	763113	7971189
PSSW3 - Flowing north from the process plant.	763776	7971854	RDSW1-Reference	786261	8015157
PSSW5 - Flowing east downstream of the tailings dam.	765490	7971182	ELSW1-Reference	772080	7988855
PSSW6 - Creek draining south east from tailings dam	764755	7971052	ELSW1-Reference	772080	7988855
PSSW7 - Flowing north towards mining lease.	763617	7970971			
PSSW8 - Flowing North East from tailings dam.	765051	7971812			
PSSW9 - Flowing East from tailings dam.	765308	7971722			
ELSW2 - Downstream of extraction pit.	772273	7988341			
RDSW3 - Downstream of extraction pit.	787127	8015155			
PSSW4 - Flowing east downstream of tailings dam.	765069	7971347			

DIANNE COPPER MINE

Site Layout and Sampling Locations



Map 2. Dianne water sample sites

MINE CONTACTS

Dianne Copper Mine

Mine Contact:

██████████ng
Hong Kong
C/- Tenement Administration Services
PO Box 8045
Woolongabba QLD 4102
Ph ██████████

Business Address:

Dianne Mining Corporation Pty Ltd
C/- KPMG
PO Box 7200
Cairns QLD
Dianne Mining Corporation Pty Ltd
Unit 33, 30 Macrossan Street
Brisbane QLD 4000

Mine Site Address:

Lot 66 on SP161906 at Palmer River

Landowners

Bonny Glenn Holding
Clinton Paradise / Donna Armstrong
Peninsula Development Road
Lakeland QLD 4871
Ph: ██████████
E: ██████████@activ8.net.au

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA 94 MGA Zone 54)

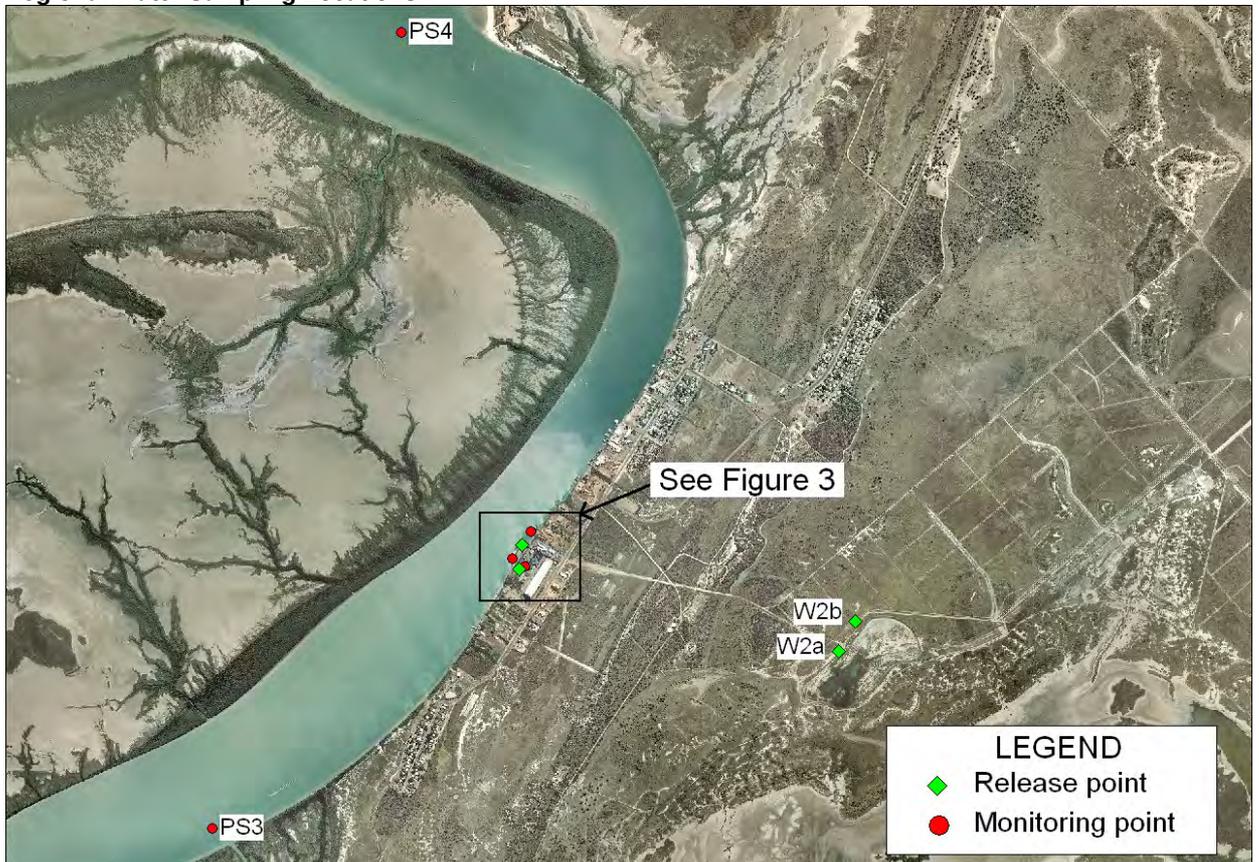
None specified in the Environmental Authority.

KARUMBA PORT FACILITY

Site Water Movements and Discharge Points



Regional Water Sampling Locations



MINE CONTACTS

Karumba Port Facility

MMG Century Ltd
 [REDACTED] – Manager Environment
Ph: [REDACTED]
Mob: [REDACTED]
E: [REDACTED]@mmg.com
 Yappar Street
 Karumba QLD 4891

Postal address:
 PO Box 8016
 Garbutt Business Centre
 Garbutt QLD 4814
Ph: [REDACTED]
Fax: [REDACTED]

Landowners

Ports North
 Port of Karumba Operations
Ph: [REDACTED]

NQEA Marine Safety
 Cairns Office - Tracey Cheetham
Ph: [REDACTED]
 [REDACTED] – Karumba Harbour Master
 Regional Harbour Master contact:
E: [REDACTED][@msg.qld.gov.au](mailto:[REDACTED]@msg.qld.gov.au)

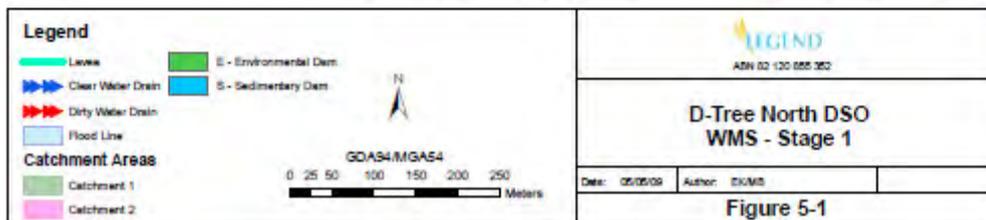
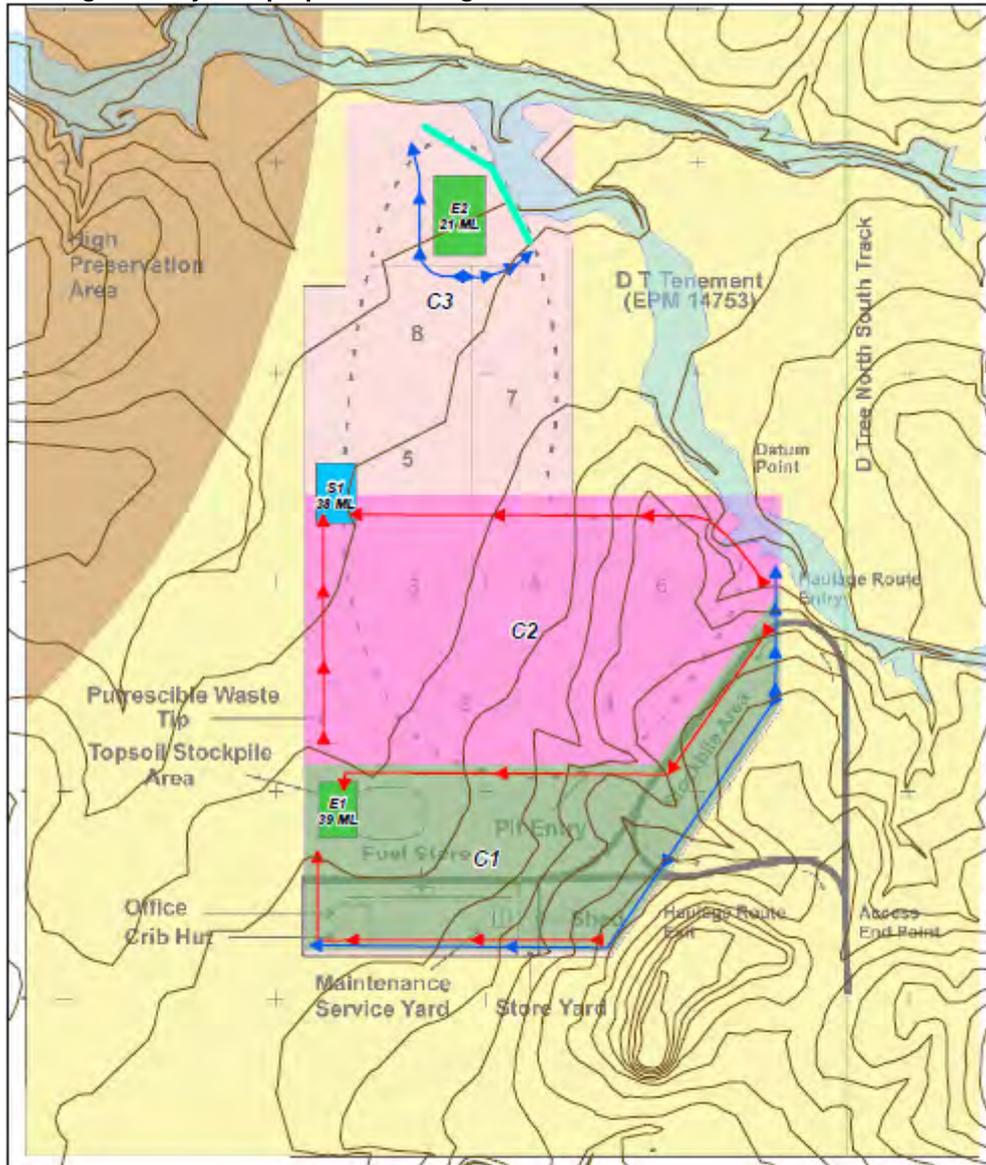
DEEDI – Boating and Fisheries
 [REDACTED] (contact for Karumba)
Mob: [REDACTED]
Ph: [REDACTED]
Fax: [REDACTED]
 8 Palmer Street
 The Point
 Karumba
 PO Box 70
 Karumba QLD 4891

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (AGD 84 Zone 54)

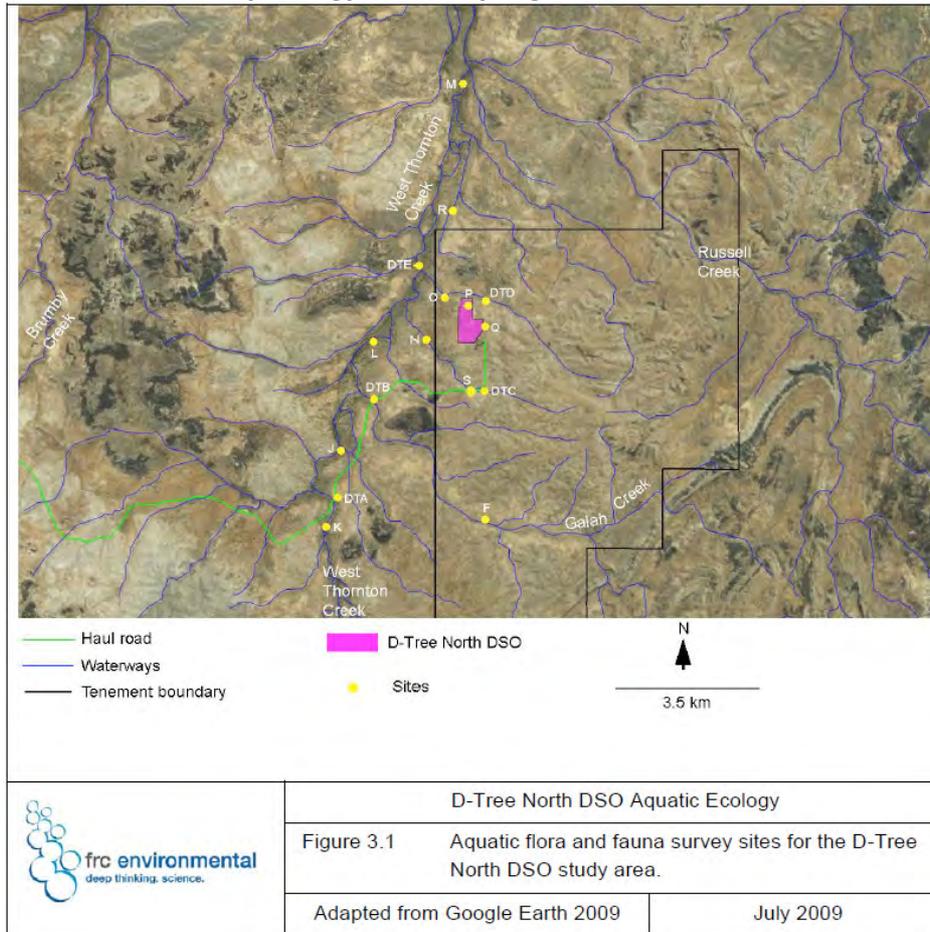
Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
PS1 – Norman River, 100m upstream of the diffuser	481,809.8	8,065,554.0	PS3 – Norman River, 2.6km upstream of the diffuser	480,375.6	8,064,296.0
PS2 – Norman River, 100m downstream of the diffuser	481,919.6	8,065,720.0	PS4 – Norman River, 4.1km downstream of the diffuser	482,640.7	8,067,449.0
Licensed Release Points					
W1 – diffuser in the Norman River	481,885.2	8,065,507.0			
W3 – first flush stormwater pond spillway	481,855.2	8,065,494.0			

LEGEND (D-TREE NORTH DSO) MINE

Water Management System proposed for Stage 1



Regional Surface Water Hydrology and Sampling Locations



MINE CONTACTS

Legend (D-Tree North DSO) Mine

Legend International Holdings Inc
 [Redacted] – Environmental Manager
Ph: [Redacted]
Fax: [Redacted]
E: [Redacted]@axisc.com.au

Level 8, 580 St Kilda Road
 Melbourne VIC 3004
 GPO Box 6315
 St Kilda Road Central
 Melbourne VIC 8008

Landowners

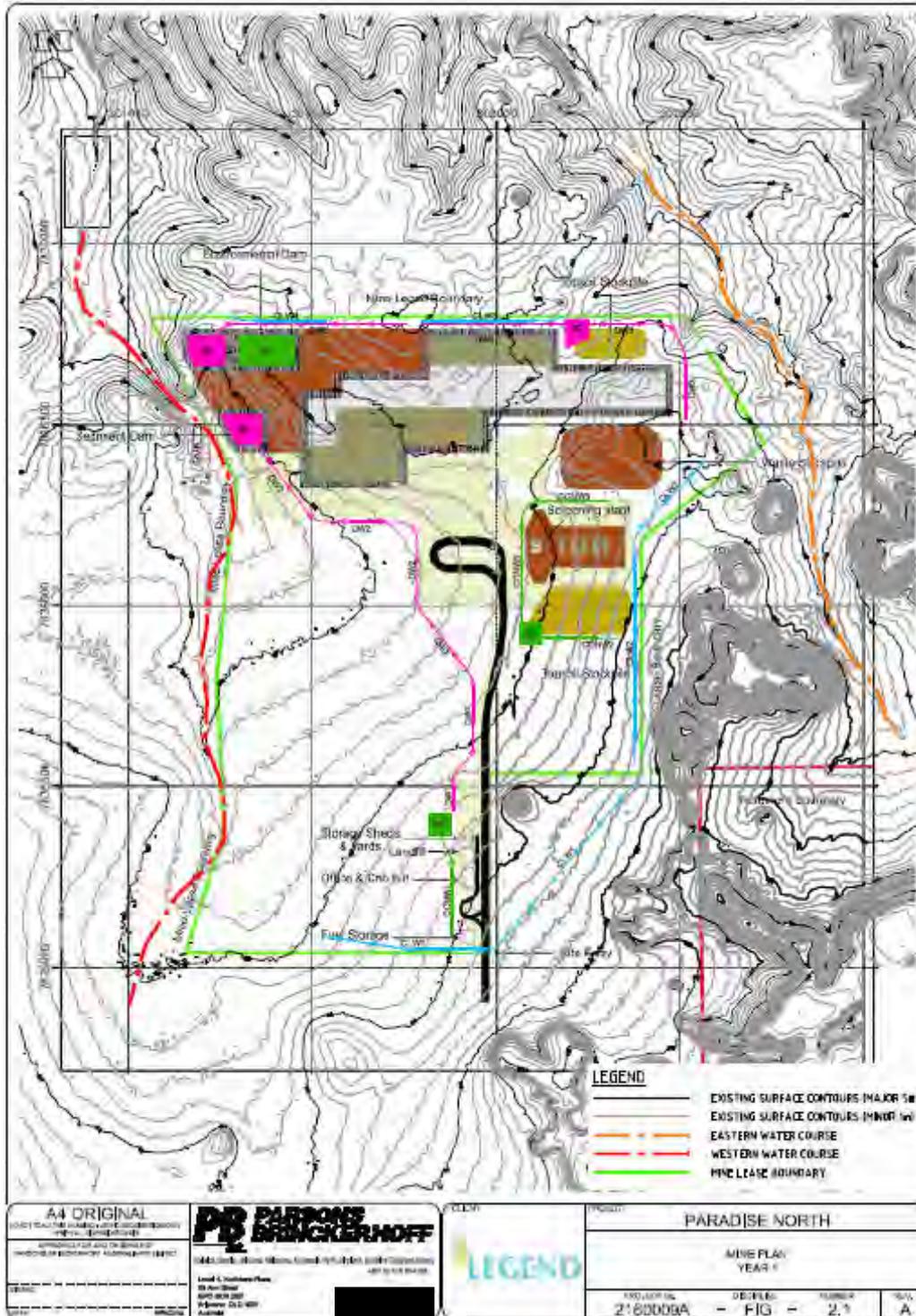
Thorntonia Station
 Bezuma Pastoral Company Pty Ltd
 11364 Gregory Downs
 Camooweal Road, Camooweal QLD 4828
 Stornaway Jambin QLD 4702
Ph: [Redacted]

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (MGA (GDA94))

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
DTE – West Thornton Ck, 1km downstream of the site	283088	7821619	DTA – West Thornton Ck, 30m upstream of sites access toad	2861167	7816158
M – West Thornton Ck, 6km downstream of the site	284041	7826001	DTB – Galah Ck, 30m upstream of the site access road	282098	7818392

LEGEND MINE (PARADISE NORTH)

Site Infrastructure proposed for Year 1



MINE CONTACTS

Legend (Paradise North) Mine

Legend International Holdings Inc
[REDACTED] – Environmental Manager

Ph: [REDACTED]
Fax: [REDACTED]
E: [REDACTED]@axisc.com.au
Level 8, 580 St Kilda Road
Melbourne VIC 3004
GPO Box 6315
St Kilda Road Central
Melbourne VIC 8008

Landowners

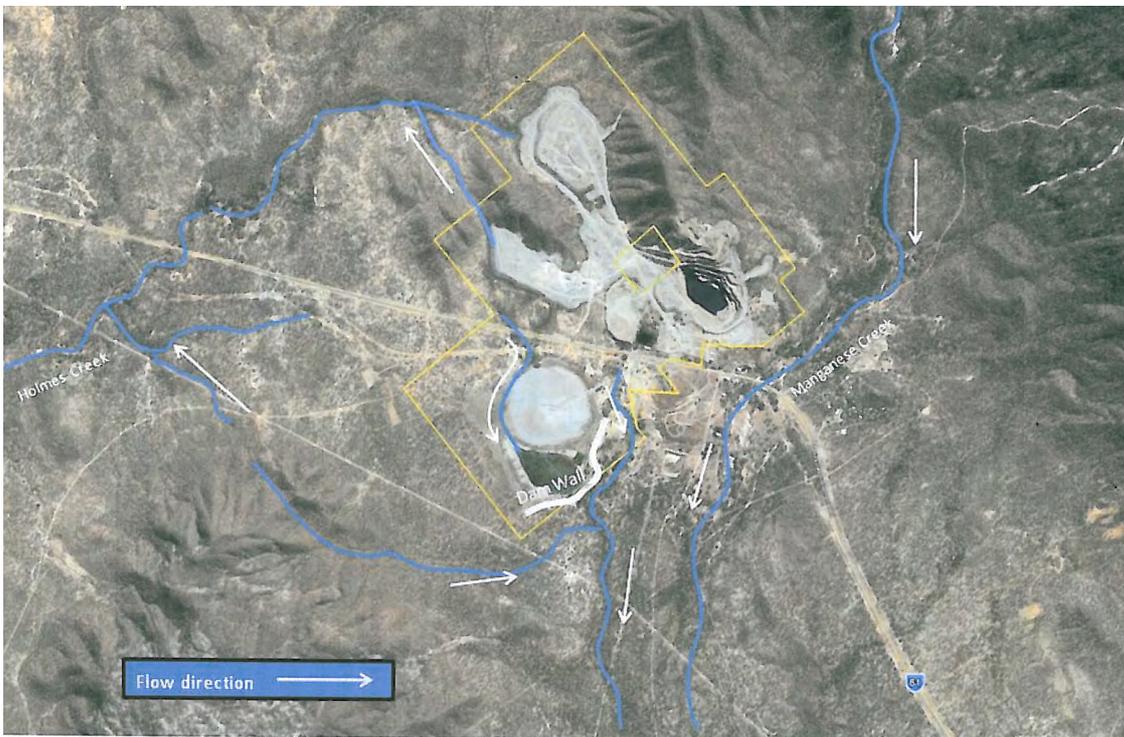
Thorntonia Station
Bezuma Pastoral Company Pty Ltd
11364 Gregory Downs
Camooweal Rd, Camooweal QLD 4828
Stornaway Jambin QLD 4702
Ph: [REDACTED]

WATER QUALITY SAMPLING LOCATIONS (GDA94)

Onsite Storage Monitoring Points	Easting	Northing
Environmental Dam 1	7835404	301863
Environmental Dam 2	7835912	302100
Environmental Dam 3	7836700	301376
Sediment Dam 1	7836485	301318
Sediment Dam 2	7836762	302210
Sediment Dam 3	7836700	301215
Sediment Dam 4	7836130	301372
Sediment Dam 5	7835742	301537
Sediment Dam 6	7835400	301535

MOUNT CARBINE MINE

Site Layout and Surface Hydrology



Map2 Lease area showing drainage

MINE CONTACTS

Mount Carbine Mine

██████████ (Director)

Ph: ██████████

Fax: ██████████

Mine Site Address:

9 Main Street
Mount Molloy QLD 4871
PO Box 3

Business Address:

Icon Resources Ltd
Suite 404
25 Lime Street
Sydney NSW 2000

Landline Consulting
(Environmental Consultant)

Ph: ██████████ Mob: ██████████

Fax: ██████████

E: ██████████@landlineconsulting.com

Address:

1 Jack Street
Atherton QLD 4883

Landowners

Brooklyn Nature Refuge
Lot 13 SP127335
Australian Wildlife Conservancy

Ph: ██████████

Fax: ██████████

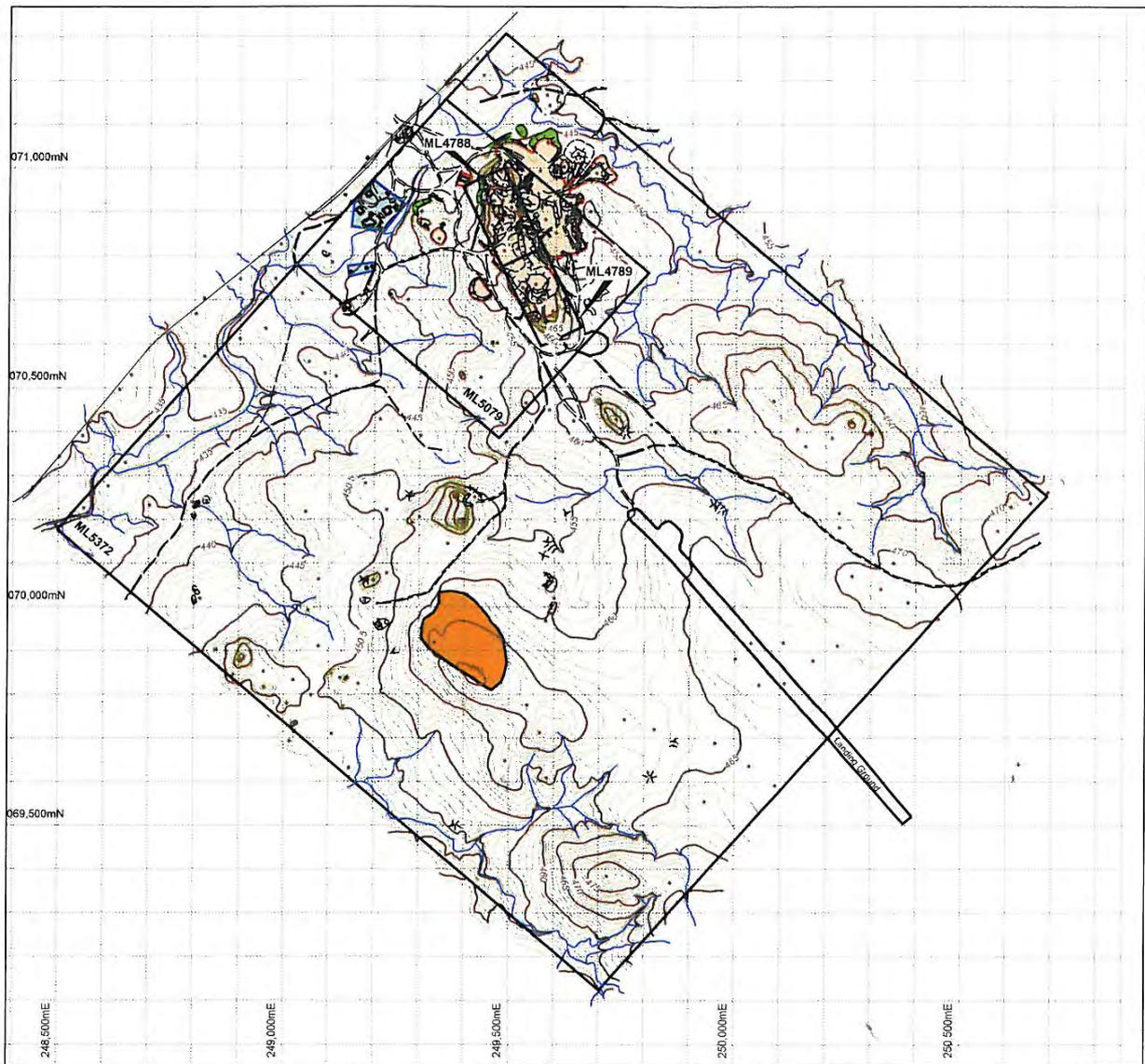
E: info@australianwildlife.org

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

None specified in the Environmental Authority

OOTAN LIME WORKS MINE

Site map



MINE CONTACTS

Ootan Lime Works

Phoenix Lime Pty Ltd
[REDACTED] - General Manager

Ph: [REDACTED]

Fax: [REDACTED]

Mob: 0417728764

1 Potts Street
East Brisbane QLD 4169

Registered Business Address:

Phoenix Lime Pty Ltd
GPO Box 122
Brisbane QLD 4001

Landowners

Spring Valley

[REDACTED]
Spring Valley Station
Almaden QLD 4871
999 Burke Development Rd
Almaden QLD 4871

Ph: [REDACTED]

[REDACTED]
Spring Valley Station
Almaden QLD 4871
Almaden-Gingerella Rd
Barwidgi QLD 4872

Ph: [REDACTED]

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (AMG (datum unknown))

Monitoring point	Easting	Northing
Receiving Waters		
Upstream Point	0249670	8070797
Downstream Point	0249099	8070672

OSBORNE MINE

Site Water Movements and Discharge Points



Lucky Luke Mine (Water Monitoring Sites)

- ▲ End of pipe Monitoring Point
- ▲ Receiving Waters
- ▲ Reference Sites
- ▭ Mining Lease
- Drainage Lines

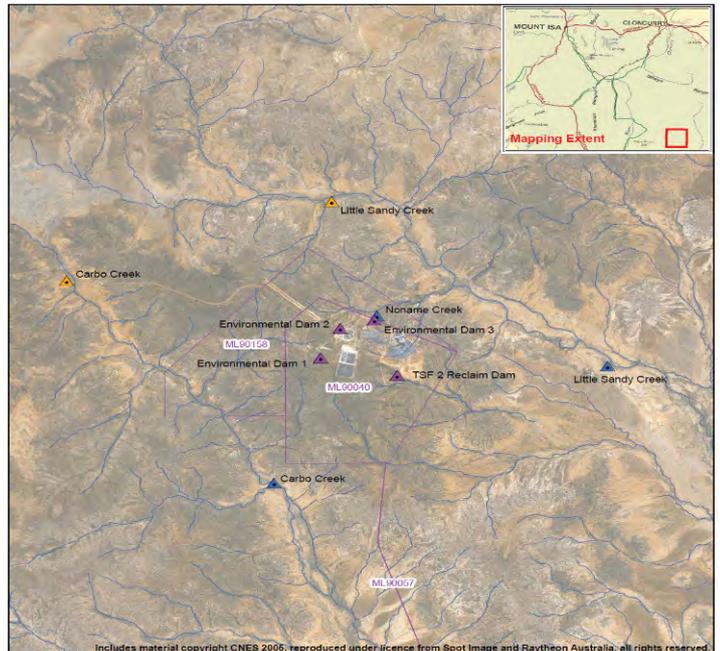


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QUEENSLAND GOVERNMENT



Osborne Mine (Water Monitoring Sites)

- Drainage Lines
- ▲ End of pipe Monitoring Point
- ▲ Receiving Waters
- ▲ Reference Sites
- ▭ Mining Lease

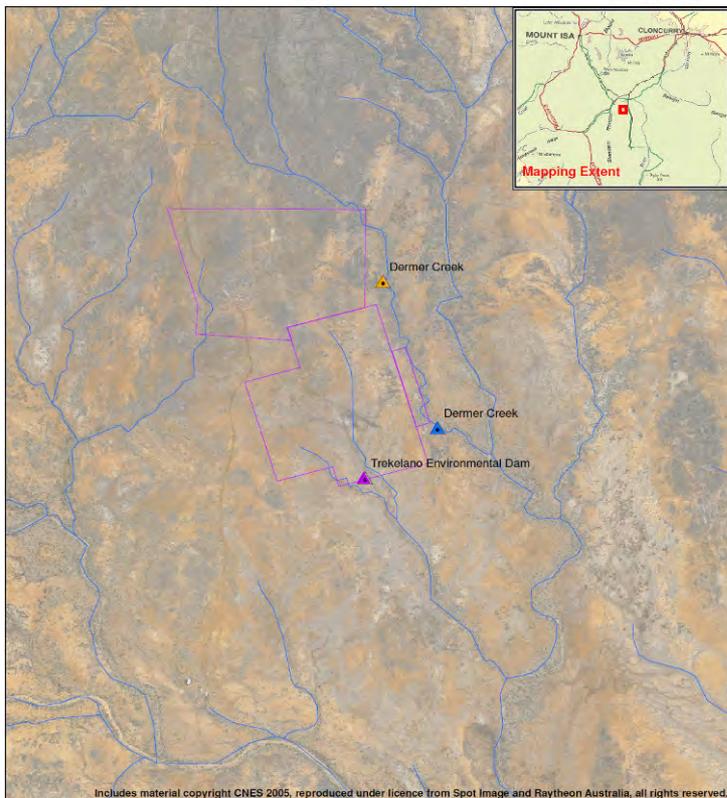


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QUEENSLAND GOVERNMENT



Trekelano (Water Monitoring Sites)

- ▭ Mining Lease
- ▲ End of pipe Monitoring Point
- ▲ Receiving Waters
- ▲ Reference Sites
- Drainage Lines

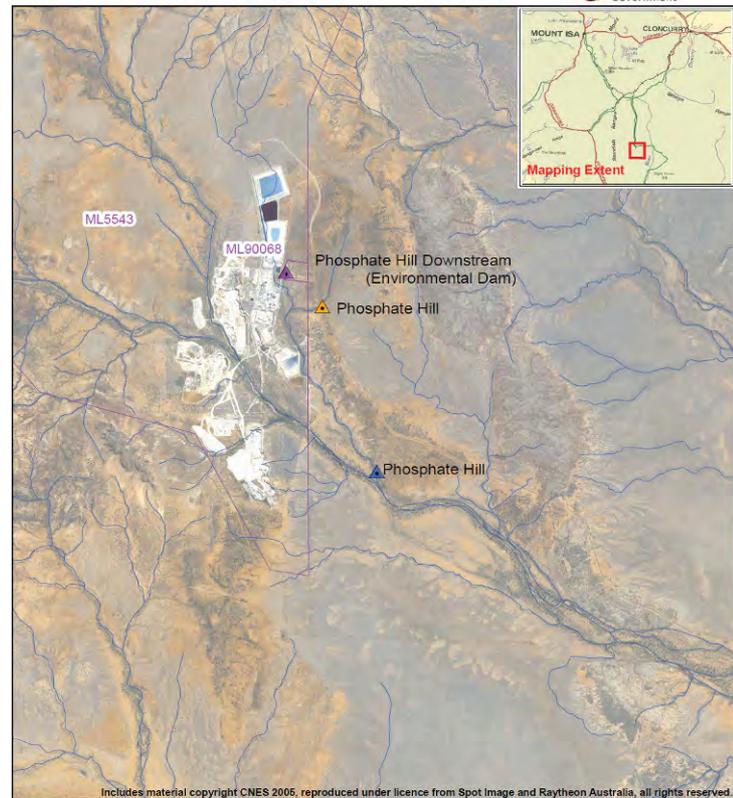


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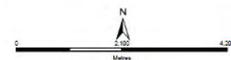
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 Department of Environment and Heritage Management
 Queensland Government
 Version: 10/12/10_A1_000

QUEENSLAND GOVERNMENT



Trekelano (Water Monitoring Sites)

- ▭ Mining Lease
- ▲ End of pipe Monitoring Point
- ▲ Receiving Waters
- ▲ Reference Sites
- Drainage Lines



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 Queensland Government
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 Sarah Venter, Sarah Nott
 Department of Environment and Heritage Management
 Queensland Government
 Version: 10/12/10_A1_000

QUEENSLAND GOVERNMENT

MINE CONTACTS

Osborne Mine

██████████ (Superintendent Environment)

Ph: ██████████

Fax: ██████████

E: ██████████@lvancorp.net

██████████ (Safety, Health, Environment and Community Manager)

Ph: ██████████

Mob: ██████████

Fax: ██████████

E: ██████████@lvancorp.net

Landowners

██████████ – Chatsworth

Station

MS 760 Boulia 4829

Ph: ██████████

Fax: ██████████

E: ██████████@bigpond.com

██████████ Devoncourt Station

Devoncourt via Duchess 4825

Ph: ██████████

Fax: (██████████)

E: ██████████@bigpond.com

██████████ – Stradbroke

Station

PMB 61 Dajarra 4825

Ph: ██████████

Fax: (██████████)

J.C. and Betty Brown – Mayfield Station

Mayfield via Duchess 4825

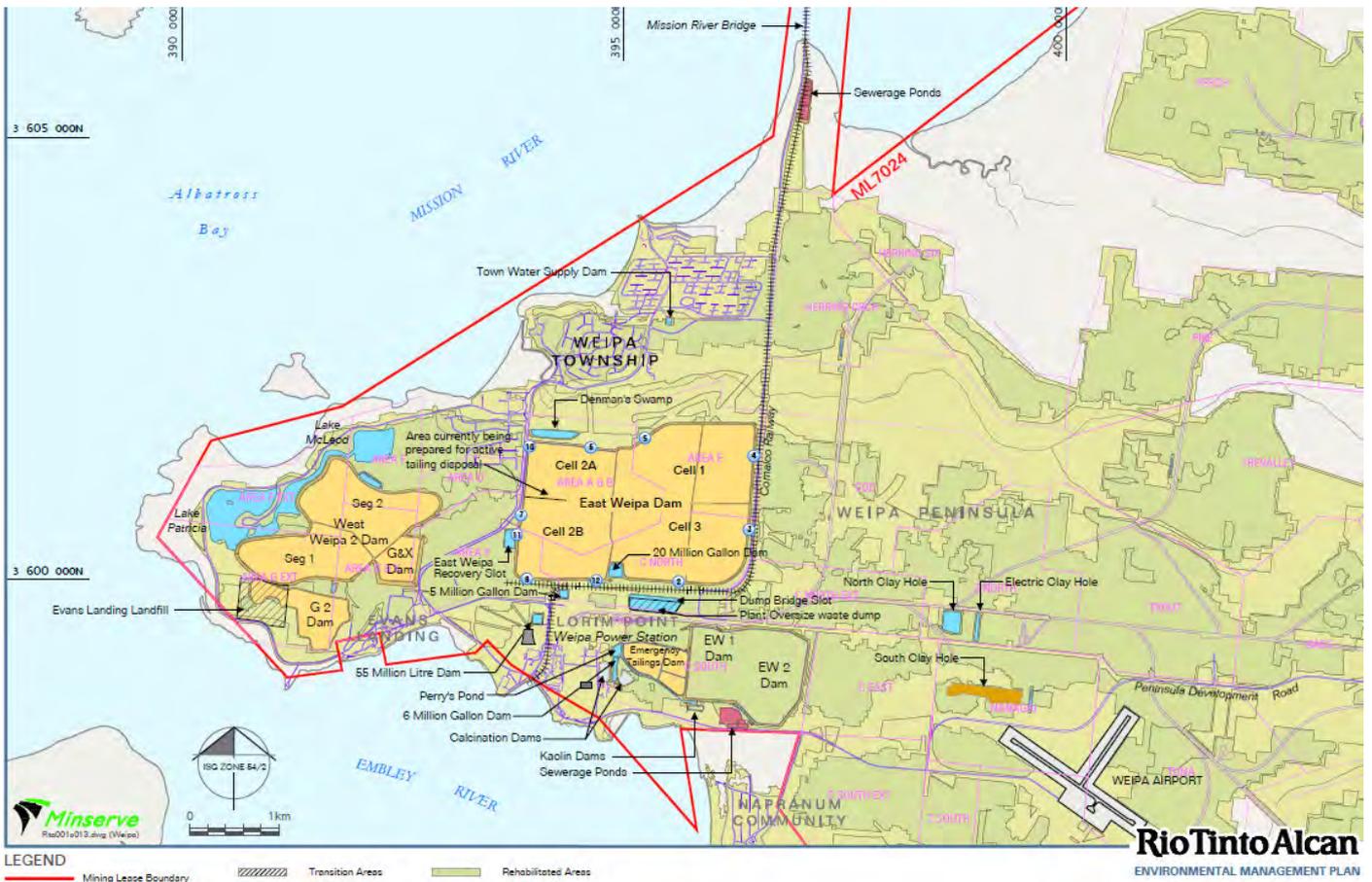
Ph: 4 ██████████

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (GDA 94 MGA Zone 54)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
Carbo Creek	453768	7551452	Carbo Creek	447741	7558773
Little Sandy Creek	463460	7555682	Little Sandy Creek	455440	7561638
Noname Creek	456750	7557500	Dermer Creek	386193	7625095
Dermer Creek	386675	7623674	Lucky Luke	443026	7591076
Lucky Luke	441410	7587126	Phosphate Hill	395216	7579769
Phosphate Hill	396303	7576331			

End of pipe Monitoring Points	Easting	Northing
Environmental Dam 1	455120	7555980
Environmental Dam 2	455690	7557050
Environmental Dam 3	456680	7557350
TSF 2 Reclaim Dam	457341	7555344
Trekelano Environmental Dam	386045	7623184
Lucky Luke Environmental Dam 1 (WRD Sediment)	441393	7587994
Phosphate Hill Downstream (Environmental Dam)	394494	7580479

Rio Tinto Aluminium Limited – Weipa



LEGEND

Mining Lease Boundary	Transition Areas	Rehabilitated Areas
Bitumen Roads	Tailings Dams	Cleared Areas
Unsealed Roads	Water Dams	Piezometer Location
Haul Roads	Sewerage Ponds	
Power Station		

Rio Tinto Alcan
ENVIRONMENTAL MANAGEMENT PLAN

Weipa Operations
Weipa Peninsula Tailings Dams and Water Dams **FIGURE 3.3**

Mine Contacts

Rio Tinto Aluminium Limited

[REDACTED])
Rio Tinto Aluminium Ltd
Level 25 – 12 Creek Street
Brisbane QLD 4000
Ph: [REDACTED] Fax: [REDACTED]
Mob: [REDACTED]
E: [REDACTED]@riotinto.com

[REDACTED]
(Environmental Superintendent)
Ph: [REDACTED] Fax: [REDACTED]
Mob: [REDACTED]
E: [REDACTED]@riotinto.com

[REDACTED]
Allens Arthur Robinson
Level 31 Riverside Centre
123 Eagle Street
Brisbane QLD 4000

Mine Site Address:
C/- Post Office
Weipa, QLD 4874

Registered Business Address:
Rio Tinto Limited
Level 2, 443 Queen Street
Brisbane QLD 4000

Landowners

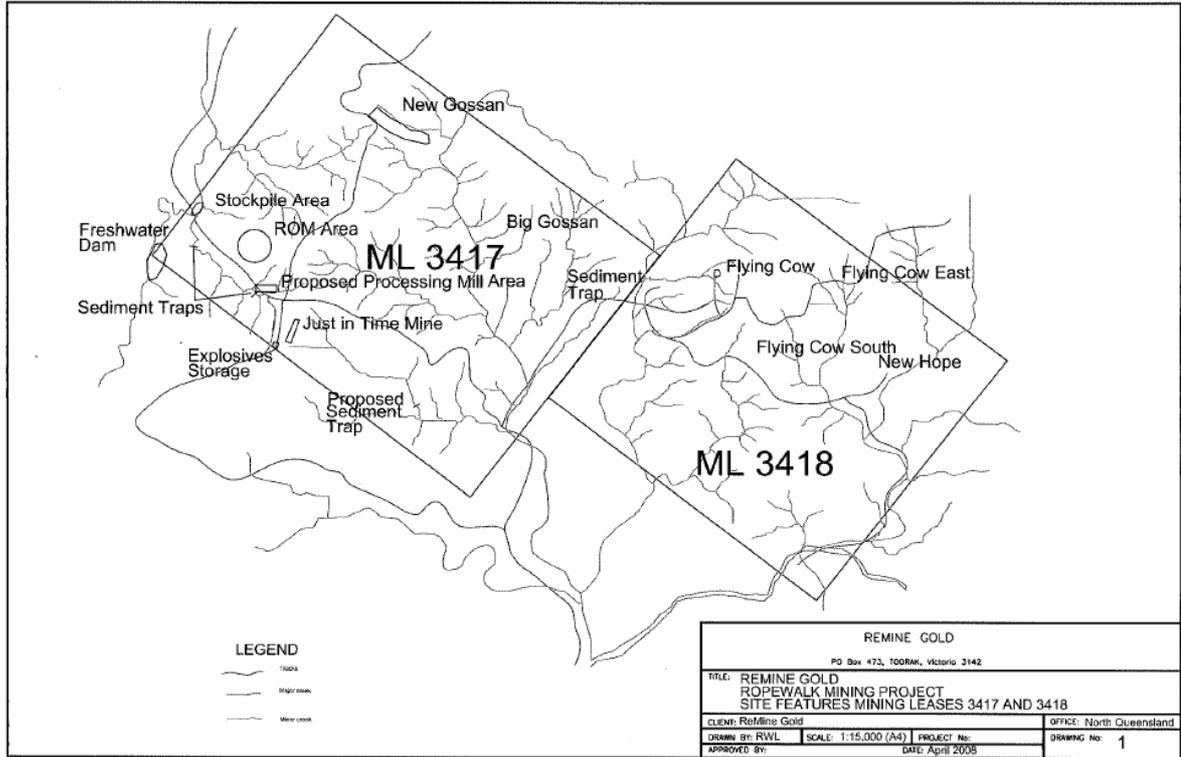
Majority of landholder on ML7024 are commercial premises. Rio Tinto owns the underlying land.
Contact for Rio Tinto:
C/- Post Office
Weipa, QLD 4874
Ph: [REDACTED]
Fax: [REDACTED]

Water Quality Sampling Locations

Transitional Environmental Authority doesn't provide monitoring locations.

ROPEWALK MINE

Site Water Movements and Discharge Points



MINE CONTACTS

Ropewalk Mine

Altius Mining Ltd

██████████ – CEO

Ph: 1300 136 453

Fax: 1300 232 784

Mob: ██████████

E: ██████████@altiusmining.com.au

PO Box 473

Toorak VIC 3142

Altius Mining Ltd

First Street

Forsayth QLD 4871

Ph/Fax: (██████████)

Mine Location:

15km south-east of Forsayth

Landowners

██████████
Robin Hood Station

Forsayth QLD 4871

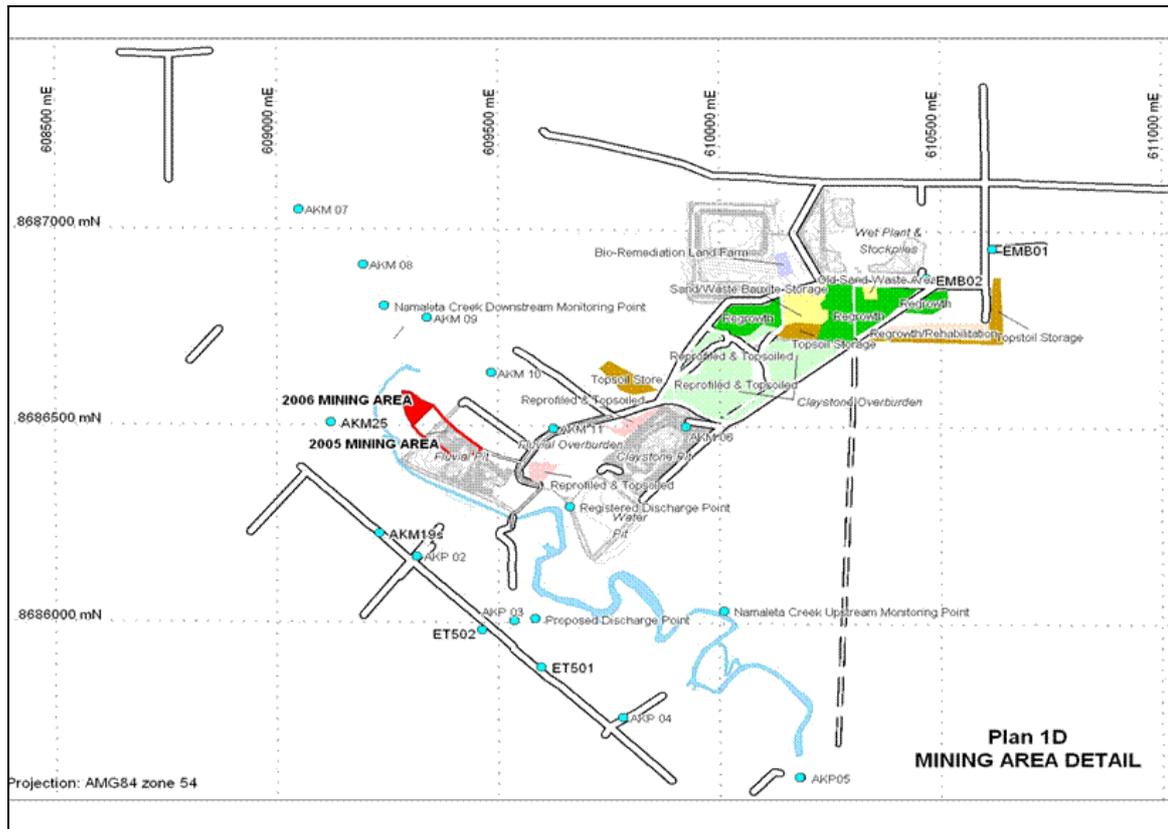
Ph: ██████████

WATER QUALITY SAMPLING LOCATIONS

No water monitoring locations are specified in the environmental authority. The majority of the area covered by the mining leases is within steep valleys of south draining creek systems that drain to the Robertson River, a bend of which is in the southern portion of ML3418. The western portion of ML3417 encompasses north draining creek systems that drain to the north flowing Goldsmith Creek.

SKARDON RIVER KAOLIN MINE

Site Water Movements and Discharge Points



MINE CONTACTS

Skardon River Kaolin Mine

Mining Tenements held jointly by:

ACC Ecominerals Ltd
 Skardon River Kaolin (subsidiary)
 [REDACTED] – Manager
 Skardon River Mine
 Located approx. 85km north of Weipa
 Ph: [REDACTED]
 E: [REDACTED]@skardon.com.au

Gulf Alumina Ltd
 [REDACTED] – Managing Director
 Suite 504, Level 5, 12 O’Connell Street
 Sydney NSW 2000
 Ph: [REDACTED]
 Fax: [REDACTED]
 E: [REDACTED]@gulfalumina.com.au

Landowners

Mapoon Aboriginal Shire Council (DOGIT)
 PO Box 213
 Weipa, QLD 4874
 Ph: [REDACTED]
 Fax: [REDACTED]
 [REDACTED]
 Telegraph Road, Mapoon Qld 4874
 PO Box 2337, Cairns QLD 4870
 C/- Mapoon Aboriginal Shire Council
 Ph: [REDACTED]

Rio Tinto Aluminium Limited
 Northern Av, Rocky Point QLD 4874
 C/- General Manager-Operations
 Post Office, Weipa QLD 4874
 Ph: [REDACTED]
 Fax: [REDACTED]

Apudthama Land Trust
 Mapoon QLD 4874
 PO Box 4952, Cairns QLD 4870

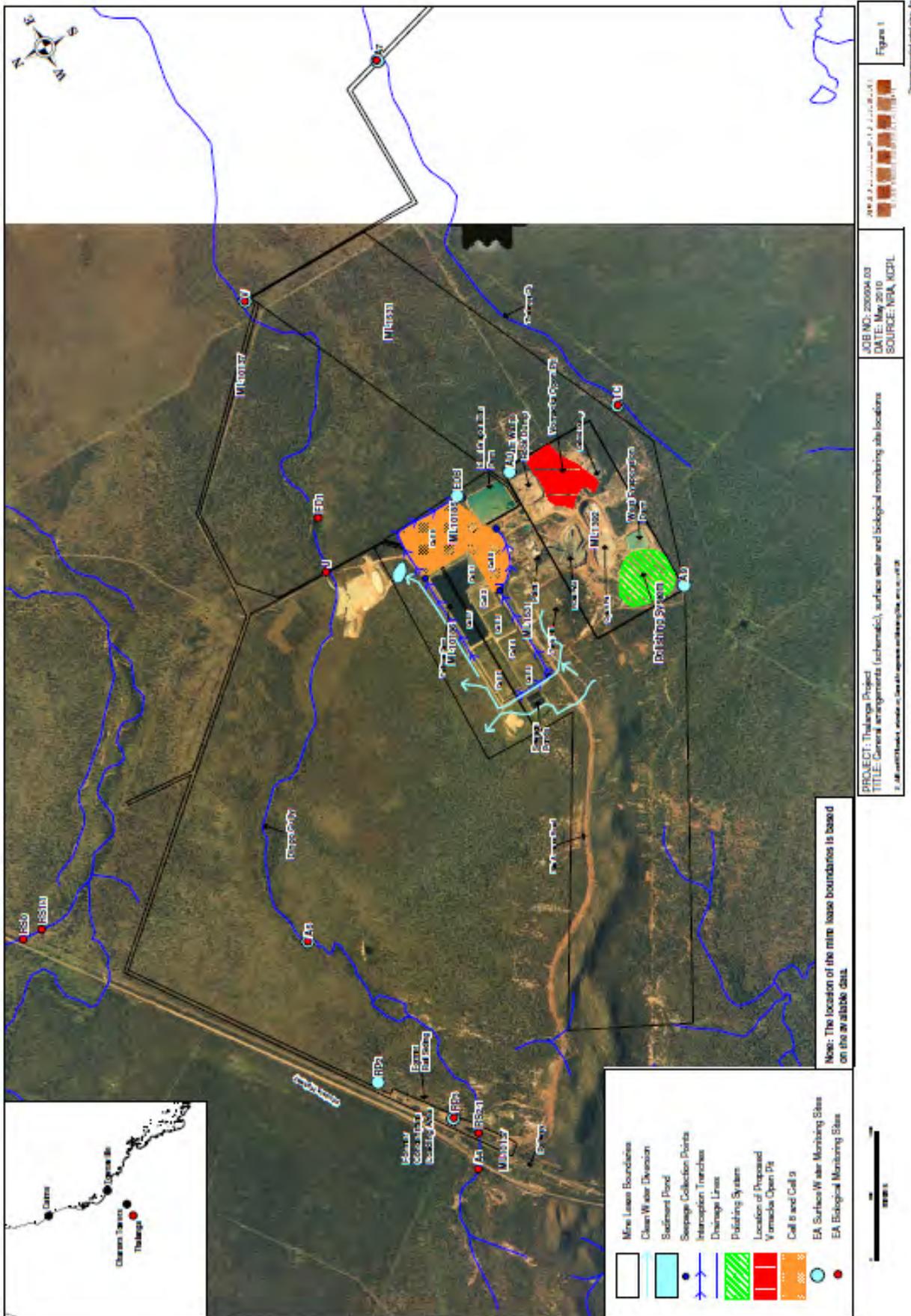
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (UTM Zone 54 L-AGD84)

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
Namaleta Creek (~100m downstream of W1)	0609528	8686246	Namaleta Creek (~100m upstream of W1)	0609651	8686244
Between 100-500m downstream of mining area	0609287	8686714	~100m upstream of mining area	0610014	8685932

End of pipe monitoring locations	Easting	Northing
W1 – Discharge point from raw water pit	0609656	8686318
W2 – Discharge point from stormwater drains	0616628	8699866
W3 – Discharge point from mobile oil/water separator to the tailings dam at the wet plant: Main diesel tank	0610576	8686920
W4 – Discharge point from mobile oil/water separator to wastewater storage pond at the dry plant: Spray dryer diesel tank Generator diesel tank Kiln diesel tank Bulk storage diesel tank	0616477 0616477 0616432 0616581	8699674 8699674 8699842 8699854
W5 – Discharge point for mining on South Side of Namaleta Creek	0609582	8686010
W6 – Discharge point for pumping water from western sump of current fluvial pit	0609296	8686478

THALANGA COPPER MINE

Site Water Movements and Discharge Points



MINE CONTACTS

Thalanga Copper Mine

Kagara Ltd
 [REDACTED] – Project Manager
 Ph: [REDACTED]
 Fax: [REDACTED]
 PO Box 4
 Mt Garnet QLD 4872

[REDACTED] – Environmental Coordinator
 Ph: [REDACTED]
 Mob: [REDACTED]
 E: [REDACTED]@mtgarnet.kagara.com.au

Landowners

[REDACTED]
 Thalanga Homestead
 (downstream landholder –
 Dingo Ck & Thalanga Ck)
 PO Box 789
 Charters Towers QLD 4820
 Ph: [REDACTED]
 Mob: [REDACTED]

[REDACTED]
 (downstream landholder – Thalanga Ck)

Braceborough Station
 PO Box 1876
 Charters Towers QLD 4820
 Ph: [REDACTED]
 Mob: [REDACTED]
 [REDACTED]

[REDACTED]
 Lakeview House
 (downstream landholder –
 Dingo Ck)
 PO Box 464
 Charters Towers QLD 4820
 Ph: [REDACTED]
 [REDACTED] (daytime contact – Towers Engineering)

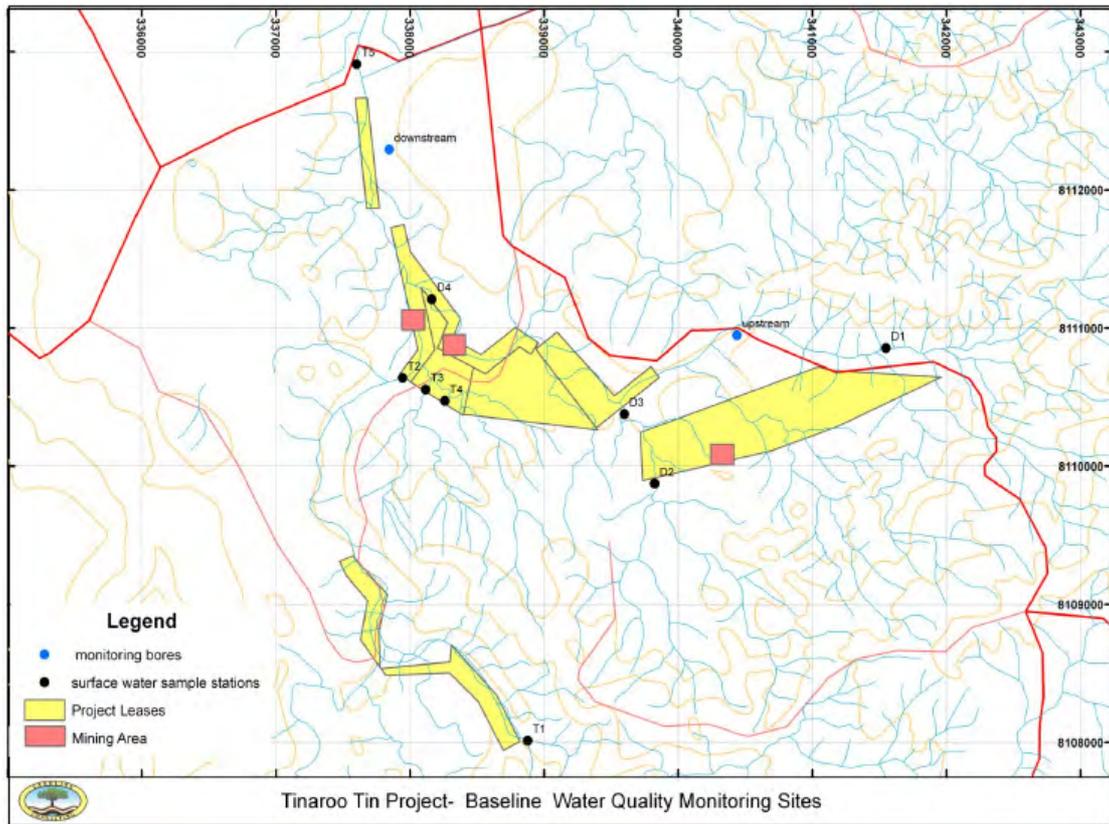
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (MGA (GDA 94))

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
Receiving Waters 1 (J)	TBA	TBA	Reference Site 1 (A4)	368236	7754046
Receiving Waters 4 (A5)	370434	7754124	Reference Site 2 (RSO)	TBA	TBA
Receiving Waters 5 (TC)	372396	7749617			
Receiving Waters 6 (A7)	375667	7749572			
Receiving Waters 7 (V)	374759	7751554			

Licensed Release Points	Easting	Northing
Release Point 1 (A9)	370956	7750020
Release Point 2 (RP2)	369225	7754325
Release Point 3 (RP3)	TBA	TBA
Release Point 4 (AD)	372470	7750628

TINAROO CREEK TIN MINE

Site Water Movements and Discharge Points



MINE CONTACTS

Tinaroo Creek Tin Mine

██████████
Anzac Avenue
Mareeba QLD 4880
Ph: (██████████)
Fax: ██████████

Mailing Address:

██████████
PO Box 1710
Mareeba QLD 4880

Mine site location:

13km south-south-east of Mareeba

Landowners

Lot 433 Plan AP3452:
 Unnamed Rd
 Mareeba QLD 4880
 Owner:

[REDACTED]
 [REDACTED]
 PO Box 5833
 Mackay MC QLD 4741

Lot 2 Plan SP182482:
 2 Tinaroo Creek Rd
 Mareeba QLD 4880
 Owner:

[REDACTED]
 [REDACTED]
 PO Box 1710
 Mareeba QLD 4880

Lot 358 Plan OL451:
 Owner details not supplied

Lot 3 Plan SP182482:
 Tinaroo Creek Rd
 Mareeba QLD 4880
 Wyndara Pty Ltd
 PO Box 1596
 Cairns QLD 4870

Lot 4 Plan SP182482:

[REDACTED]
 Mareeba QLD 4880
 Owner:
 [REDACTED] and [REDACTED]
 1 Stewarts Rd
 Caravonica QLD 4878

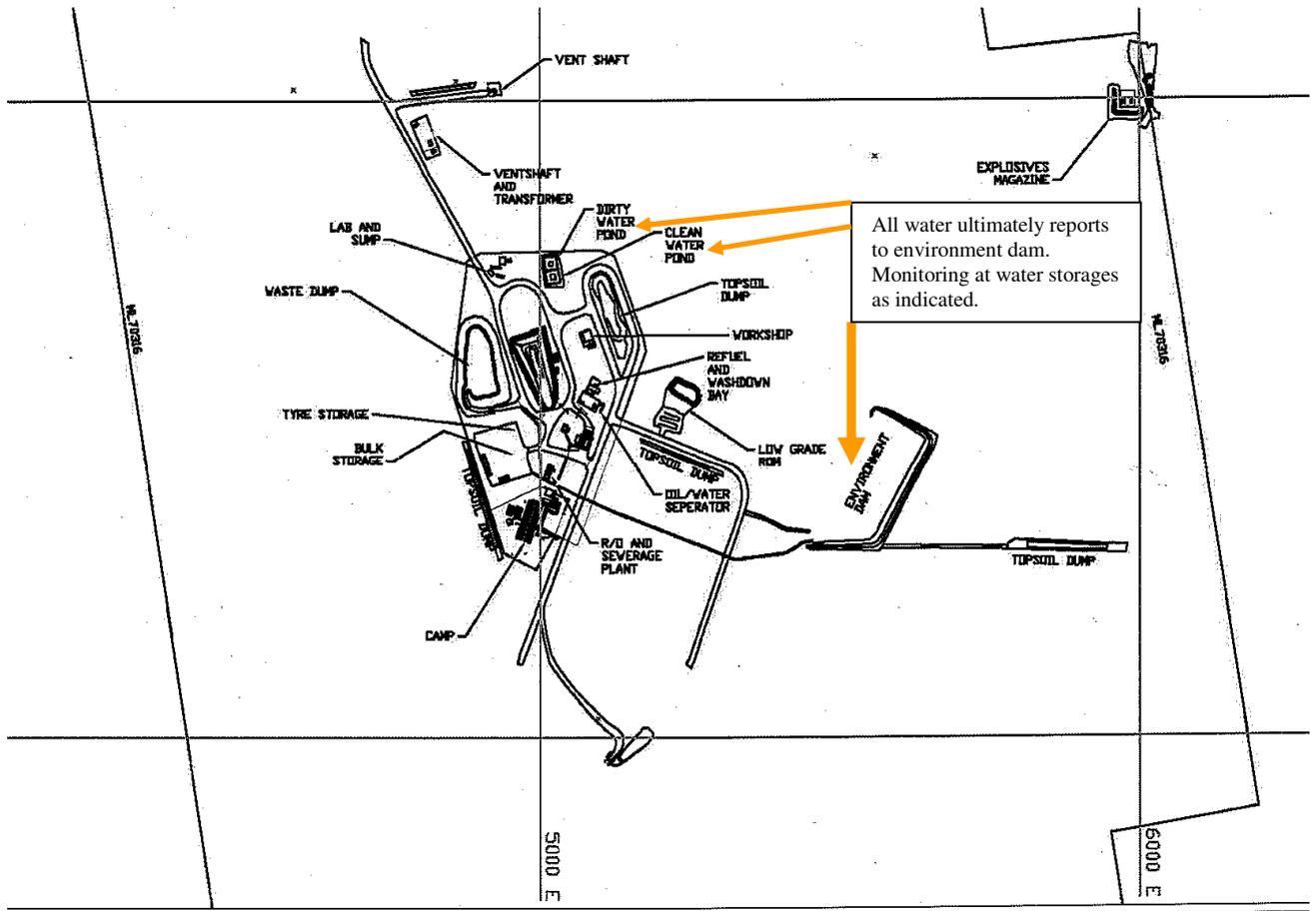
WATER QUALITY & SEDIMENT SAMPLING LOCATIONS (MGA (GDA 94))

Monitoring point	Easting	Northing	Monitoring point	Easting	Northing
Receiving Waters			Reference Sites		
T3 – 500m downstream of potential release point from TSF	338060	8110990	T1 – upstream of ML4878 and mining project	338880	8108010
T4 – 1km downstream of potential release point from TSF	337809	8111752	T2 – upstream of ML5078 and mining project	338120	8110555
T5 – 250m downstream of ML5104	337600	8112790	D1- upstream of potential release from disturbance on ML20319	341550	8110680
Licensed Release Points					
TSF Outflow	338260	8110470			

Onsite Storage Monitoring Points	Easting	Northing
Tailings Storage Facility (Spillway)	338260	8110470
Sediment Dam (SD1) (down-slope of ROM/crusher area)	338450	8110750
Sediment Dam (SD2) (down-slope of organic material stockpile)	338630	8110520

TWIN HILLS PROJECT

Regional Water Sample Locations



Site Water Movements and Discharge Points



MINE CONTACTS

Twin Hills Project

██████████ (Environmental Manager)
Ph. ██████████
Fax: ██████████
Mob: ██████████
E: ██████████@conquestmining.com.au

Registered Business Address:

PO Box 260
Bondi Junction NSW 1355
Level 7, 282 Oxford Street
Bondi Junction NSW 2022

Mine Site Address:

██████████
Conquest Gold Pty Ltd
PO Box 1435
CHARTERS TOWERS. 4820

Mine Site Address:

Approx 120km north of
Clermont
Gregory Development Rd

Landowners

TBA

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

Table C1 Contaminant Release, Sources Monitoring & Receiving Waters and monitoring

Water Storage Description	Latitude or northing	Longitude or easting	Monitoring Location	Frequency of Monitoring
Evaporation Pond	TBA	TBA	At spillway	Bimonthly
Lower Settling Pond	TBA	TBA	At spillway	Quarterly
Settling Pond 2	TBA	TBA	At spillway	Quarterly

RISHTON/HADLEIGH CASTLE MINE

Site Water Movements and Discharge Points



Regional Water Sample Locations



MINE CONTACTS

Rishton/Hadleigh Castle Mine

Tamaya Resources Limited (receivers and managers appointed) (**in liquidation**)

M [REDACTED] Liquidator C/- Ernst and Young

680 George Street Sydney, NSW 2000 FAX: [REDACTED]

Mine Site Address:

Approximately 40km ESE
Charters Towers. Qld

Registered Business Address:

Tamaya Resources Limited
Level 12, 75 Elizabeth Street
SYDNEY NSW 2000

Landowners

These projects are located adjacent to the Burdekin River, approximately 40km ESE of Charters Towers. The local water ways are ephemeral creeks, both sites are in close proximity to the Burdekin river and upstream of the Burdekin Dam. Adjacent areas are primarily used for cattle grazing.

Rishton	Cameron Downs Station [REDACTED] [REDACTED] [REDACTED]
Hadleigh Castle	Amity Station [REDACTED] Lot 4004/ Amity Station Ravenswood QLD4816 [REDACTED] fax [REDACTED]

Receiving Water Monitoring Locations and Frequency

Monitoring point	Easting (AMG)	Northing (AMG)	Monitoring frequency
Hadleigh Castle Run-off (HCRO)	458789	7776503	Annually ¹
Rishton Tailings dam run-off (RTRO)	453034	7774267	Annually ¹
ROM Pad and Plant Site Run-off (JDRO)	453044	7773705	Annually ¹

NOTE: This does not apply to tailings dams

Receiving Water Contaminant Limits

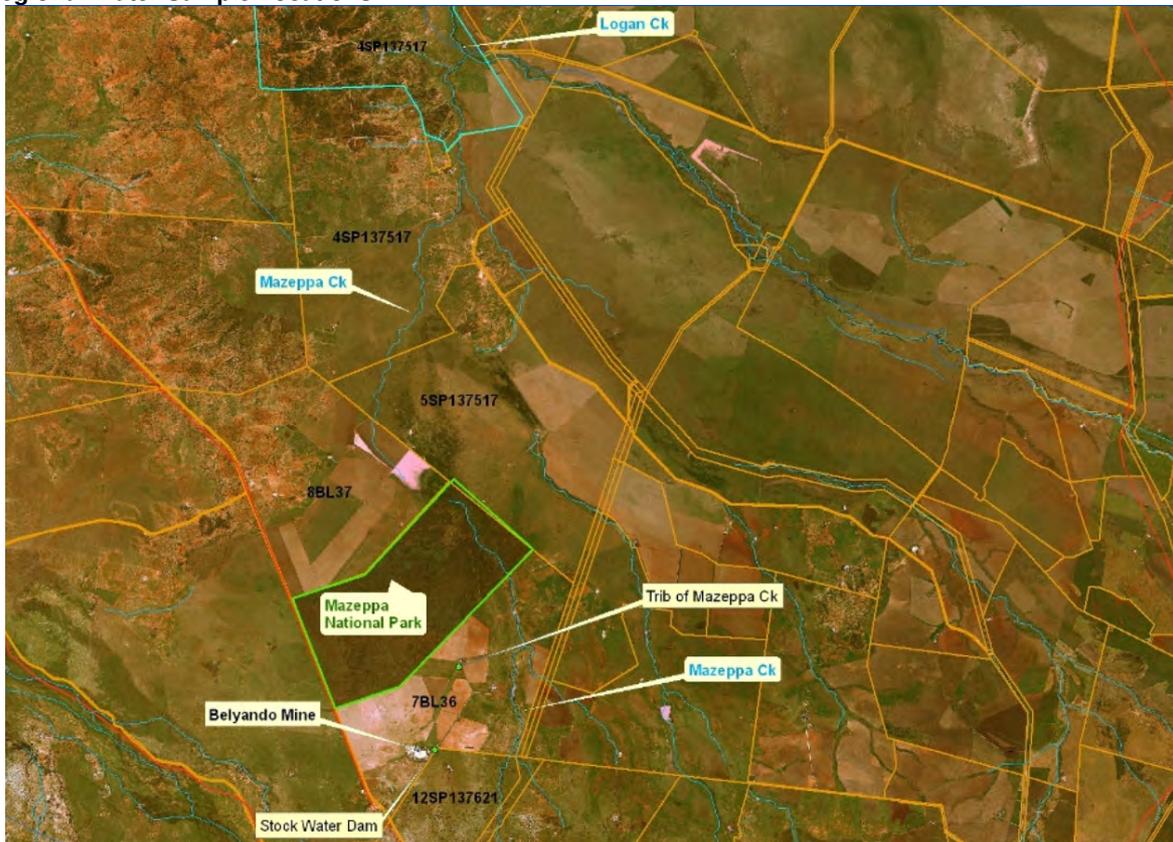
Parameter	Units	Limit type	Limit Hadleigh	Limit Rishton
pH		Acceptable range	7 - 9	6.5 - 9
Total Dissolved Solids	mg/L	Maximum	4000	500
Sulfate	mg/L	Maximum	1000	250
Copper	mg/L	Maximum	1 ¹	1
Molybdenum	mg/L	Maximum	0.15 ¹	0.05
Arsenic	mg/L	Maximum	0.5 ¹	0.007
Selenium (Total)	mg/L	Maximum	0.02 ¹	0.01
Mercury	mg/L	Maximum	0.002 ¹	0.001
Lead	mg/L	Maximum	0.1 ¹	0.01
Zinc	mg/L	Maximum	20 ¹	3
Cyanide	mg/L	Maximum	0.1 ¹	0.08
Cadmium	mg/L	Maximum	0.01 ¹	0.002

BELYANDO MINE

Site Water Movements and Discharge Points



Regional Water Sample Locations



MINE CONTACTS

Belyando Mine (Wirralie Mines Pty Ltd)

██████████ (Director Wirralie Mines Pty Ltd)

Mob: ██████████

E: ██████████@hotmail.com

Mine Site Address:

Lot 7 on Plan BL36
Mazeppa Park Station
67km north of Clermont

Registered Business Address:

Wirralie Mines Pty Ltd
63 King Street
LISSNER QLD 4820

Landowners

██████████ (Mazeppa Park Station)

Ph: ██████████

Mob: ██████████

E: ██████████@reachnet.com.au

Address:

"Mazeppa" M/S 163
CLERMONT QLD 4721

████████████████████

Ph: ██████████

WATER QUALITY & SEDIMENT SAMPLING LOCATIONS

Environmental Authority monitoring locations

Monitoring point	Northing	Easting
Stock water dam	7535310	0531155
Stock water dam (sediment point)	7555317	531160
Tributary of Mazeppa Ck	7538777	0532119

Additional monitoring locations for on site storages

Monitoring point	Northing	Easting
Pregnant Pond	7535037	530809
Barren Pond	7535005	530835
Stormwater Pond 1	7534940	530841
Stormwater Pond 2	7534993	530892
Diversion Drain	7534918	530798
Main Pit (if accessible)	7535267	530347
Blue Lined Dam	7535061	530877

Additional downstream monitoring locations for receiving environment

Monitoring point	Northing	Easting
Confluence between tributary and Mazeppa Creek		
Mazeppa Creek upstream of confluence	7537978	534265
Mazeppa Creek downstream of confluence		
Mazeppa Creek downstream of Mazeppa National Park		

Central West Region

Environmental Services

Summer Season Preparedness and Response Plan 2010/11



**Department of Environment
and Resource Management**

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Central West ES Mining Waste Water Storage Risk Assessment	Error! Bookmark not defined.
Central West ES Gladstone Waste Water Storage Risk Assessment	Error! Bookmark not defined.
Central West ES Mackay Waste Water Storage Risk Assessment.....	Error! Bookmark not defined.
Central West ES Rockhampton Waste Water Storage Risk Assessment.....	Error! Bookmark not defined.
Appendix 2 - Waste Water Storage Facilities Contacts List	Error! Bookmark not defined.
Gladstone Mining Sites	Error! Bookmark not defined.
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Gladstone Waste Water Sites	Error! Bookmark not defined.
Mackay Waste Water Sites.....	Error! Bookmark not defined.
Appendix 3 - Contact Details of ES Team Members....	Error! Bookmark not defined.
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Appendix 4 - Incident Action Recording Sheet	Error! Bookmark not defined.
Appendix 5 - Environmental Services On-Call system	Error! Bookmark not defined.
Appendix 6 - Example of letter sent to Mining Facilities Pre-inspection.....	Error! Bookmark not defined.
Appendix 7- ES Mining Pre-summer Season Planned Inspection Schedule	Error! Bookmark not defined.

Purpose and Scope

This document is designed to assist the Central West Region identify regulated water storage facilities which pose a risk of potential spillages during a summer season. Secondly, the document aims to identify what type of response is needed should an unauthorised discharge occur in order to best protect any surrounding water courses, population centres and land from pollution.

Background

Mackay averages 942mm, Rockhampton 395mm and Emerald 270mm during the traditional summer wet season (based on data from the BoM website).

The highest recorded rainfall over the last 100 years in January alone has been 2027mm for Mackay, Rockhampton received 807mm and there was 605mm in Emerald (based on data from the BoM website).

Rainfall in the Fitzroy region results in stream flow in several large catchments, including the Comet, Nogoia, MacKenzie, Connors, Isaac and Dawson.

In the Mackay region, catchments include the Pioneer, Whitsunday and Burdekin. The Mackay and Whitsunday region produces higher rainfall figures during this season, and is also prone to flooding events. Unexpected major rainfall events can push storage facility capabilities to their limits, whether they involve industry, population centres or agriculture.

Hence it is necessary to have a two tiered approach to unplanned discharges from storage facilities, to organise some preparatory work which take place before the summer season occurs (called the Preparedness Plan) and then what the department is required to do should there indeed be an unauthorised discharge due to the increased water level during the summer season (called the Response Plan).

Preparedness Plan

Prior to each summer season a priority list of sites is identified that would be of concern to the department should a discharge occur. This includes specific details that would assist the department in determining what pre-emptive action is needed to ensure the site managers are aware of their responsibilities.

The risk posed by waste storage facilities is assessed by consideration of a range of factors including but not limited to:

- The size of the storage and current levels
- The proximity to areas of environmental value such as water courses
- The preparedness plan of the organisation operating the facility
- The potential magnitude of the disaster should there be a discharge
- The ability of the local environment to absorb such discharges

Each site is assessed using a desktop model and categorised, in order of priority. Depending on the outcome, regional staff can then plan inspections deemed necessary to establish the operators' contingency plans in preparation for the summer season. Details of the sites identified are shown in Appendix 1.

Due to the impact of the flooding events of 2008, the department regards mining facilities are at a greater risk of unauthorised discharges, therefore a proactive system of communications is put in place. The owners of the identified sites are sent a letter (Appendix 6) to bring to their attention that their site will be visited by the department in

order to assess their preparedness for the summer season. The departmental representatives then coordinate the following to ensure that the site is fully aware of its responsibilities:

Pre-inspection

Review Environmental Authority (EA), Water Management Plan and the Receiving Environment Management Plan to gain a basic understanding of the water management arrangements on site.

Inspection Focus: Water management

Environmental Services Mining Staff:

- Water storage monitoring locations – water storages associated with release points, as defined in the Environmental Authority, Table W5
- All release points on sites – water levels in associated dams (Regulated dams MRL's), discuss water quality and review available data,
- All water monitoring locations – accessible in summer weather, requirement for stream flow gauges, telemetry systems, automatic samplers
- All receiving waters (upstream and downstream) as defined in the Environmental Authority

Assistance Staff:

- Identify water storages that may have the potential for uncontrolled discharges through the failure to contain water and embankment failure.
- Identify spillway capacity for water storages and determine appropriateness of capacity.

Post Inspection

Environmental Services Mining Staff:

- Develop brief inspection report
- Correspondence to Mines identify areas of concern/outcomes of inspection

Assistance Staff:

- Provision of technical information to facilitate the drafting of a brief inspection report.

Inspection Schedule:

This is determined following the desktop risk assessment, an example of which is shown in Appendix 7.

Response Plan

The aim of the Response Plan is to enable the department to respond with minimum delay and put in place a plan of action to respond to any unplanned discharge from a waste water storage facility within our region

This includes:

- Contact details of site
- Location
- Identification of possible hazards
- Contact details of rostered Environmental Services team members (Appendix 3)

Roles and Responsibilities during the summer season

The roles and responsibilities will depend on the incidents which are scaled up/down depending upon the type of incident. In virtually all cases the relevant Manager is the primary contact; however it may be co-ordinated by the State Incident Response Network member for a major environmental incident.

Central West Region Environmental Services operates a 24 hour, seven day a week on-call system that allows the department to respond to any environmental incident that may occur. The on-call system and responsibilities of the on-call officer are detailed in Appendix 5.

Communications Plan in the event of an incident

The responsibility of communicating any unauthorised discharge lies with a number of stakeholders as detailed below:

Mining Companies

- Responsible to ensure compliance with conditions of the environmental authority relating to notification of release events.

Notification of Release Event

The authority holder must notify the administering authority as soon as practicable (no later than 6 hours of having commenced releasing mine affected water to the receiving environment). Notification must include the submission of written verification to the administering authority of the following information:

- a) release commencement date/time;
- b) expected release cessation date/time;
- c) release point/s;
- d) release volume (estimated);
- e) receiving water/s including the natural flow rate; and
- f) any details (including available data) regarding likely impacts on the receiving water(s).

Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.

The authority holder must notify the administering authority as soon as practicable, (nominally within twenty-four (24) hours after cessation of a release) of the cessation of a release notified under Condition W12 and within 28 days provide the following information in writing:

- a) release cessation date/time;
- b) natural flow volume in receiving water;
- c) volume of water released;

- d) details regarding the compliance of the release with the conditions of Department Interest: Water of this environmental authority (i.e. contamination limits, natural flow, discharge volume);
- e) all in-situ water quality monitoring results; and
- f) any other matters pertinent to the water release event.

Notification of Release Event Exceedance

If the release limits defined in Table W2 are exceeded, the holder of the environmental authority must notify the administering authority within twenty-four (24) hours of receiving the results.

The authority holder must, within twenty-eight (28) days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:

- a) the reason for the release;
- b) the location of the release;
- c) all water quality monitoring results;
- d) any general observations;
- e) all calculations; and
- f) any other matters pertinent to the water release event.

DERM

- The department has developed an interim template for notification of discharges to ensure that information received is consistent.
- The ES Mining team has developed a database to collate the submitted information.
- Regional Manager- Mining is responsible for informing the Fitzroy Water Quality Advisory Group (FWQAG).

Standard Operating Procedure

Proactive Compliance Inspection – B Water

1. Always check that the SOP is current with the latest amendments to the *Environmental Protection Act 1994* (the Act).
2. Always check that the SOP is current with the latest amendments to EcoSteps as procedural guidelines/policies and checklists are often updated without notice.

1.0 OUTLINE

'Water' B level inspections are an assessment of compliance against statutory documents issued/approved by DERM for an activity OR the legislation in general. The assessment will focus on site Water Management Systems to:

- Identify the wet season storage capacity;
- Identify any potential contamination issues;
- Identify the quality of water contained on site;
- Identify contingencies for the wet season.

This SOP provides guidance to DERM staff to assess the environmental compliance for mining projects administered under the Act. The primary objective is to determine whether the mining activities are complying with conditions of the environmental authority and to assess the general level of environmental protection being achieved.

Section 18 of the EP Act includes mining activities as an Environmentally Relevant Activity (ERA). This means it will require an environmental authority under the EP Act and must comply with the relevant environmental authority conditions and in addition to the responsibility of all persons to take all reasonable and practicable measures to minimise the likelihood of environmental harm (general environmental duty).

When assessing a mining operation it is recommended that a site inspection be undertaken in conjunction with a review of the environmental conditions contained within the environmental authority and the current Plan of Operations for the project. The purpose of the plan of operations is to supply information on the relevant mining leases, activities to be undertaken during the period of the plan, provide an action program for implementing the relevant conditions from the environmental authority (EA) and provide a calculation of financial assurance for the total area disturbed during the period of the plan.

During the 'Water' inspections, Project Managers will be required to consider:

- Environmental Authority Conditions;
- Environmental Management Plan Commitments;
- Plan of Operations Action Programs; and
- Water Management Plans.

2.0 ACTIONS

1. Forward the client a letter to notify of the programmed inspection, at a minimum, **3 weeks** prior to the inspection programmed date. Text is saved on EcoSteps/N Drive SOP file. *Note: the project manger should contact the site representative ASAP to advise of the inspection date.*
2. 'Water' B level inspections are focusing on the Department Interest – Water and Regulated Dams components of Environmental Authorities. Project Managers are required to consider the interaction of the EA conditions, EM Plan commitments and PoO action program when conducting inspections. Complete the template 'Form – Compliance Program Audit Plan' and 'Form - Compliance Program Inspection.doc' located within the N Drive SOP file for pre inspection matters. *If sampling will be required, the project manager must consider what sampling equipment/methodology is required, how the samples will be submitted to a laboratory that is NATA accredited for the sampling required and chain of custody requirements.*

3. Undertake field inspection. Complete 'Form - Compliance Program Inspection.doc' during the inspection. Complete an entry in official notebook. Please view the departmental procedural guide 'Use of official note books'.
4. Complete an inspection report and ensure all documents/photo's are saved correctly. Inspection report documentation is located in EcoSteps/N Drive SOP File.
Inspection Report – the following documents need to be completed, compiled into one document and pdf'd in colour:
 - 'Form – Compliance Program Audit Report'
 - 'Checklist – Attach to Audit Report'
 - 'Form – Compliance Program Audit Report – Photo Attachment';
 - 'Form – Compliance Program Audit Report – Document Register';
 - 'Form – Compliance Program Audit Plan'; and
 - 'Form – Compliance Program Inspection'.
5. Forward the client a letter to notify the outcomes of the programmed inspection within **4 weeks** of the inspection being completed.
6. If the inspection has generated enforcement action, proceed with enforcement as per required legislative and procedural guidelines.

3.0 ECOTRACK

All compliance inspections are required to be recorded in EcoTrack. Project managers should follow the departmental procedural guide 'How to record Annual Compliance Plan Inspections in EcoTrack' also see the Central West Region help document 'EcoTrack Proactive Compliance Guide' located within the N Drive SOP file.

Running sheets should be entered for each action undertaken, including:

1. sending the letter to notify of the programmed inspection,
2. undertaking the compliance inspection, and
3. sending correspondence after the programmed inspection.

Any enforcement actions generated from the inspection continue to be entered against the EcoTrack compliance entry.

Ensure the EcoTrack compliance entry is set to finalised at completion of all actions.

4.0 COMPLIANCE PROGRAM REPORTING

The department implements a number of strategies to improve business and industry's environmental performance and promote sustainable development. One of the ways it does this is through a proactive, modern and innovative compliance program.

Programmed compliance inspection numbers are set for each region annually (each financial year) by the Compliance and Investigations Branch. Central West Regions, Environmental Services – Mining section then translates these numbers into a targeted program.

Complete the details for the inspection within the Regional Compliance Program located at N:\Mines\Compliance\2011-12.

A	B	C	D	E	F	G	H	I	J
Mine	Inspection Level/Type	Lead Officer	Support Officer	Proposed Date	Completed	CA	Finalised	Comments	Inspection Program
Gregory Creek	1 July - 30 September	Justin Gagnier	Terrie Neilson	July					2011-12/Mining/PGC/Environmental Services

Enter that the Compliance Action has been finalised and enter any comments you may have regarding the inspection.

Compliance program outputs are regularly reported to management and the government, and include the number of proactive inspections by inspection type, enforcement measures issued and the client expenditure required to comply with those enforcement measures.

5.0 IN THE FIELD

1. Have you got:
 - Water Compliance Inspection Package;
 - lap top;
 - mobile phone,
 - camera,
 - GPS,
 - water sampling equipment;
 - chain of custody documentation;
 - Sampling Manual;
 - official notebook;
 - general notebook
 - caution card,
 - authorised officer/identification card.
2. Have you established a call in procedure with the office?
3. Have you completed the Work Place Health and Safety checklist and are you aware of procedures for operating in remote locations?

6.0 RECORDING DOCUMENTATION/PHOTOS

Documentation

Water Management Plans received prior to the inspection are required to be recorded in Corro and placed on the file.

Any reports receipted while on inspection are required to be recorded in 'Ortex Correspondence Management System' (Corro) and placed on file. Electronic copies of documentation are required to be saved within the electronic file system and a printed copy be recorded in Corro and placed on file. These documents also need to be recorded within the 'Form – Compliance Program Audit Report – Document Register' located on the N Drive SOP File.

Copies of any 'Chain of Custody' documentation are required to be recorded in Corro and placed on file.

Documentation viewed during the inspection is required to be recorded within 'Form – Compliance Program Audit Report – Document Register' and, where possible, photo copies of the cover, contents and critical information attached.

Photos

All photographs must be recorded in the official note book, recording the date, time, place, image number and a brief description of the photo. Do not delete photos on the camera during an inspection. If a photo is blurry, attempt to take the photo again and leave the blurry image in sequence.

Photos should be saved to a CD or DVD without editing the photo or changing the file name as recorded within the camera. All photos are saved on the camera with an individual number and include details of the date and time the photo was taken. The disc needs to then be recorded in Corro and placed on file.

When writing the inspection report, select photo's that demonstrate the matters discussed. Photos are attached to the inspection report within the 'Form - Compliance Program Audit Report - Photo Attachment.doc' located on the N Drive SOP file. An example is provided on how to describe photos.

GPS Tracking

The coordinates for all:

- photo locations; and
- critical water management infrastructure (dams, spillways, valves, release points),

are to be written down and recorded in the official note book for the inspection.

Upon returning to the office, record all locations into a spreadsheet and forward the spreadsheet to the Manager with a Work Request for the GIS unit to develop a map/aerial photograph of the mining lease with all points clearly identified. This is required to be attached to the inspection program.

7.0 ENFORCEMENT

When undertaking an inspection be aware of your rights as an authorised officer. The department has many procedural guides available on EcoSteps detailing the powers of an authorised person and how and when to implement various enforcement measures.

Ensure notes have been made within the official notebook. An official notebook is issued to an authorised person for use for Departmental matters. Official note books are to be used only for the purpose of recording notes about the person's official duties and must not be used to record notes or private matters. An incident that may not seem like a compliance or investigation issue at the time may become an issue at a later date. Authorised persons should, whenever in doubt, record information in the official notebook. For the purpose of accuracy of references and admissibility of the notes as evidence, notes should be made at the time the events being recorded are taking place, or as soon as possible afterwards so that the facts are still fresh in the memory of the person making the notes. For more information regarding the use of official notebooks please see the departmental procedural guide 'Use of Official Note Books'.

When attending an inspection, as an authorised officer, the project manager should be aware of when to issue a caution. For more information please see the departmental procedural guide 'How and When to Issue a Caution'.

Caution

"At this stage I warn you that you are not obliged to answer any more questions or make any statements. Any questions you do answer or any statement you do make will be recorded and may later be given in evidence. Do you clearly understand what I have just said to you?"