Appendix 2: Plan distribution schedule

An electronic copy of the plan has been distributed to the following officers:

Position	Name
Director-General	John Bradley
Associate Director-General, Operations and Environmental Regulator	Terry Wall
Deputy Director-General, Water and Ecosystem Outcomes	Debbie Best
General Manager, Office of the Water Supply Regulator, Environment and Natural Resource Regulation	Bob Reilly
Director, Dam Safety (Water Supply), Office of the Water Supply Regulator, Environment and Natural Resource Regulation	Peter Allen
Director, Recycled and Drinking Water Quality, Office of the Water Supply Regulator, Environment and Natural Resource Regulation	Heather Uwins
neral Manager, Water Quality and Accounting, Water and Ecosystem Outcomes	Graeme Milligan
Director, Water Accounting, Water Quality and Accounting, Water and Ecosystem Outcomes	Greg Long
Assistant-Director General, Corporate Services	Danielle Anderson
General Manager, Client Communications and Information, Corporate Services	Kerry Waters
General Manager, Finance and Asset Management, Corporate Services	Peter Philipson
General Manager, Information and Technology Management, Corporate Services	Howard Dyer
Director, ICT Infrastructure, Information and Technology Management, Corporate Services	Michael Boyle
Director, Executive and Administration Services, Corporate Services	Ken Davis
Manager, Administration, Executive and Administration Services, Corporate Services	Robert Burns
Director, Human Resources, Corporate Services	Dale Himstedt
sistant Director-General, Land and Indigenous Services	Chris Robson
General Manager, Land Management and Use, Land and Indigenous Services	Stephen Walker
Director, Forest Products, Land Management and Use, Land and Indigenous Services	Geoffrey Kent
Manager, Sustainability and Operations Policy, Forest Products, Land Management and Use, Land and Indigenous Services	David Ward
Director, State Land Asset Management, Land Management and Use, Land and Indigenous Services	Greg Coonan
General Manager, Spatial Information, Land and Indigenous Services	Steve Jacoby
Executive Director, Aboriginal and Torres Straight Islander (ATSI) Land Services, Land and Indigenous Services	James McNamara
Director, Data Management and Acquisition, Spatial Information, Land and Indigenous Services	Peter Lennon
Assistant Director-General, Office of Climate Change	Greg Withers
Director, Climate Change and Coastal Impacts, Office of Climate Change	David Robinson
Assistant Director-General, Regional Service Delivery	Damien Brown

Position	Name
Regional Services Director, Central West Region, Regional Service Delivery	Joe Pappalardo
Regional Services Director, North Region, Regional Service Delivery	Andrew Buckley
Regional Services Director, South East Region, Regional Service Delivery	Randall Hart
Regional Services Director, South West Region, Regional Service Delivery	Mike Birchley
Assistant Director-General, Queensland Parks and Wildlife Service	Andrea Leverington
Senior Director, Conservation, Strategy and Planning, Queensland Parks and Wildlife Service	Clive Cook
Senior Director, Terrestrial Parks, Queensland Parks and Wildlife Service	Annie Moody
Senior Director, Marine Parks, Queensland Parks and Wildlife Service	Terry Harper
Assistant Director-General, Environment and Natural Resource Regulation	Dean Ellwood
nior Director, Technical Operations,, Environment and Natural Resource Regulation	Dr Ian Wilson
Chief Advisor, Incident Management, Technical Operations, Environment and Natural Resource Regulation	Michael Short
Principal Advisor, Incident Management, Technical Operations, Environment and Natural Resource Regulation	Gary Kane
Principal Advisor, Incident Management, Technical Operations, Environment and Natural Resource Regulation	Nigel Holmes
Assistant Director-General, Environment and Resource Sciences	Dr Christine Williams
Director, Water Quality and Aquatic Ecosystem Health, Environment and Resource Sciences	Dr Julia Playford
Director, Water Planning Sciences, Environment and Resource Sciences	John Ruffini
Executive Director, Wet Tropics Management Authority, Queensland Parks and Wildlife Service	Andrew Maclean

Appendix 3: Version history

Version	Date	Comments
1 Draft	11 November 2009	Circulated for consultation
1 Final draft	16 December 2009	Draft for plan test exercise in early 2010
1 Updated final draft	18 March 2010	Minor edits and updates
1 Updated final draft	29 September 2010	Updated distribution schedule following restructure
1 Updated final draft	6 December 2010	- Inclusion of a Disaster Management Risk Register - Update DDMG Governance arrangements in line with DDMG Governance Guidelines

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DERM-07

CTS No. ~~20897/10~~ 21121/10.

Department of Environment and Resource Management
EMG BRIEFING NOTE

Meeting No: Agenda Item No: Date:
SECRETARIAT USE ONLY
Approved Not Approved Noted
EMG ..... Dated / /

TO: **The Executive Management Group**

SUBJECT: **Disaster preparedness**

TIMEFRAME

- Noting of this briefing note is not urgent.

RECOMMENDATION

It is recommended that the EMG:

- **note** the attached departmental Disaster Management Plan (Attachment 1).
- **note** the role of the Associate Director-General as the DERM Disaster Management Coordinator.
- **note** that each EMG member is responsible for ensuring that appropriate senior staff are rostered or placed "on-call" over the Christmas and New Year period and throughout the school holidays.
- **note** the overview of preparedness for the 5 identified Summer Issues (Attachment 2).

BACKGROUND

- The Premier has requested a review of department's disaster preparedness and business continuity plans, given the summer weather predictions.
- The department has provided the Department of the Premier and Cabinet with a list of 5 summer issues where DERM will have involvement (Attachment 3).
- A brief has also been prepared for the Minister at her request to review our preparedness for the summer season.

CURRENT ISSUES

- There are a number of reasonably likely weather events coming this summer involving cyclones and storms/flooding.
- This department has been asked to review its preparedness for those events.

RESOURCE/IMPLEMENTATION IMPLICATIONS

- There are no significant short term or ongoing resource costs in the preparedness phase.

ATTACHMENTS

- Attachment 1 – DERM Disaster Management Plan
- Attachment 2 – DERM Summer Issues – Overview
- Attachment 3 – DERM Summer Issues – as provided to DPC

Author	Cleared by	Cleared by	Recommended:
Name: Ken Davis Position:Director EAS Tel No: [redacted] Date:11/11/10	Name: Position: Tel No:	Name: Position: Tel No:	Name: Danielle Anderson Position: ADG CS Tel No: [redacted] Date: 18/11/10
	Name: Position: Tel No:	Name: Position: Tel No:	

File Ref:

Department of Environment
and Resource Management

Departmental Disaster Management Plan

Queensland Government

ATTACHMENT 2

SUMMER ISSUES

1. **Unauthorised discharges of contaminated/poor quality water from mines and other regulated water storages such as sewage treatment plants.**

The department has a 24 hour hotline managed by Regional Service Delivery where incidents of this nature are reported. The Regional Services Directors in each region have staff rostered on to respond to emergency calls to the hotline 24 hours a day / 7 days a week.

The department has protocols in place to notify the Assistant Director-General Regional Service Delivery, the Director-General, the Ministers and the department's Media Unit of environmental incidents via an incident alert system.

The department has also developed Response Plans for high risk sites across Central West and North areas of the state to ensure a rapid and coordinated response to large scale incidents. The response plans complement the existing protocols for notification of environmental incidents and specifically deal with the short-term immediate response to the incident and detail specific actions for regional staff (for example, mobilisation of field staff, notification of land holders, media, collection of evidence, etc).

In the event of a major event, the department's Incident Response Unit (Environment and Natural Resource Regulation) will also engage in a coordination role and provide assistance if required.

Through these systems the department has the capability to respond to emergent environmental events 24 hours a day, 7 days a week.

2. **Significant damage to national parks and the need to evacuate campers.**

The Queensland Parks and Wildlife Service (QPWS) has a procedural guide for closure and evacuation of QPWS managed areas.

The chief executive can close a park if it is necessary for public health and safety, and people can be evacuated from the affected area. This power has been delegated to Senior Rangers which enables action at local level. Any closure of QPWS estate that is due to increased risk must be reported to the respective Regional Manager who in turn reports it up to General Manager and Assistant Director-General QPWS.

Where a significant risk or disaster has required closure and evacuation, the department will form an appropriate incident management team using AIIM's principles and an officer will be nominated to assume the role of Incident Controller. DERM uses the structural and procedural templates of the Australian Inter-service Incident Management System (AIIMS) in incident and disaster management.

Where the closure is as a result of a disaster the Departmental Disaster Management Plan is followed. The plan is also followed when it is necessary to evacuate people from an area.

All QPWS regions have current response plans for incidents and all have received advice that the coming summer season has great potential for serious weather related incidents.

3. Significant downstream flooding in South-East Queensland.

The Chief Executive Officer of the South-East Queensland Water Grid Manager has carriage of the incident response protocol for communication of flood information for releases from Wivenhoe and Somerset Dams.

Regional Service Delivery will assist with the statewide incident response as requested.

4. Failure of dams resulting in major downstream flooding. Potentially significant property damage and loss of life. In addition, loss of water supply from the failed dams.

Description of Risk

Extreme rainfall events can produce floods greater than those that can be safely handled by dams and this can result in dam failure. The risk is aggravated if the dam storage is full at the start of the event and its catchments are already very wet.

The failure of a dam can result in major downstream flooding which can have the potential to result in significant property damage and possible loss of life that may be in the flood path of the dam.

In addition, to the above potential issues, the failure of a water supply dam will result in the loss of water supply which may not be able to be replaced quickly. This could result in severe water restrictions in affected communities.

Mitigation Strategies

The Queensland Government has a long-term strategy to ensure that large water supply dams which have a population at risk fully meet safety standards. Such dams are regulated as 'referable' dams under the provisions of the *Water Supply (Safety and Reliability) Act 2008*.

The likelihood of a large referable dam failing is extremely low as these dams are designed to safely handle extreme flood events (for example those that occur on average once in every 10,000 years or even rarer).

Referable dams have dam safety conditions applied to them to ensure that the dam owner establishes and maintains an appropriate dam safety management program to manage the safety of their dam. Compliance with these conditions is periodically audited and the integrity of the dam is assessed through dam safety reviews and inspection programs. Such programs are designed to ensure, for instance, that the spillways can adequately cope for exceptional flood levels. Where necessary, dam owners are required to upgrade dam spillways to meet current standards.

In addition to this, the Department of Environment and Resource Management has been undertaking a project to identify large farms dams that may have a population at risk. When such dams are identified, the department requires their owners to undertake a failure impact study to confirm they are referable and then dam safety conditions are applied.

One mitigation measure is to ensure that dam owners have emergency action plans in place. These plans identify the communities at risk if the dam should fail, and the emergency response arrangements to link in with downstream flood plans and enable the evacuation of those people at risk.

In the event of a flood which has the potential to cause the failure of a dam these plans are implemented and the Queensland dam safety regulator (Office of the Water Supply Regulator - OWSR) and Emergency Management Queensland (EMQ) would be immediately notified by the dam owner.

OWSR would inform the Director-General and through him, Minister for Natural Resources, Mines and Energy and Minister for Trade. EMQ would activate appropriate disaster management arrangements, including evacuation of people when necessary.

The OWSR is currently requesting all dam owners to provide assurance by 30 November 2010, that they have current emergency action plans. It is anticipated that this information will be available by early December. If a dam owner does not provide the required information, compliance action will be taken.

The potential risk of a loss of drinking water supply has been reduced in the South East Queensland (SEQ) area due to the Government's introduction of the SEQ water grid. The Water Grid manager can reallocate water from a number of sources to meet supply needs. Options for other areas in the State would need to be considered if this situation arose.

Remaining Risk

While the risk of dam failure is low due to the current strategies in place, a risk still exists.

Recent dam failures have resulted in loss of life to people who were swimming down stream of the dam. These instances are difficult to monitor as these people often do not live in the vicinity of the dam and would not be covered under emergency action plans.

Whilst signs may be able to be erected by the relevant local government or dam owner at popular swimming areas, this will not cover all areas that people might swim at.

Key Communication Messages

Dam owners are responsible for the safety of their dams. The State Government undertakes a regulatory role in ensuring dam owners have the appropriate safe guards in place.

Local governments and dam owners should provide information to the community of the risks associated in swimming in storages and rivers in potential flood conditions.

5. **Environmental damage including wildlife and possible risks to human health.**

The 1300 130 372 environmental incident notification system operates 24/7.

Staff supporting this system use specific Procedural Guides that determine the incident category and associated response activations.

Activation of personnel and response resources can be state-wide and are often across a range of divisions. Systems are in place to support this.

The Incident Response Unit takes a lead role during Major incident types and provides technical support for Medium scale incidents. Regions typically deal with minor incidents independently.

Incidents can often escalate to multi agency type responses. Plans and MOUs are in place that detail these working relationships clearly identifying the roles of each agency involved.

CONFIDENTIAL

SUMMER ISSUES (TEMPLATE)

DEPARTMENT OF ENVIRONMENT AND RESOURCE MANAGEMENT

If assistance is required to complete this template, please contact Fran Parker or Kerry Wilson in the Performance and Delivery Office.
Fran Parker - telephone 323 71042/Kerry Wilson 322 58046 or email pm@premiers.qld.gov.au

Summer Issues

Please provide details of Summer Issues **by 29 October 2010** to pm@premiers.qld.gov.au
The following table should list the key operational risks that could arise over the period. The list should concentrate on those issues that are either (i) highly likely to occur over the period or (ii) potentially of significant impact to the Government's business or community safety. Once complete, the schedule should be endorsed by the Minister's Office and signed off by the Director-General.

Issue	Likelihood	Impact	Nature of Impact	Mitigation and Response	Contact
Significant natural disaster/major hazard such as cyclone and/or flood or severe storm	Medium/High	Medium/High	Potential for: • unauthorised discharges of contaminated/poor quality water from mines and other regulated water storages such as sewage treatment plants	Statewide incident response planning in place.	Name: Damien Brown Position: Assistant DG, Regional Service Delivery Work phone: [redacted] Mobile phone: [redacted] Email: [redacted]
Significant natural disaster/major hazard such as cyclone and/or flood or severe storm	Medium/High	Medium/High	• significant damage to national parks, and need to evacuate campers	Statewide incident response planning in place.	Name: Andrea Leverington Position: assistant DG, Queensland Parks and wildlife Service Work phone: [redacted] Mobile phone: [redacted] Email: [redacted]
Significant natural disaster/major hazard such as cyclone and/or flood or severe storm	Medium/High	Medium/High	• significant downstream flooding in South East Queensland	Statewide incident response planning in place. SEQ incident response protocol planning in place for communication of flood information for releases from Wivenhoe and Somerset Dams in place.	Name: Barry Dennien Chief Executive Officer SE Qld Water Grid Manager Work Phone: [redacted] Mobile Phone: [redacted] Email: [redacted]
Flood preparedness of Queensland's large	Low	High	• Failure of dams resulting in major downstream flooding. Potentially significant property damage and loss of life. In addition, loss of	Queensland Government has a long-term strategy to progressively upgrade large water supply dams so that they fully meet safety standards.	Peter Allen, Director, Dam Safety Work phone: [redacted]

water supply dams			water supply from the failed dams. NB: the likelihood of a dam failing is extremely low as these dams are designed to safely handle very rare flood events (for example those that occur on average once in every 10,000 years).	The short-term mitigation measure is to ensure that dam owners have in place emergency action plans that contain the communities at risk if the dam should fail, and the emergency response arrangements to enable the evacuation of those people at risk. In the event of a flood which has the potential to cause the failure of a dam, the Queensland dam safety regulator (Office of the Water Supply Regulator - OWSR) and Emergency Management Queensland (EMQ) would be immediately notified by the dam owner. OWSR would inform the Director-General and through him, Minister Robertson. EMQ would activate appropriate disaster management arrangements, including evacuation of people.	Mobile phone: [redacted] Email: [redacted] Dean Ellwood Assistant DG, Environment and Natural Resource Regulation Work phone: [redacted] Mobile: [redacted] Email: [redacted]
Non-natural disasters (eg. ship groundings, major chemical/oil spills)	Medium	High/Medium	• Environmental damage including wildlife and possible risks to human health	Activate the state wide incident response network with 2 people on call at all times.	Mike Short Chief Advisor, Incident Management Work phone: [redacted] Mobile: [redacted] Email: [redacted] Dean Ellwood Assistant DG, Environment and Natural Resource Regulation Work phone: [redacted] Mobile: [redacted] Email: [redacted]

'DERM-08'

Department of Environment and Resource Management

DS 5.1 Flood mitigation manual for a dam

WIR/2009/3991 – Version 1

Endorsed 28/10/2010
by Peter Allen, Director, Dam Safety (Water Supply), Office of the Water Supply Regulator

Queensland Government

Queensland Government

Table of Contents

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Version History

Version	Date	Comment
1	28/10/2010	Original Approval

Queensland Government

Purpose

To provide a framework for assessing a flood mitigation manual for a dam required by the chief executive under Chapter 4, Part 2 of the *Water Supply (Safety and Reliability) Act 2008* (the Act). This section of the Act provides the chief executive with the power to approve, by gazette notice, a flood mitigation manual for a dam.

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Rationale

Under s. 370 of the Act owners of dams prescribed by regulation under s. 370 must prepare a flood mitigation manual for their dams for approval by the chief executive.

The Explanatory Note to the Water Supply (Safety and Reliability) Bill (at page 122) states:

"A dam nominated in the regulation will be a dam which was constructed for the purpose of flood mitigation. A flood mitigation manual ensures that such dams make controlled releases of water for flood mitigation purposes in accordance with pre-agreed conditions."

At the time of writing, no regulation under s. 370 had been made. There are however existing manuals for three dams approved under the former Water Act 2000 that are taken to be manuals approved under s. 371 by force of the transitional provisions set out in s.613. The three dams are Wivenhoe, Somerset and North Pine. The most recent approval dates for each of these dams are:

- North Pine Dam, gazetted on 28 September 2007;
- Wivenhoe and Somerset Dams (approval for one manual for both dams), gazetted on 22 January 2010.

The chief executive may also require the dam owner to amend the flood mitigation manual by a notice (s. 372 of the Act). The dam owner must provide the chief executive with a copy of the flood mitigation manual for approval. The chief executive may also get advice from an advisory council before approving the manual. At the time of writing no advisory councils were in existence.

Before an approval for the flood mitigation manual for a dam expires, the owner of the dam must review and if needed update the manual (s. 373). The dam owner must then provide the chief executive with a copy of the updated flood mitigation manual for approval under s. 371 of the Act. This work procedure currently only has application to this review and further approval process for the three dams listed above.

An owner of a dam who observes the operational procedures in a flood mitigation manual, approved by the chief executive, does not incur civil liability for an act done, or omission made, honestly and without negligence in observing the procedures in the manual (s. 374).

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Procedure

This work practice is set out below.

A flow chart for this work practice can be found in Attachment A <attachments/ds5-1-fmm-flowchart-a.pdf> .

Note: any reference in this work practice to a flood mitigation manual may also be a reference to an amended flood mitigation manual received under ss. 372 or 373 of the Act.

Step 1 - Receiving a flood mitigation manual

Upon receiving the flood mitigation manual (or amended flood mitigation manual) the project officer:

- Stamps the covering letter (or a copy of the front page and contents page of the manual if there was no covering letter) with the Document received by DERM stamp
- Scans the document (or copy created above) and records details in Keeper on the flood mitigation manual file for the dam and fills in the relevant sections of the Document received stamp in accordance with local office processes and departmental standards
- Updates WICD–RDR
- Prepares an acknowledgement letter to the dam owner that the flood mitigation manual has been received and is being assessed. Refer to Attachment B <attachments/ds5-1-fmm-ack-let-b.pdf> for a template for an acknowledgement letter (A template for this letter is available in G:\WIR\Dam_Safety\Templates).
- Gives all documents and the file (if required) to the decision maker.

The decision maker:

- Checks and signs the letter confirming receipt of the manual. If changes are necessary to the draft letter confirming receipt of the manual, the decision maker should make the changes and return the letter to the Project Officer for updating prior to signing.
- Allocates an action officer to process the manual (the decision maker may also be the action officer)
- Gives the signed letter, the manual and the file to the project officer.

The project officer:

- Copies and sends the signed letter.
- Scans the signed letter and registers the letter in Keeper in accordance with local office processes and relevant departmental standards.
- Places the copy of the signed letter on the file relating to the flood mitigation dam.
- Updates WICD–RDR with appropriate information.
- Gives the manual and file to the action officer.

Proceed to Step 2

Step 2 - Action officer conducts an assessment of the flood mitigation manual

The action officer:

- Conducts a detailed assessment of the flood mitigation manual. Action officers are expected to conduct the detailed assessment having regard to the matters outlined in any relevant guidelines and the Flood Mitigation Manual (FMM) Assessment and Decision Form and the notes in that form (see Attachment C <attachments/ds5-1-fmm-a-d-form-c.pdf> . A template for this form is available in G:\WIR\Dam_Safety\Templates).

- Completes the FMM Assessment and Decision Form as the assessment occurs.

The purpose of the checklist in the FMM Assessment and Decision Form is to assist the action officer to determine whether the flood mitigation manual complies with the Act and any relevant guidelines and to enable the action officer to make a recommendation on whether the flood mitigation manual should be approved. However, action officers should note that the checklist in the FMM Assessment and Decision Form is not intended to be relied upon by action officers as an exact statement of the Act and any guidelines and it is essential that action officers regularly refer to the full text of those documents to determine the precise details of these requirements.

Discussions with dam owners and other stakeholders may be undertaken to refine the content of the manual and to ensure that the flood mitigation manual is adequate for its required purpose. See step 3.

In completing the FMM Assessment and Decision Form the action officer:

- Records on the FMM Assessment Checklist whether the manual complies with the Act and any guidelines
- Includes appropriate comments in the FMM Assessment Checklist about individual items (in the comments column for the appropriate item/s). Note: if the action officer believes additional information or clarification of information is required proceed to step 3 prior to completing this step.
- Completes the 'Action officer's recommendation to decision maker' part of the FMM Assessment and Decision Form, including all items that are relevant to the recommendation/s made.
- Gives the FMM Assessment and Decision Form, the manual and the file to the decision maker.

Action officers should be aware that the information and documents referred to in the FMM Assessment and Decision Form and kept and retained in Keeper and on departmental file/s may later need to be made available to the decision maker, or other people, for independent consideration or inspection.

Proceed to Step 4.

Step 3 - Request further information

In some situations the action officer may need to communicate with the owner of the dam, or other people, to clarify certain issues for the assessment of the flood mitigation manual. **Accurate and written records of any communications, including verbal communications, must be kept and retained in Keeper and on the relevant Departmental file.** These records should indicate who was contacted or consulted about particular issues, when this occurred and the advice that was given. It may also be appropriate for the action officer to make some reference to these communications in the FMM assessment and decision form itself (for example, in the comments column for the appropriate item/s in the flood mitigation checklist).

Action officers should be aware that the information and documents referred to in the FMM assessment and decision form and kept on departmental file/s may later need to be made available to the decision maker, or other people, for independent consideration or inspection.

A suggested format for a letter requiring further information can be found at Attachment D <attachments/ds5-1-fmm-req-info-d.pdf> . A template for this letter is available in G:\WIR\Dam_Safety\Templates.

The letter requiring further information must:

- Be prepared on the basis of the information contained in the FMM assessment and decision form (see step 2); and
- Be sent to the owner of the dam.

If the department does not receive any information from the dam owner in response to the request for further

information, the action officer must discuss appropriate action to take with the decision maker.

Return to step 2 when requested information is received.

Step 4 - Decision maker makes decision about flood mitigation manual

The decision maker:

- Considers the flood mitigation manual and the recommendation made by the action officer.
- Decides what action should be taken in relation to the manual. Decision makers are expected to assess the appropriate action to take having regard to the matters outlined in the FMM Assessment and Decision Form and the notes to that form (Attachment C <attachments/ds5-1-fmm-a-d-form-c.pdf>).
- Completes the 'Decision maker's decision' part of the FMM Assessment and Decision Form.
- Gives the completed FMM Assessment and Decision Form, the manual and the file to the action officer.

Depending on the situation, available options for the decision maker may be to:

- Not approve the manual because it does not meet the expected requirements for approval. *Go to Step 5.*
- Approve the manual – *Go to Step 7.*
- Require more information from the dam owner – *Go to Step 3.*
- Require a more detailed assessment of the FMM by the action officer – *Go to Step 2.*

If the decision maker decides more information is required from the dam owner, they should indicate this on the Assessment Checklist and return all documentation to the action officer who will *return to step 2.*

Step 5 - Action officer prepares letter rejecting flood mitigation manual

Note: This step should only be taken if the action officer/decision maker has been unable to get appropriate changes made by the dam owner to the manual to make it suitable for approval. It is very unlikely that this would occur as it is in the best interests of the dam owner to have an approved flood mitigation manual as the dam owner is then indemnified against civil liability for an act done, or omission made, honestly and without negligence when observing the procedures in the manual.

Action officer receives the decision to not approve the manual from the decision maker and prepares a draft letter (including yellow file copy) advising of non-approval of the flood mitigation manual. See Attachment E <attachments/ds5-1-fmm-reject-let-e.pdf> for a template. A template for this letter is available in G:\WIR\Dam_Safety\Templates

Action officer gives the draft letter to the decision maker who either signs the letter or requests changes to be made.

Once the decision maker has signed the letter the action officer sends the letter to the dam owner.

If an amended flood mitigation manual is received from the dam owner *return to step 1.*

If a dam owner chooses not to prepare an amended manual they will no longer be indemnified against civil liability under the Act once the approval period has expired for the current approved manual, however, it is not an offence to not have a flood mitigation manual and no further action should be taken if they choose to not submit another manual. *Go to step 8.*

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Step 6 - Action officer prepares gazette notice

Action officer receives the decision to approve the manual from the decision maker and prepares a notice of draft gazette notice and memo for the Executive Council Team (Cabinet and Parliamentary Services, DERM).

The gazette notice should state the following:

- The notice number and year
- The name of the dam to which the flood mitigation manual applies
- The number of years for which the manual is approved. Where the manual is an amendment required by the chief executive the approval may be for the balance of the original five years or for a period of not more than 5 years as per the normal approval of a manual.

Note: see Attachment F <attachments/ds5-1-fmm-gaz-notice-f.pdf> for a draft template of the gazette notice. See Attachment G <attachments/ds5-1-fmm-gaz-memo-g.pdf> for the covering memo to the executive council team. A template for these documents is available in G:\WIR\Dam_Safety\Templates

Once the notice and memo has been prepared it must be signed off by the Director, Dam Safety (Water Supply) (or a higher position) and sent to the Senior Project Officer, Executive Council, Cabinet and Parliamentary Services with a covering briefing note. The electronic version of the gazette notice must also be sent by email. The executive council team will arrange for publication of the notice in the gazette and will advise the action officer by email of the publishing of the notice (a copy of the published notice is usually included in the email). *Go to step 7 when gazettal has taken place.*

Step 7 - Letter sent to dam owner advising of approval of manual

The action officer prepares draft letter (including yellow file copy) to dam owner advising of approval of the manual and enclosing a copy of the gazette notice. See Attachment H <attachments/ds5-1-fmm-app-let-h.pdf> for a template. A template for this letter is available in G:\WIR\Dam_Safety\Templates.

Action officer gives the draft letter and copy of the gazette notice to the decision maker for signing.

Once the letter has been signed by the decision maker the project officer sends the letter and gazette notice to the dam owner.

Go to step 8.

Step 8 - Action officer takes appropriate action with respect to RDR, the file and departmental records

The action officer:

- conducts a final check to ensure all relevant data has been entered into WICD–RDR.
- checks the completed FMM Assessment and Decision Form has been signed by the action officer and decision maker, and that this form and all other documents created or received during the course of this work practice have been placed on the appropriate departmental file/s.
- returns the departmental file to the project officer who will check that all relevant documents have been registered in Keeper. If not, the project officer will register the documents in Keeper in accordance with local office processes and relevant departmental standards.

Queensland Government

The assessment of a flood mitigation manual is complete.

Queensland Government

Responsibilities

The dam owner must give the chief executive a copy of the flood mitigation manual for the dam for the chief executive's approval.

Section 371 of the *Water Supply (Safety and Reliability) Act 2008* gives the chief executive the power to approve the flood mitigation manual for a dam.

At the time of writing, the *Water Supply (Chief Executive) Delegation (No. 1) 2010* was in force. Under that instrument of delegation, the powers of the chief executive relating to flood mitigation manuals for dams under the Act were delegated to the following positions:

- Director, Dam Safety (Water Supply), Office of the Water Supply Regulator;
- Director, Water Industry Asset Management and Standards, Office of the Water Supply Regulator;
- General Manager, Office of the Water Supply Regulator.

Decision makers must ensure that they have, at the time of making their decision, a current delegation allowing them to make their decision. This is important as instruments of delegation can be revoked and replaced from time to time.

Queensland Government

Definitions

"the Act" – means the *Water Supply (Safety and Reliability) Act 2008*

"chief executive" – means the Director-General, Department of Environment and Resource Management

"dam" –

1. *Dam* means–
   - Works that include a barrier, whether permanent or temporary, that does or could impound water; and
   - The storage area created by the works.

2. The term includes an embankment or other structure that controls the flow of water and is incidental to works mentioned in paragraph (1) above.
3. The term does not include the following:
   - A rainwater tank;
   - A water tank constructed of steel or concrete or a combination of steel and concrete;
   - A water tank constructed of fibreglass, plastic or similar material.

"decision maker" – the person making the decision on whether to approve or request a change to a flood mitigation manual for a dam, under this work practice.

"flood mitigation manual" – means a manual prepared under s. 370, or amended under ss. 372-373, and approved under s. 371 or s. 372 of the Act.

"manual" – means a flood mitigation manual

"reasonable belief" – a reasonable belief does not have to be one that is completely without doubt, but it must also not rely on mere speculation, suspicion, guesses or assumptions that have been made without any foundation.

A reasonable belief is, generally, a belief based on information:

- reasonably believed to be reliable and accurate; and
- available to the decision maker.

"referable dam" – is a dam, or a proposed dam after its construction, for which –

- A failure impact assessment is required to be carried out under the Act; and
- The assessment states the dam has, or the proposed dam after its construction will have, a category 1 or 2 failure impact rating; and
- The chief executive has, under s. 349, accepted the assessment.

The term does not include –

- A hazardous waste dam;
- A weir, unless the weir has a variable flow control structure on the crest of the weir.

"registered professional engineer" – means a registered professional engineer, a registered professional engineering company or a registered professional engineering unit as defined under the *Professional Engineers Act 2002.*

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References

The following documents should be referenced in conjunction with this work practice:-

- *Water Supply (Safety and Reliability) Act 2008*
- *Water Supply (Chief Executive) Delegation (No. 1) 2010*
- Queensland dam safety management guidelines
- Acceptable flood capacity for dams guidelines
- Failure impact assessment guidelines

Officers involved in this work practice should also be familiar with, and comply with, requirements of the following departmental standards:

- Departmental policy RKP/2006/2907 – Recordkeeping overarching policy
- Departmental policy RKP/2006/2899 – Recordkeeping email policy
- Departmental standard IMP/2005/2253 – Procedures for using electronic mail
- Departmental standard ADM/2005/941 – Paper-based document management
- Departmental standard ADM/2002/965 – Decision making and requests for statements of reasons under the *Judicial Review Act 1991*
- Departmental standard ADM/2003/1402 – Information privacy.

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Legislation

Water Supply (Safety and Reliability) Act 2008

Queensland Government

Attachments

Attachment A - Flowchart <attachments/ds5-1-fmm-flowchart-a.pdf>

Attachment B - Acknowledgement letter <attachments/ds5-1-fmm-ack-let-b.pdf>

Attachment C - Assessment and decision form <attachments/ds5-1-fmm-a-d-form-c.pdf>

Attachment D - Request for information letter <attachments/ds5-1-fmm-req-info-d.pdf>

Attachment E - Reject flood mitigation manual letter <attachments/ds5-1-fmm-reject-let-e.pdf>

Attachment F - Gazette notice <attachments/ds5-1-fmm-gaz-notice-f.pdf>

Attachment G - Covering memo for gazette notice <attachments/ds5-1-fmm-gaz-memo-g.pdf>

Attachment H - Approval of flood mitigation manual letter <attachments/ds5-1-fmm-app-let-h.pdf>

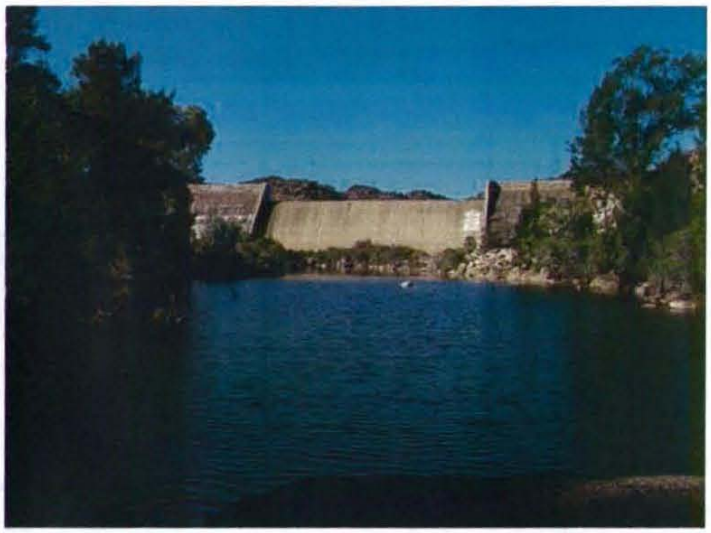
DERM-09

epartment of Environment
and Resource Management

EMERGENCY ACTION PLAN

Copperfield River Gorge Dam

Revision 5, May 2010



Queensland Government

Prepared by:
Non-Commercial Assets
Department of Environment and Resource Management

May 2010

PREPARATION AND AUTHORISATION

This Emergency Action Plan was prepared by Principal Engineer, Non-Commercial Assets.

Preparation:

_____ Date:___/___/_____

Principal Engineer, Non-Commercial Assets

Approval:

_____ Date:___/___/_____

Regional Manager, Water Services, Central West Region

Revision Status

Revision No.	Date	Revision Description
0	November 2005	Interim Issue
1	February 2007	Contacts list updated and documentation revision
2	September 2007	Contacts list updated
3	March 2008	Contacts list updated
4	October 2009	Contacts list updated and documentation revision
5	May 2010	Contacts list updated and documentation revision

CONTENTS PAGE

1.0 INTRODUCTION

Copperfield Dam is a Roller Compacted Concrete (RCC) dam that was built in 1984. It is located on the Copperfield River approximately 280 kilometres south-west of Cairns; the nearest town is Einasleigh, which is about 42 kilometres north of the dam.

The Dam is operated by the Department of Environment and Resource Management. Water is supplied under agreement to Barrick Gold Pty Ltd for their operations at Kidston. A 33 kilometre pipeline runs north from the dam to supply Kidston Mine and the accommodation centre at Oaks Rush. The pipeline is gravity feed, and there are offtakes that supply Rycon Station, 4 residences in Kidston township, and numerous stock watering points.

The Oaks Homestead, residences in Kidston township and Rycon Homestead will be inundated if there is a Sunny Day, Dam Crest Flood or Probable Maximum Flood Failure of the Dam.

2.0 CONTROLLED COPY DISTRIBUTION LIST

Copy Number	Position	Location
1	Emergency Action Plan Officer	Rycon Station via Kidston
2	Emergency Action Plan Backup 1	The Oaks Station via Kidston
3	Emergency Action Plan Backup 2	Rycon Station via Kidston
4	Principal Engineer, Non-Commercial Assets	Rockhampton
5	Regional Services Director, DERM, North Region	Townsville
6	Regional Manager, Water Services, North Region	Cairns
7	Regional Manager, Water Services, Central West Region	Rockhampton
8	Director, Dam Safety	Brisbane
9	Officer In Charge, Police	Georgetown
10	Disaster District Coordinator	Mareeba
11	Executive Officer, Local Disaster Management Group, (CEO)	Etheridge Shire Council
12	Director, Disaster Operations, Emergency Management Queensland	Brisbane
13	Regional Director, Far Northern Region, Emergency Management Queensland	Cairns
14	Officer In Charge, Police	Forsayth

2.0 NOTIFICATION LIST

Title/Name	Phone Business	Phone A/H	Phone Mobile	Fax
EAP Officers UHF radio channel 1 EAP Officer (Richard Fielder) EAP Backup 1 (Owen Campbell) EAP Backup 2 (Carol Fielder)	[redacted]			
Regional Management Regional Service Director Central West Region (Joe Pappalardo) Regional Service Director North Region (to be advised) Regional Manager, Water Services Central West Region (Ed Donohue) Regional Manager, Water Services North Region (Nigel Kelly) Regional Manager, Environmental Services North (Rob Lawrence Principal Engineer, Non-Commercial Assets (Bill Steen)	[redacted]			
Dam Safety Group Director Dam Safety (Peter Allen) Principal Engineer Dam Safety (Ron Guppy) EAP Engineer (Andrew Schelberg)	[redacted]			

NOTIFICATION LIST (continued)

TITLE/NAME	Phone Business	Phone A/H	Phone Mobile	Fax
Counter Disaster Groups Regional Director, Far Northern Region, Emergency Management Queensland (Wayne Coutts) Executive Officer, Local Disaster Management Group CEO Etheridge Shire (Les Edmistone) Emergency Management Queensland Watch Desk Officer Chemical Hazards Emergency Management Services Scientific Unit Queensland Fire and Rescue Services Chemical Hazards Unit	[redacted]			
Police Police Forsyth Officer In Charge (In an emergency 000) Police Mareeba Officer In Charge (Snr Sergeant Richard Kroon) (In an emergency 000) Disaster District Coordinator (District Inspector Rolf Stratamier)				
Landowners Richard & Carol Fielder Rycon Homestead Owen Campbell The Oaks Homestead Richard & Carol Fielder Residence in Kidston Cindy Hapgood & Damien Farrell Residence in Kidston Paul Bond Residence in Kidston	[redacted]			

3.0 EMERGENCY EVENTS AND ACTIONS

The maximum storage height on record is 589.72m in 2002. Any overflow events that do not reach this level are regarded as small to medium events. The procedures to be followed for these events are outlined in Standing Operating Procedures for Small to Medium Spillway Overflows (SOP 14). A copy of this procedure is included as Appendix 9.

The following events are defined as emergency events:

- Major Overflow Event - Reservoir level approaching EL 590 and heavy rainfall continuing in the catchment.
- Sunny Day Failure or Earthquake, Tremor or Landslide into the storage
- Increase in seepage, not due to storage rise , and/or additional cracking or increased crack widths in dam wall.
- Toxic spill within storage/catchment.

The actions that are to be undertaken by the EAP Officer in each emergency event are described in the following sections of this chapter. The EAP Officer may assign EAP Backup 1 and/or 2 or other EAP officers to assist him undertake these actions.

The Dam is likely to be inaccessible by road after rainfall because of local stream rises. The EAP Officer is then reliant on the telemetry to the height gauge at the left abutment in order to report on flooding. During a heavy rainfall event the height gauge and the rain gauge at the EAP Officers residence should be read at one-hour intervals until the storage height reaches 589.72m which is the maximum on record in 2002. The height gauge and the rain gauge should be read at half hourly intervals if the storage height increases.

3.1 EVENT 1

Reservoir level approaching the Dam height gauge 590.0 and heavy rainfall continuing in the catchment.

The EAP Officer shall:

- If safe access to the Dam is possible, check for new cracking or increased crack widths in the dam wall. Appendix 4 - Potential Problem Identification gives a guide for inspecting the dam.
- Read storage height gauge and rain gauge at half-hour intervals.
- Notify the Principal Engineer, Non-Commercial Assets of the storage height gauge, rainfall, and rate of rise of the storage. Regularly update Principal Engineer, Non-Commercial Assets during the event. At least twice daily or as directed.
- Notify the Police in Georgetown, and the Executive Officer, Local Disaster Management Group, Etheridge Shire Council that a major flood is in progress and confirm previous advice that the gates on the access road at Rycon Homestead have been closed and a sign installed that the dam site is closed and, if known, that there are tourists and campers at the site who are unable to leave.
- Notify property owners and residents at Rycon Homestead, The Oaks Homestead, Oaks Rush Outback Resort and Kidston that the dam site has been closed, a major flood is in progress and prepare to receive advice from Police to implement their individual evacuation plan.
- This Event ends when the preceding twelve-hour rainfall is less than 50mm and the storage height gauge is less than 587.0 and falling and local stream rises have fallen sufficiently to allow access to and egress from the site. On authorisation from Principal Engineer, Non-Commercial Assets, EAP Officer makes a final inspection of the Dam and notifies EAP Backups, the Police in Georgetown, and the Executive Officer, Local Disaster Management Group, Etheridge Shire Council that the Emergency Event is at an end and reverts to Standing Operating Procedures for Small to Medium Spillway Overflows (SOP 14).
- After the event, compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.
- Once given permission by the Principal Engineer, Non -Commercial Assets the dam site can be opened to the public. The site maybe closed for extended periods following an event due to flood waters on the access road.

Principal Engineer, Non-Commercial Assets shall:

- Monitor discharge trends form spillway and downstream gauging station to determine if there is additional flow.
- Provide an environmental incident alert to the Regional Manager Water Services Central West
- Provide a report to Director Dam Safety within 30 days.

3.2 EVENT 2

Sunny Day Failure

The most likely event that may cause a Sunny Day Failure is an earth tremor or landslide into the dam.

An earth tremor and subsequent failure of the Dam will not allow time for EAP Officer to travel to the Dam for inspection purposes before the access road is cut by flooding in local creeks.

If the EAP Officer notices an earth tremor or learns of one through the media, he shall:

- Immediately advise residents and occupants at Rycon Homestead; at Kidston and The Oaks Homestead that an earth tremor may have occurred and the dam could experience a Sunny Day Failure and they may wish to implement their individual evacuation plans.
- Read the storage height gauge, remotely, at five-minute intervals for 15 minutes. If the height gauge falls by 100mm in any five-minute period a failure or partial failure of the dam may have occurred. The EAP Officer must then:-
  - Notify the Police in Forsayth, and the Executive Officer, Local Disaster Management Group, Etheridge Shire Council that the dam may have experienced a failure or partial failure and the evacuation plans for the population at risk should be implemented.
  - Report the possible failure immediately to the Principal Engineer, Non-Commercial Assets, or if he cannot be contacted, the Regional Manager, Water Services Central West Region.
  - Contact Rycon Homestead and ask that the gates to the dam site to be closed and display the dam site closed sign. If unable to contact Rycon Homestead install the dam site closed sign at the Kidston turnoff.
  - If the height gauge does not fall, and safe access to the Dam is possible, immediately check the dam and spillway for cracking and leakage and if anything unusual is observed, report any damage immediately to the Principal Engineer, Non-Commercial Assets.
  - Advise any tourists or campers at the dam that the dam is considered unsafe and they should leave the site immediately. If they are unable to leave the site because of local stream rises or other reasons they should seek higher ground above the Dam crest on the left bank of the river and await evacuation by police and emergency services.
- Notify the Police in Georgetown, and the Executive Officer, Local Disaster Management Group, Etheridge Shire Council that the dam should be considered unsafe and of the possibility of dam failure, that the gates on the access road at Rycon Homestead have been closed and a sign installed that the dam site is closed and, if known, that there are tourists and campers at the site who are unable to leave.
- After the event (usually within 24 hours), compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.
- Once given permission by the Principal Engineer, Non -Commercial Assets the dam site can be opened to the public.

Principal Engineer, Non-Commercial Assets shall:

- If thought necessary, after considering EAP Officer verbal and written reports, arrange for inspection of the dam by an experienced Consulting Dam Safety Engineer.
- Report Dam Safety Engineers findings to Director Dam Safety and obtain clearance to end the event.
- Instruct EAP Officer to notify EAP Backup 1 and 2, the Police in Georgetown and the Executive Officer, Local Disaster Management Group, Etheridge Shire that the emergency event is at an end.
- Provide an environmental incident alert to the Regional Manager Water Services Central West
- Provide a report to Director Dam Safety within 30 days

3.3 EVENT 3

Increase in seepage or additional cracking or increased crack widths in dam wall.

The dam has no significant leaks through the spillway concrete face, roller compacted concrete or fuse plug. The gallery leakage rate has historically remained constant. Drains flowing into the roller bucket display a constant flow. If leakage rates rise for no corresponding rise in water level or if additional cracking or increased cracking in the concrete face is observed, the EAP Officer shall:

- Visually assess the increase in seepage.
- Inspect the upstream concrete face for any signs of new cracks, displacements across cracks or joints, or whirlpools that might indicate the source of new or increased seepage.
- Immediately notify Principal Engineer, Non-Commercial Assets.
- Monitor and record and take photographs at regular intervals until advised otherwise by Principal Engineer, Non-Commercial Assets.
- This Event ends when advised by Principal Engineer, Non-Commercial Assets
- After the event compile an Emergency Event Report and forward to Principal Engineer, Non-Commercial Assets.

Principal Engineer, Non-Commercial Assets shall:

- Determine possible cause for additional seepage.
- Investigate possible remedial action, such as reducing the water level in the storage by opening the river release valve.
- Monitor downstream gauging station.
- Provide an environmental incident alert to the Regional Manager Water Services Central West
- Provide a report to Director Dam Safety within 30 days.

3.4 EVENT 4

Toxic spill within the Catchment/Storage.

Note: Under no circumstances shall EAP officers approach spills where the nature or toxicity of the substance is not known.

On detection or notification of a toxic or hazardous substance contaminating the catchment or storage the EAP Officer shall:

- Identify the hazardous substance or chemical, if possible.
- Seek advice from the Queensland Fire and Rescue Service by dialling the general emergency telephone number 000 and/or the Chemical Hazards and Emergency Management Unit, on the nature of the hazard.
- Notify landowners upstream and downstream of the dam and visitors to the dam site who may be affected.
- Isolate the Kidston pipeline and river release by closing valves.
- Take reasonable steps to isolate the spill or containment from the dam by construction of a containment embankment, or prevent further contamination.
- Notify the Police in Georgetown.
- Notify the Executive Officer, Local Disaster Management Group, Etheridge Shire Council.
- Notify the Principal Engineer, Non-Commercial Assets who will assess the situation, advise on further action or advise the end of the Emergency Event.
- This Event ends when advice is received from the Chemical Hazards and Emergency Management Unit that the spill is no longer a toxic hazard. EAP Officer makes a final inspection of the Dam, advises Principal Engineer, Non-Commercial Assets, EAP Backups, the Police in Georgetown, and the Executive Officer, Local Disaster Management Group, Etheridge Shire Council, that the Emergency Event is at an end and stands down.

- Notify landowners upstream and downstream of the dam and visitors to the dam site that there are no longer any toxic hazards.
- Once given permission by the Principal Engineer, Non -Commercial Assets re-open the valves as directed.
- After the event, compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.

Principal Engineer, Non-Commercial Assets shall:

- Assess the situation and advise on further action.
- Direct reopen the valves.
- Advise the end of the Emergency Event.
- Provide an environmental incident alert to the Regional Manager Water Services Central West and the Director Environmental Services North Region
- Provide a report on the event to the Director Dam Safety within 30 days.

4.0 ROLES AND RESPONSIBILITIES

4.1 EAP Officer

EAP Officer shall:

- Monitor the dam for any potential emergency conditions.
- Follow the Emergency Action Plan in time of emergency. If unable to notify Principal Engineer, Non-Commercial Assets, then contact shall be made with Regional Manager, Water Services, Central West Region, and if he cannot be contacted, the Regional Manager, Water Services, North Region.
- During an emergency event, report to and receive instructions from the Principal Engineer, Non-Commercial Assets or if he cannot be contacted, the Regional Manager, Water Services, Central West Region, or if he cannot be contacted, the Regional Manager, Water Services, North Region
- In an emergency event, take steps to ensure personal safety and the safety of other EAP Officers and the public.
- Record details of the Emergency Events as described in the Storage Log Book and take photographs. Details which should be recorded are time and date, water level readings, rain gauge readings, details of all phone calls, actions, directions from Principal Engineer, Non-Commercial Assets or his backup.
- Immediately fax or phone all recordings to the Principal Engineer, Non-Commercial Assets for evaluation during the emergency or if he cannot be contacted, the Regional Manager, Water Services, Central West Region or if he cannot be contacted, the Regional Manager, Water Services, North Region.
- During an emergency event, provide status reports to the Executive Officer of the Local Disaster Management Group, Etheridge Shire Council. These reports shall contain factual information such as water level and rainfall recordings. Projections or opinions based on past experience of similar events or specialist knowledge may be given. The EAP Officer may give **ONLY FACTUAL INFORMATION** to the media and the public.
- In the likelihood of adverse weather or stream flow conditions or at any other time that the EAP Officer is unable to fulfil the duties, advise EAP Backup 1 or 2 of any intended absence from the area and leave a point of contact.
- Immediately notify the EAP Backup officers when the Emergency Action Plan is being initiated.
- Make contact with telephone numbers and facsimile numbers of the Notification List of the Emergency Action Plan by 1st September each year.
- Notify the Principal Engineer, Non-Commercial Assets in writing of any changes to names and numbers on the Notification List of the Emergency Action Plan.
- Notify Principal Engineer, Non-Commercial Assets in writing of names and contact details of personnel undertaking and/or relieving the role of EAP Officer and EAP Backup 1 or 2.
- Keep the Emergency Action Plan in a clean, secure facility.
- Ensure Emergency events are recorded in the Storage Log Book as described in section 3.7.
- After an emergency event, prepare an Emergency Event Report as described in section 3.8. Immediately after the event this report shall be sent to Principal Engineer, Non-Commercial Assets.

4.2 EAP Backup 1 and 2

EAP Backup 1 and 2 shall:

- Assist the EAP Officer in times of emergency.

- Undertake the responsibilities of the EAP Officer should that person be unavailable.
- If, during adverse weather conditions, EAP Backup 1 and 2 have not been contacted by EAP Officer they shall:
  - Attempt to contact EAP Officer,
  - Enact the Emergency Action Plan if contact with the EAP Officer cannot be made.

4.3 Principal Engineer, Non-Commercial Assets

Principal Engineer, Non-Commercial Assets shall:

- Ensure this Emergency Action Plan is implemented.
- Approve the person undertaking and/or relieving in the role of EAP Officer and EAP Backup 1 and 2.
- Ensure the EAP Officer and EAP Backup 1 and 2 are conversant with the Emergency Action Plan.
- Review the Emergency Action Plan in consultation with Regional Manager, Water Services, Central West Region, by 1st May each year.
- Ensure the Emergency Action Plan is distributed according to the Distribution List and that the police and counter disaster organisations are conversant with the plan.
- Notify Director, Dam Safety and Regional Manager, Water Services, Central West Region, of any emergency event.
- Only on delegation from the Regional Manager, Water Services, Central West Region at the time of each event, act for and on behalf of the Regional Manager during the emergency.
- Monitor any emergency event.
- Evaluate situation on best available information.
- Advise Director, Dam Safety and Regional Manager, Water Services, Central West Region during an emergency event.
- Provide an environmental incident alert to the Regional Services Director Central West. A template is provided in Appendix 10.
- Within thirty (30) days of an event, present an Emergency Event Report to Director Dam Safety and Regional Manager, Water Services, Central West Region.

4.4 Regional Manager, Water Services, Central West Region

Regional Manager, Water Services, Central West Region, shall:

- Review the Emergency Action Plan in consultation with the Principal Engineer, Non-Commercial Assets by 1st May each year.
- Direct the actions of Departmental Personnel during an emergency to protect life and property to the maximum extent considered possible under the prevailing conditions and with the resources available.
- Delegate role of Regional Manager, Water Services, Central West, in his/her absence.
- Authorise this Emergency Action Plan.
- Review environmental incident alerts and forward to the Regional Services Director, Central West Region and the Regional Manager Water Services North Region. Forward a copy of any alert for toxic spills to the Regional Manager, Environmental Services North Region.

4.5 Regional Manager, Environmental Services, North Region

- Review environmental incident alert and provide advice to the Regional Services Directors, North and Central West Regions.

4.6 Regional Services Director, Central West Region

Regional Services Director, Central West Region shall:-

- Review and approve environmental incident alerts and forward to Assistant Director General, Regional Service Delivery.

5.0 EVACUATION PROCEDURE

5.1 GENERAL

Evacuation of residents is the role of the Police and Emergency Service Personnel. EAP officers will provide evacuation advice only to the Police and Executive Officer, Local Disaster Management Group, Etheridge Shire. Advice on likely flood levels and times will be provided to the population at risk including tourists at the dam in order for them to make their own assessment of the need to evacuate.

Emergency events at Copperfield River Gorge Dam may cause rapid flooding in houses at risk. Notice of flooding may not be possible and residents may need to make their own assessment of the need to evacuate. For this reason Individual Evacuation Plans have been prepared for each residence. They detail the route to follow to a safe point. Individual Evacuation Plans are found in APPENDIX 6. Residents have been consulted in the development of their evacuation plan and have been requested to position their evacuation plan in a prominent location in their house.

Because of the terrain, distances and possible flooded streams it may not be possible for residents at risk to assemble at one point. The common evacuation assembly point is Oaks Rush Outback Resort if residents have adequate time to evacuate before local streams rise and cut access. Otherwise, they should move to the high ground indicated in their individual evacuation plans.

5.2 SUNNY DAY FAILURE

The time intervals between responsible EAP Officers or residents at risk becoming aware of an emergency event due to a Sunny Day Failure of the dam and the arrival of the flood peak at houses may be too short to allow implementation by Police or Emergency Services Personnel of an Evacuation Procedure.

The EAP Officer at the site, immediately on becoming aware or suspecting that an emergency event has occurred which could result in a Sunny Day Failure, is to advise the Police and Executive Officer, Local Disaster Management Group, Etheridge Shire and the population at risk that they may wish to implement their Individual Evacuation Plan.

Individual Evacuation Plans have been prepared for and distributed to residents at risk. They have been advised implement their Evacuation Plan without further advice from EAP Officer, Police or Executive Officer, Local Disaster Management Group, Etheridge Shire if they become aware of or suspect that an emergency event has occurred.

5.3 FLOOD EVENTS

When emergency events occur where more time is available the EAP Officer on site is to advise Police in Georgetown that a flood event is occurring, which could result in an emergency event. Police may then implement the emergency action they consider appropriate which may include the Individual Evacuation Plans.

5.4 POST EVACUATION

After an emergency event has occurred during which this Evacuation Procedure has been implemented Police and the Local Disaster Management Group are to control return of people to buildings, which have been affected.

5.5 POST EMERGENCY EVENT

After an emergency event the Local Disaster Management Group and Police are in charge of the area and this Emergency Action Plan has no further role in that event.

6.0 PREDICTED FLOOD LEVELS AND FLOOD TRAVEL TIMES

6.1 PREDICTED DEPTH OF FLOODING

Scenario	Location		
	Rycon Homestead	Kidston	The Oaks
Sunny Day Breach –	7m	Up to 3.5m	8m to 9m
Dam Crest Flood –			
- With breach	11.7m	4m to 10m	16m to 17m
- Without breach	2.1m		3m to 4m

Note: Levels at each location are independent and have no relation to levels at other locations and are not related to AHD or GDA.

6.2 FLOOD WAVE TRAVEL TIMES

Flood wave travel times within the Copperfield River have not been modelled for the above Scenarios. However, until a better understanding is obtained from observations the following should be used as a guide:

Sunny Day Failure with breach-flood waters moving at an average 3 meters per second:-

Copperfield Dam to Rycon Homestead	30 mins
Copperfield Dam to Kidston township	3 hours
Copperfield Dam to The Oaks Homestead	4 hours

There is considerable uncertainty in the values of flood travel times and thus prompt warning should be given to population at risk on being aware of a potential dam break event.

7.0 COMMUNICATIONS

During an emergency, an open line of communication shall be maintained between EAP Officer, Principal Engineer, Non-Commercial Assets and the Regional Manager, Water Services, Central West Region.

The primary means of communications shall be by telephone.

The EAP Officer and EAP Backup 1 have been issued a satellite telephone and a UHF radio. Officers carrying out inspections of the dam during an emergency event shall have a satellite phone and a handheld UHF radio at all times. During the emergency event, UHF radio communication, channel 1, shall be the primary communication between one another. The satellite phone shall be used to communicate outside the Dam site should the normal landline fail to operate.

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If there is a total communication failure, the EAP Officer shall take action that is reasonable under the circumstances and in accordance with the Workplace Health and Safety Act. The details of this action and the reasons for it shall be recorded in the Storage Log Book. The Principal Engineer, Non-Commercial Assets shall, in consultation with Regional Manager, Water Services Central West Region, assess the situation and attempt to establish alternative means of communication.

8.0 STORAGE LOG BOOK

EAP Officer shall ensure that events and appropriate data are recorded in the Storage Log Book. All new entries are to be copied and forwarded to Principal Engineer, Non-Commercial Assets monthly.

Entries shall be a record of water levels, weather observations, inspections, actions that are carried out, telephone conversations that are related to the emergency event, and comments identifying problems and unusual events.

All entries shall be written legibly and be unedited and signed by the person making the entry. Errors made shall be struck out and initialled.

The Storage Log Book shall be kept permanently in the EAP Officer residence. It must be available on request and its location known to, EAP Backup Officers and Principal Engineer, Non-Commercial Assets.

9.0 POTENTIAL PROBLEM IDENTIFICATION TO NOTE WHEN INSPECTING THE DAM

9.1 INSPECTION SAFETY PROTOCOL

The EAP Officer must comply with the Inspection Safety protocol detailed in Appendix 3.

9.2 POTENTIAL PROBLEM IDENTIFICATION

EAP officers inspect the dam weekly and complete an inspection checklist. EAP Engineer also visits the dam monthly and completes a monthly inspection report. Both weekly and monthly inspection checklists are sent to Principal Engineer, Non-Commercial Assets who will check and evaluate these reports.

It is important that the dam is inspected during an emergency event or shortly thereafter by the EAP officer, providing it is safe to do so. Potential problems that can be identified during these inspections are discussed in APPENDIX 4-POTENTIAL PROBLEM IDENTIFICATION. Any abnormalities shall be immediately brought to the attention of Principal Engineer, Non-Commercial Assets.

9.3 DAM DETAILS

Name and location	
Name of Dam	Copperfield River Gorge Dam
Other Names	Kidston Dam, Copperfield Dam
Location	Latitude 19° 02' 10" Longitude 144° 07' 48"
DERM Region	North
Shire	Etheridge
Nearest Town	Einasleigh
Stream and AMTD	Copperfield River 72 km
Licence No	36192K
Development Permit	April 13, 2006. Dam No 256. Notice applying safety conditions to Copperfield River Gorge Dam
Current Owner	Queensland Government (managed by Department of Environment and Resource Management)
Designer (Date)	Gutteridge Haskins & Davey Pty Ltd (1984)
Construction Authority – Supervisor	Gutteridge Haskins & Davey Pty Ltd

Construction Contractor	Hornibrook
Safety review dates	2005
Technical data	
Dam Type	Roller compacted concrete with central ogee concrete spillway and fuse plug emergency spillway
Purpose	Water supply to Kidston Gold Mine rehabilitation and stock water supply
Main Dam Height (above lowest toe)	32 m to spillway with main crest to 40 m
Main Dam Length	340 m
Fuse Plug height	13 m
Fuse Plug length	140 m
Spillway Type	Service – Central uncontrolled ogee spillway Fuse Plug – Uncontrolled return slope to river
Spillway Description	Service – Spillway width of 100 m Fuse Plug – Spillway width of 140 m
Outlet Description	River release outlet works consisting of 800mm diameter steel pipe with 8mm wall thickness and coated internally with an epoxy paint system through the dam encased in conventional concrete, controlled by a 600mm diameter cone dispersion valve as a flow regulator at the downstream end and a bulkhead gate at the upstream end. An 800mm diameter butterfly guard valve is located upstream in the valve chamber. Mine pipeline release outlet works consist of two 508mm diameter steel pipes with 6mm wall thickness and 10mm thick cement mortar lining through the dam encased in conventional concrete. One of the pipes is not used and has been sealed at both ends with blank flanges. The service pipe is controlled by 500mm diameter butterfly valves to the mine supply pipeline and to the scour to the roller bucket. A ductile iron concrete lined pipe stack at the reservoir side equipped with knife gate valves at variable levels controls inlet of water to the pipe.
Storage characteristics	
Full supply level (FSL)	EL 586.0 m
Storage capacity	20 600 ML
Surface area	Unknown
Length of shoreline	Unknown
Main Spillway capacity	4700m3/s at EL 593.5 Crest Level EL 594.0 4865m3/s at Dam

Fuse Plug Spillway capacity	4520m3/s at Dam Crest Level EL 594.0
Outlet capacity River release	3m3/s with storage at or above EL 575.0
Dam crest level (DCL)	EL 594.0 m
Catchment area	123,300 ha
Catchment description	Flat basalt covered plain with an area of hilly granitic terrain at the dam site
Design Rainfall Review	Design Flood Hydrology-Sunwater Sept 2005
Methods	Frequent to large events based on Book II, Section I Australian Rainfall and Runoff (ARR) (IEAust 2003) and Volume 2, ARR (IEAust 1987) for AEPs of 1 in 50 and 1 in 100, for storm burst durations up to 120 hours. Large to rare events as per Book VI, ARR (IEAust 2003). The CRC-FORGE regional rainfall estimates prepared for storm burst durations between 24 and 120 hours for AEPs of 1 in 50 to 1 in 2000. PMP estimates and rainfall temporal patterns as per the Revised Generalised Tropical Storm Method for storm durations between 24 hours and 120 hours. Extreme events as per Book VI of ARR (IEAust 2003) for the range of AEPs of 1 in 2000 up to the AEP of PMP.
Original Spillway Design Flood	Design Report-RCC Dam-GHD 1984
Maximum Level	EL 593.5 m
Flood volume	Unknown
Peak Discharge	4700 m³/s
AEP of Flood	1 in 500
Freeboard, original	0.5 m (approx)
Probable Maximum Flood	Design Report-RCC Dam-GHD 1984
Maximum Level	EL 594.0 m
Flood Volume	Unknown
Peak Discharge	8500 m³/s
AEP of Flood	Probable Maximum Flood
Freeboard	none
Dam Crest Flood (DCF)	Design Flood Hydrology-Sunwater Sept 2005
Maximum Level	EL 594.0
Flood Volume	281000 Ml
Peak Discharge	9360m3/s

AEP of Flood	1 in 7000
Freeboard	none
PMP Design Flood (PMP-DF)	Design Flood Hydrology-Sunwater Sept 2005
Maximum Level	EL 599.96
Flood Volume	710000 Ml
Peak Discharge	28680m³/s
Freeboard	None – wall overtopped by 6m
Description of dam wall	
Wall Type-Main Wall	Mass concrete constructed using roller compacted concrete with central ogee spillway surfaced in conventional concrete.
Wall Height (above lowest D/S toe)	40 m
Crest Elevation	EL 594.0 m
Wall Length	340 m
Total Quantities	Volume of RCC-140,000 m3 Volume of Conventional concrete-16,800 m3
Wall Type-Fuse Plug	Zoned fill embankment designed to fail when overtopped.
Wall Height	13 m
Crest Elevation	EL 593.5 m
Fixed Crest Level	EL 584.5 m
Wall Length	140 m
Total Quantities	25000 m³ (approx)
Materials Description	Clay, fine river gravel, natural river sand, rip-rap.
Description of spillway	
Main spillway	
Spillway Description	The spillway is an uncontrolled ogee crest with a maximum height of 32 m.
Spillway Crest	EL 586.0 m
Plunge Pool Floor	
Spillway Width	100 m
Energy Dissipation Method	Roller bucket
Design Head	The ogee crest was designed for a head of 6 m.

Control Description	Uncontrolled
Auxiliary spillway	
Spillway Description	Fuse plug embankment designed for failure and collapse down to a fixed crest RCC sill, in the event of 500 mm depth of flow over the crest
Spillway Crest	EL 585.5 m.
Fixed Crest	EL 584.5 m
Spillway Width	140 m at top of embankment, 90 m at fuse plug fixed crest.
Energy Dissipation Method	Uncontrolled return slope to river channel.
Design Head	n/a
Control Description	Uncontrolled
Description of outlet works	
Reservoir Outlet Description	Outlet works consist of a river release outlet and a mine supply outlet.
River Release Conduit Description	800mm diameter steel pipe through the dam wall embedded in concrete and protected with an epoxy paint system internally.
Intake Works	The intake to the river release pipe is directly from the reservoir which can be isolated by a slide gate at the upstream end. The intake has a steel screen over the entrance to the pipe.
Regulator Description	The outlet flow regulator is a 600mm diameter fixed cone dispersion valve which is guarded upstream by a 800mm diameter butterfly valve located in a valve chamber. The cone valve discharges into the spillway roller bucket.
Mine Supply Conduit Description	Two 508mm diameter cement lined steel pipes through the dam wall embedded in concrete. One of the pipes is a reserve and is sealed by blank flanges at each end.
Intake Works	The intake works consist of a 500mm diameter DICL pipe stack with variable level inlet knife valves.
Regulator Description	The service mine supply pipe is controlled by a 500mm diameter butterfly valve located in the valve chamber.

Hydrologic Performance		
Year	Peak Reservoir level	Peak Discharge
2002	EL 589.72 m	1410 m3/s
2005	EL 589.42 m	1242 m3/s
1991	EL 588.68 m	859 m³/s

10.0 EMERGENCY EVENT REPORT

The EAP Officer shall prepare an Emergency Event Report after each emergency event and forward it to the Principal Engineer, NCA within 15 days of the event.

The report maybe free format but shall contain at least:

- A description of the event summarised from the Storage Log Book.
- Description of any observed damage or other consequences.
- Photographs
- A summary of data recorded during the event and the times of these recordings such as;
    - Rainfall
    - Water level within the storage
    - Seepage flows and observations
- Details of communication which took place during the emergency.
- Comment on the adequacy of the Emergency Action Plan.
- Any recommendations or suggested changes to the Emergency Action Plan.
- Any further comments considered necessary.

The Principal Engineer, NCA shall provide a report on the event to the Director Dam Safety within 30 days of the event.

11.0 REVISION OF EVACUATION PLANS

Each year in September EAP Officer shall visit each house/structure at risk and revise the evacuation plan accordingly. The revised plan shall be forwarded to Principal Engineer, Non-Commercial Assets.

The Principal Engineer, Non-Commercial Assets shall post revised plans to each resident.

12.0 REFERENCES

Workplace Health and Safety Act 1995

DERM-RoadTek Memorandum of Understanding (2009)

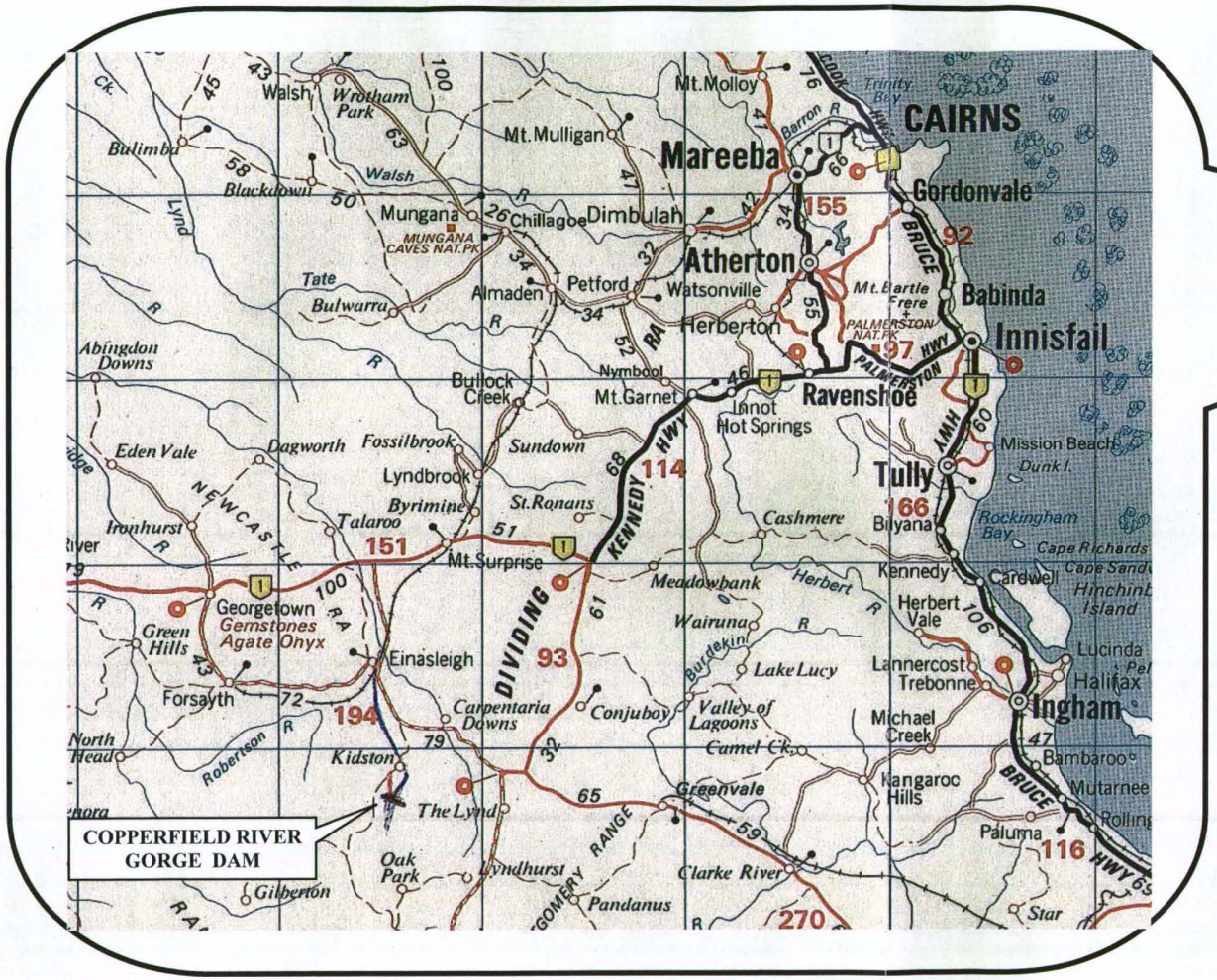
Copperfield Dam - Storage Log Book

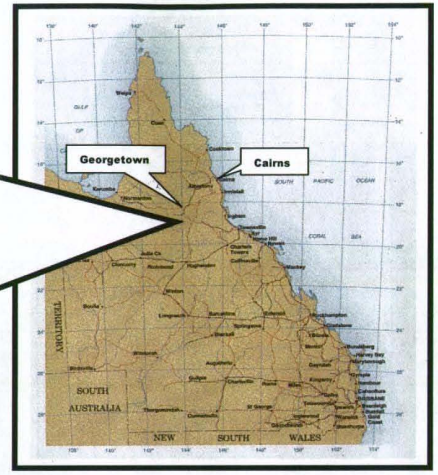
Copperfield Gorge Dam Design Flood Hydrology Based on Revised PMP Estimates, SunWater, September 2006

Copperfield Gorge Dam - Failure Impact Assessment, GHD December 2004

APPENDIX 1
LOCALITY PLAN

Queensland Government
Natural Resources and Water





LOCATION PLAN

APPENDIX 2
CATCHMENT BOUNDARY


INSET
Copperfield River at Kidston Dam Tailwater
Copperfield River at Kidston Dam Headwater
COPPERFIELD DAM
Copperfield River at Upstream Watercourse
COPPERFIELD DAM
Refer Inset
Copperfield River Catchment
Copperfield River
COPPERFIELD DAM
0 2.5 5 7.5 10 12.5
Kilometers
DATUM: Geocentric Datum of Australia 1994
PROJECTION: Map Grid of Australia (MGA94), Zone 55, Central Meridian 147° East
GDA
Queensland Government
NOTES
The satellite imagery used in this product has been purchased from Geoscience Australia, Commonwealth of Australia and orthorectified in conjunction with the Statewide Landcover and Trees Study (SLATS). Satellite acquisition date: August 2006.
Cadastral data (Current as at April, 2010) provided with permission of the Department of Environment and Resource Management, Brisbane.
Map produced by the Resource Assessment and Information Group, Department of Environment and Resource Management, Rockhampton.
© The State of Queensland (Department of Environment and Resource Management) 2010.

APPENDIX 3
INSPECTION SAFETY PROTOCOL

APPENDIX 3 INSPECTION SAFETY PROTOCOL

All EAP officers who visit the dam site are to observe this protocol.

(1) A hand held satellite phone with backup battery to be available at all inspections.

(2) Officers on site to have UHF Radio available at all times.

(3) Inspections are to be carried out only when conditions are deemed to be safe as per inspection and risk assessment/s.

(4) During an emergency event access to dam structure, main spillway and fuse plug emergency spillway is not to be made by boat.

(5) Only EAP officers are authorised to visit the dam site during Emergency Events.

APPENDIX 4
POTENTIAL PROBLEM IDENTIFICATION

APPENDIX 4 POTENTIAL PROBLEM IDENTIFICATION

INSPECTION OF CONCRETE AND MASONRY DAMS

INSPECTING FOR DEFICIENCIES: SUMMARY

TYPE OF DEFICIENCY	LOOK FOR
SURFACE DEFECTS	Honeycomb: Voids around aggregate. Stratification: Non-uniform layers of aggregate in concrete. Form Slippage: Uneven joints and surfaces. Stains. Impact damage.
DISPACEMENT	Displacement at joints between blocks. Volume change in concrete. Closing or opening of joints. Loss of joint filler. Cracking. Debonding of lifts. Tilting, shearing, or shifting of hardware or machinery.
LEAKAGE and SEEPAGE	Significant new leakage on downstream face or in galleries. Wetness in abutment or foundation adjacent to toe. Major changes in leakage/seepage pattern or flow. Water spurting or running out of joints or cracks. Turbidity of the seepage. Blocked drains.
MAINTENANCE CONCERNS	Vegetation in joints between concrete blocks. Large accumulations of debris. Missing or deteriorated joint filler. Quality and condition of previous repairs. Adequacy of ventilation inside dam.

Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

INSPECTION OF EMBANKMENT DAMS

INSPECTING FOR DEFICIENCIES: SUMMARY

TYPE OF DEFICIENCY	LOOK FOR
SEEPAGE	A water flow or sand boil on the lower portion of the downstream slope or toe area, especially at the groins. Leakage around conveyance structures such as outlet works. Wet areas or areas where the vegetation appears greener or more lush on the embankment slope or toe area. Blocked toe drains. An increase in the amount of water being released from toe drains. (Remember to take into account changes in the reservoir level.) Turbidity or cloudiness of the seepage.
CRACKING	Desiccation Cracking: A random honeycomb pattern of cracks usually found on the crest and the downstream slope. Transverse Cracking: Cracks that are perpendicular to the length of the dam usually found on the crest. Longitudinal Cracking: Cracks that are parallel to the length of the dam. Longitudinal cracks may be associated with stability problems in the slopes.
INSTABILITY	Slides on the upstream or downstream slopes. Bulging, especially at the toe of the dam.
DEPRESSIONS	Misalignment in the crest and embankment slopes found by sighting along fixed points. Sinkholes found by checking and probing each depression. Remember, sinkholes have steep, bucket like sides while minor depressions have gently sloping, bowl like sides.
MAINTENANCE CONCERNS	Inadequate Slope Protection: Check for bald areas or areas where the protection is sparse or damaged. Surface Runoff Erosion: Check for gullies or other signs of erosion. Make sure to check the low points along the upstream and downstream shoulders and groins since surface runoff can collect in these areas. Inappropriate Vegetative Growth: Check for excessive and deep rooted vegetative growth. Debris: Check for debris on and around the dam, especially near outlet works or spillway inlets. Animal Burrows: Check for damage caused by burrowing animals.

Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered above are very serious. If you observe any of the following deficiencies, you should consult with the Principal Engineer, Non – Commercial Assets:

- Sand boils or turbid seepage.
- Seepage that has increased since the last inspection (taking the reservoir level into consideration).
- Cracking that extends below the reservoir level or potential reservoir level.
- Transverse and longitudinal cracking.
- Deep seated slides or bulging associated with slides.
- Sinkholes or other large depressions.
- Deep rooted vegetation that might need to be removed.

If you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with the Principal Engineer, Non –Commercial Assets.

APPENDIX 5
Emergency Event Phone Numbers

Event Phone Numbers for RoadTek Officer (EAP)

All Emergency Events

Police in Forsayth,
Phone 07 4062 5376

Police in Mareeba,
Phone 07 4030 3370, A/H [redacted]

Executive Officer, Local Disaster Management Group, Etheridge Shire
Les Edmistone Phone [redacted], A/H [redacted]

RoadTek Backup 1,
Owen Campbell Phone [redacted]

RoadTek Backup 2,
Carol Fielder Phone [redacted]

Principal Engineer, Non-Commercial Assets,
William Steen Phone 07 4938 4020, [redacted]

if unable to contact then:

Regional Manager, Water Services,
Ed Donohue Phone 07 [redacted], A/H [redacted], Mobile [redacted]

Event Phone Numbers for Principal Engineering, Non-Commercial Assets

All Emergency Events

RoadTek Officer (EAP),
Richard Fielder Phone [redacted], Mobile (Sat Phone) [redacted]

Director Dam Safety,
Peter Allen Phone [redacted], A/H [redacted], Mobile [redacted]

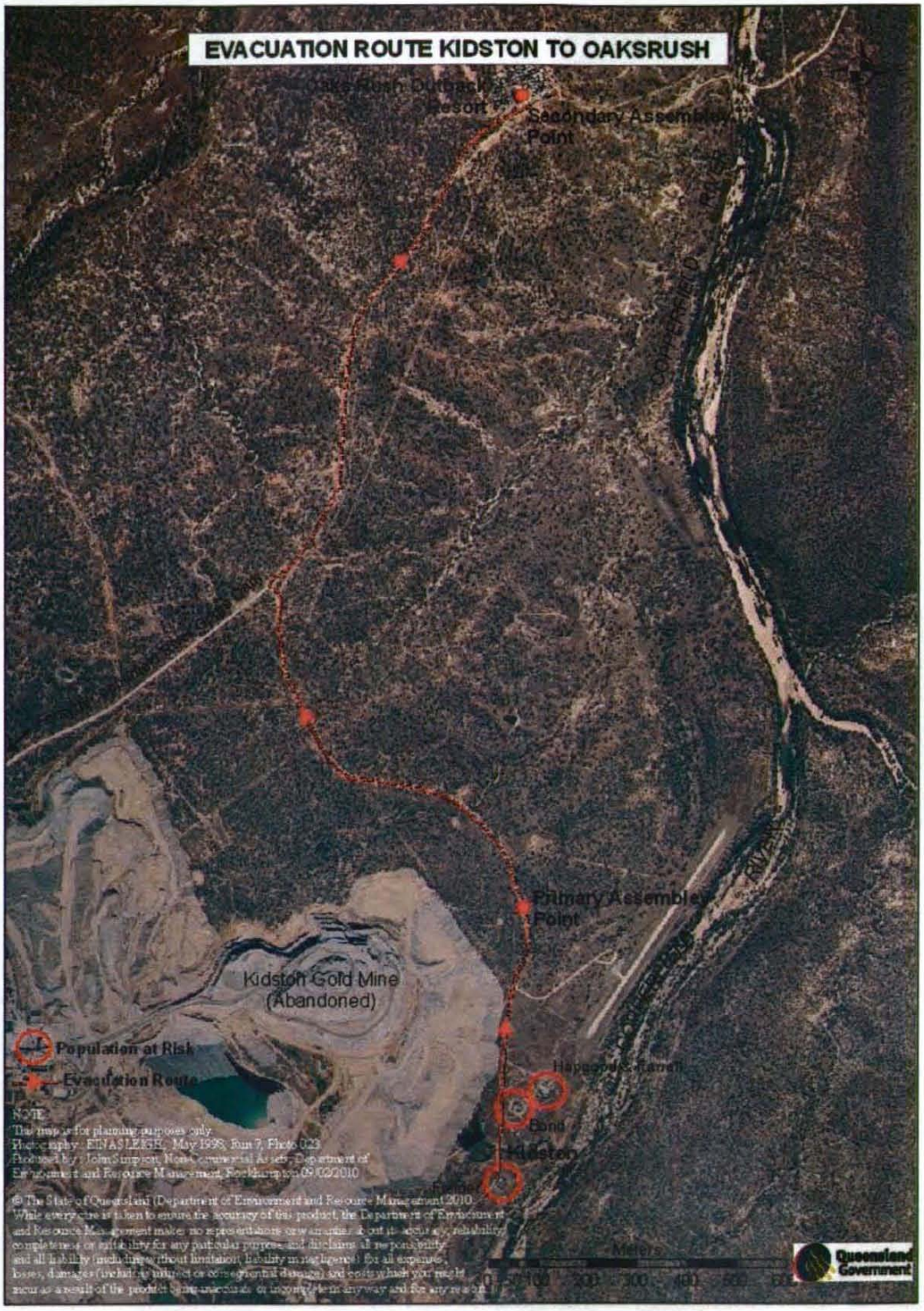
Regional Manager, Water Services,
Ed Donohue Phone [redacted], A/H [redacted], Mobile [redacted]

Gauging Stations:
Headwater - Copperfield River Gorge Dam Phone [redacted]
Tailwater - Copperfield River Gorge Dam Phone

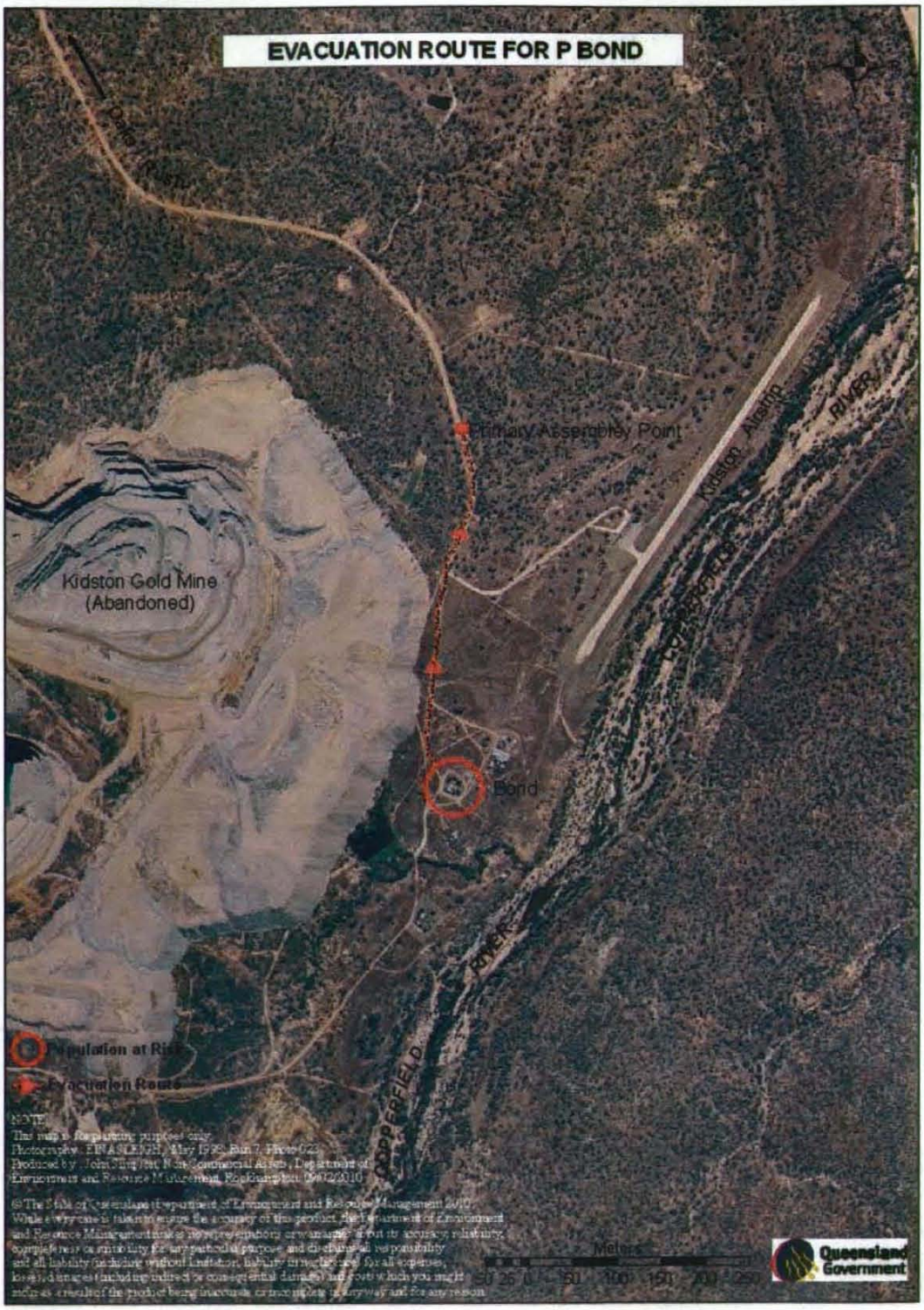
APPENDIX 6
EVACUATION PLANS

EXCAVATION PLAN FOR RYCON HOMESTEAD

EVACUATION PLAN FROM KIDSTON
PRIMARY AND SECONDARY ASSEMBLEY POINTS



EVACUATION PLAN FROM KIDSTON HOUSE 1 P BOND



EVACUATION PLAN FROM KIDSTON HOUSE 2 C HAPGOOD & D FARRELL

EVACUATION PLAN FROM KIDSTON HOUSE 3 R & C FIELDER

EVACUATION PLAN FROM THE OAKS HOMESTEAD O CAMPBELL

APPENDIX 7

RAINFALL AND GAUGE HEIGHT INFORMATION

Radar Image of Rainfall

The Bureau of Meteorology website provides radar images of rainfall that might be approaching the catchment area.

- Go to the website: www.bom.gov.au
- Left click on the Radar Icon
- Left click on the Cairns location
- Left click on the 512 km composite icon
- Move the pointer so that the bottom two cells in Pointer data reads 275 km away and 218 Degrees. This is the approximate location of Copperfield Dam.

Rainfall and Gauge Height Information

Detailed information is available from the Bureau website.

- Go to website: www.bom.gov.au
- Left Click Queensland area of the map of Australia.
- Scroll down to Flood Warning, Rainfall and River Information.
- Left click Queensland Flood Warning Centre.
- Scroll down to "Zoom in to:"
- Left Click Gulf and Peninsula.
- Scroll Down to table under map and go to column displaying Latest Rainfall Data
- For the Gilbert River, Left Click 3hr for latest rainfall. Read rainfall data for Einasleigh TM and Mt Surprise TM.
- Move to top tool bar and Left Click Back arrow
- Left Click 24 hr for stations as above – read rainfall data.

For Gauge Height information

- Move to top tool bar and Left Click Back arrow
- For the Gilbert River, Left Click – Gilbert - for Latest River Heights. Read information for Copperfield River at Spanner Waterhole and at Kidston Dam Hw

The information provided through the Bureau of Meteorology website is normally updated daily, and hourly during flood events.

Instantaneous gauge heights can be obtained via telephone from a height recorder located at Kidstone Dam Hw and a gauging station at Copperfield River Tailwater. On telephoning these, a recorded voice message will provide a height in four digits (eg; wx.yz). For the Kidston Dam Hw, 550.00 must be added to the four digit number to convert it to storage height in metres AHD.

Site	Phone Number[1]
Kidston Dam Hw	0011 870 764 716 597
Copperfield River Tailwater	0011 870 764 343 416

[1] These numbers are also listed in Appendix 5

APPENDIX 8

RATING TABLES

Qld NRW SWDB HYRATAB V146 Output 12/03/2010

Site 917116A Copperfield River at Kidston Dam Headwater

Rating Table 1.00 24/01/1985 to Present Interpolation = Log CTF = 36.0000

Converting 100 Stream Water Level in Metres
Into 140 Stream Discharge in Cumecs

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
36.00	0.0	0.196F	0.554F	1.02F	1.57F	2.19F	2.88F	3.63F	4.44F	5.29F
36.10	6.20F	7.15F	8.15F	9.19F	10.3F	11.4F	12.5F	13.7F	15.0F	16.2F
36.20	17.5F	18.9F	20.2F	21.6F	23.0F	24.5F	26.0F	27.5F	29.0F	30.6F
36.30	32.2F	33.8F	35.5F	37.2F	38.9F	40.6F	42.3F	44.1F	45.9F	47.7F
36.40	49.6F	51.5F	53.4F	55.3F	57.2F	59.2F	61.2F	63.2F	65.2F	67.2F
36.50	69.3F	71.4F	73.5F	75.6F	77.8F	80.0F	82.1F	84.4F	86.6F	88.8F
36.60	91.1F	93.4F	95.7F	98.0F	100F	103F	105F	108F	110F	112F
36.70	115F	117F	120F	122F	125F	127F	130F	132F	135F	138F
36.80	140F	143F	146F	148F	151F	154F	156F	159F	162F	165F
36.90	167F	170F	173F	176F	179F	182F	184F	187F	190F	193F

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
37.00	196F	199F	202F	205F	208F	211F	214F	217F	220F	223F
37.10	226F	229F	232F	235F	239F	242F	245F	248F	251F	254F
37.20	258F	261F	264F	267F	271F	274F	277F	281F	284F	287F
37.30	291F	294F	297F	301F	304F	307F	311F	314F	318F	321F
37.40	325F	328F	332F	335F	339F	342F	346F	349F	353F	357F
37.50	360F	364F	367F	371F	375F	378F	382F	386F	389F	393F
37.60	397F	400F	404F	408F	412F	415F	419F	423F	427F	431F
37.70	434F	438F	442F	446F	450F	454F	458F	462F	466F	469F
37.80	473F	477F	481F	485F	489F	493F	497F	501F	505F	509F
37.90	513F	517F	521F	526F	530F	534F	538F	542F	546F	550F
38.00	554F	559F	563F	567F	571F	575F	580F	584F	588F	592F
38.10	597F	601F	605F	609F	614F	618F	622F	627F	631F	635F
38.20	640F	644F	648F	653F	657F	662F	666F	670F	675F	679F
38.30	684F	688F	693F	697F	702F	706F	711F	715F	720F	724F
38.40	729F	733F	738F	742F	747F	752F	756F	761F	766F	770F
38.50	775F	779F	784F	789F	793F	798F	803F	808F	812F	817F
38.60	822F	827F	831F	836F	841F	846F	850F	855F	860F	865F
38.70	870F	874F	879F	884F	889F	894F	899F	904F	909F	913F
38.80	918F	923F	928F	933F	938F	943F	948F	953F	958F	963F
38.90	968F	973F	978F	983F	988F	993F	998F	1003F	1008F	1013F

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
39.00	1018F	1024F	1029F	1034F	1039F	1044F	1049F	1054F	1059F	1065F
39.10	1070F	1075F	1080F	1085F	1091F	1096F	1101F	1106F	1111F	1117F
39.20	1122F	1127F	1133F	1138F	1143F	1148F	1154F	1159F	1164F	1170F
39.30	1175F	1180F	1186F	1191F	1196F	1202F	1207F	1213F	1218F	1223F
39.40	1229F	1234F	1240F	1245F	1251F	1256F	1261F	1267F	1272F	1278F
39.50	1283F	1289F	1294F	1300F	1305F	1311F	1317F	1322F	1328F	1333F
39.60	1339F	1344F	1350F	1356F	1361F	1367F	1372F	1378F	1384F	1389F
39.70	1395F	1401F	1406F	1412F	1418F	1423F	1429F	1435F	1440F	1446F
39.80	1452F	1458F	1463F	1469F	1475F	1481F	1486F	1492F	1498F	1504F
39.90	1510F	1515F	1521F	1527F	1533F	1539F	1545F	1550F	1556F	1562F
40.00	1568F									

---------- Notes ----------

All rated data has been coded as reliable except where the following tags are used...

Fair

Qld NRW SWDB HYRATAB V146 Output 12/03/2010

Site 917118A Copperfield River at Kidston Dam Tailwater

Rating Table 3.00 27/11/1996 to Present Interpolation = Log CTF = 1.0000

Converting 100 Stream Water Level in Metres
Into 140 Stream Discharge in Cumecs

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.30	0.00133	0.00184	0.00252	0.00342	0.0046	0.00558	0.00672	0.00807	0.00963	0.0114
1.40	0.0135	0.0160	0.0187	0.0219	0.0255	0.0285	0.0318	0.0353	0.0392	0.0434
1.50	0.0479	0.0528	0.0581	0.0638	0.0700	0.0773	0.0851	0.0937	0.103	0.113
1.60	0.124	0.135	0.147	0.161	0.175	0.190	0.206	0.224	0.242	0.267
1.70	0.296	0.329	0.365	0.404	0.446	0.492	0.543	0.597	0.657	0.721
1.80	0.791	0.867	0.949	1.04	1.13	1.24	1.33F	1.39F	1.45F	1.52F
1.90	1.58F	1.65F	1.72F	1.79F	1.86F	1.94F	2.02F	2.10F	2.18F	2.27F

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2.00	2.36F	2.45F	2.54F	2.64F	2.73F	2.83F	2.94F	3.04F	3.15F	3.27F
2.10	3.38F	3.50F	3.62F	3.74F	3.87F	4.00F	4.11F	4.23F	4.35F	4.47F
2.20	4.59F	4.72F	4.85F	4.98F	5.11F	5.25F	5.39F	5.53F	5.67F	5.81F
2.30	5.96F	6.11F	6.27F	6.42F	6.65F	6.97F	7.29F	7.63F	7.99F	8.35F
2.40	8.73F	9.13F	9.54F	9.96F	10.4F	10.9F	11.3F	11.8F	12.3F	12.9F
2.50	13.4F	14.0F	14.6F	15.2F	15.8F	16.4F	17.1F	17.8F	18.5F	19.2F
2.60	20.0F	20.8P	21.6P	22.4P	23.2P	24.1P	25.0P	25.9P	26.9P	27.9P
2.70	28.9P	29.9P	31.0P	32.1P	33.3P	34.5P	35.7P	36.9P	38.2P	39.5P
2.80	40.9P	42.3P	43.7P	45.2P	46.7P	48.3P	49.9P	51.5P	53.2P	55.0P
2.90	56.8P	58.6P	60.5P	62.4P	64.4P	66.4P	68.5P	70.7P	72.9P	75.2P
3.00	77.5P	79.9P	82.3P	84.8P	87.4P	90.0P	91.9P	93.8P	95.8P	97.8P
3.10	99.8P	102P	104P	106P	108P	110P	113P	115P	117P	120P
3.20	122P	124P	127P	129P	132P	134P	137P	140P	142P	145P
3.30	148P	150P	153P	156P	159P	162P	165P	168P	171P	174P
3.40	177P	180P	184P	187P	190P	194P	197P	201P	204P	208P
3.50	211P	215P	219P	222P	226P	230P	234P	238P	242P	246P
3.60	250P	253P	255P	258P	260P	263P	266P	268P	271P	274P
3.70	276P	279P	282P	284P	287P	290P	293P	296P	298P	301P
3.80	304P	307P	310P	313P	316P	319P	322P	325P	328P	331P
3.90	334P	337P	340P	343P	346P	349P	352P	355P	358P	362P

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
4.00	365P	368P	371P	375P	378P	381P	384P	388P	391P	395P
4.10	398P	401P	405P	408P	412P	415P	419P	422P	426P	429P
4.20	433P	436P	440P	443P	447P	451P	454P	458P	462P	466P
4.30	469P	473P	477P	481P	484P	488P	492P	496P	500P	504P
4.40	508P	512P	516P	520P	524P	528P	532P	536P	540P	544P
4.50	548P	552P	557P	561P	565P	569P	573P	578P	582P	586P
4.60	591P	595P	599P	604P	608P	612P	617P	621P	626P	630P
4.70	635P	639P	644P	649P	653P	658P	662P	667P	672P	676P
4.80	681P	686P	691P	696P	700P	705P	710P	715P	720P	725P
4.90	730P	735P	740P	745P	750P	755P	760P	765P	770P	775P
5.00	780P	784P	789P	793P	797P	801P	806P	810P	814P	819P
5.10	823P	828P	832P	836P	841P	845P	850P	854P	859P	863P
5.20	868P	872P	877P	881P	886P	890P	895P	899P	904P	909P
5.30	913P	918P	922P	927P	932P	936P	941P	946P	951P	955P
5.40	960P	965P	970P	975P	980P	985P	989P	994P	999P	1004P
5.50	1009P	1014P	1019P	1024P	1029P	1034P	1040P	1045P	1050P	1055P
5.60	1060P	1065P	1070P	1075P	1081P	1086P	1091P	1096P	1102P	1107P
5.70	1112P	1117P	1123P	1128P	1133P	1139P	1144P	1149P	1155P	1160P
5.80	1166P	1171P	1176P	1182P	1187P	1193P	1198P	1204P	1209P	1215P
5.90	1220P	1226P	1231P	1237P	1243P	1248P	1254P	1260P	1265P	1271P

G.H.	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
6.00	1277P	1282P	1288P	1294P	1299P	1305P	1311P	1317P	1323P	1328P
6.10	1334P	1340P	1346P	1352P	1358P	1364P	1369P	1375P	1381P	1387P
6.20	1393P	1399P	1405P	1411P	1417P	1423P	1429P	1435P	1442P	1448P
6.30	1454P	1460P	1466P	1472P	1478P	1484P	1491P	1497P	1503P	1509P
6.40	1516P	1522P	1528P	1534P	1541P	1547P	1553P	1560P	1566P	1572P
6.50	1579P	1585P	1592P	1598P	1605P	1611P	1618P	1624P	1631P	1637P
6.60	1644P	1650P	1657P	1663P	1670P	1677P	1683P	1690P	1696P	1703P
6.70	1710P	1716P	1723P	1730P	1737P	1743P	1750P	1757P	1764P	1771P
6.80	1777P	1784P	1791P	1798P						

---------- Notes ----------

All rated data has been coded as reliable
except where the following tags are used...
Fair
Poor

APPENDIX 9

STANDING OPERATING PROCEDURE FOR SMALL TO MEDIUM SPILLWAY DISCHARGES – SOP 14

Department of Environment and Resource Management

Copperfield River Gorge Dam

Standing Operating Procedures

for

Small to Medium Spillway Overflows

SOP - 14

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Appendices

Purpose

The Copperfield River Gorge Dam is managed by DERM. In terms of an MoU with DERM, the RoadTek Works Manager, Asset Services North, Cairns, manages the operation and maintenance of the Copperfield River Gorge Dam, including routine dam safety inspections.

Part of the dam safety management program is to inspect the Dam immediately before the spillway starts to overflow. A secondary objective is to advise tourists or campers to that access and egress to the area may be cut off due to local stream rises.

Scope

This Procedure applies to spillway overflow events that are less than the historical maximum event with a storage level of 589.72m. The personnel are the Emergency Action Plan (EAP) Officers listed in the EAP for Copperfield River Gorge Dam.

Personnel Affected and Responsibilities

Officer	Responsibility
RoadTek Engineer	A Registered Professional Engineer, Queensland, responsible for carrying out monthly inspections at the dam.
Emergency Action Plan Officers (EAP Officers)	The Officer based at Einasleigh and at or near Copperfield River Gorge Dam responsible for carrying out EAP procedures for the Dam and this Standing Operating Procedure.
Principal Engineer, Non-Commercial Assets	The person responsible for approving the persons undertaking the role of EAP Officers and, for managing, receiving, storing and checking data for the Copperfield River Gorge Dam, reviewing and authorising documentation produced by the RoadTek Officer and consultants on the dam and initiating investigations into abnormal behaviour of the dam. Manages the Distribution, Approval and Revision Control relating to this Procedure.
Regional Manager, Water Services, Central West Region, DERM	The person responsible for authorising/approving the Emergency Action Plan, the Standing Operating Procedures and the Operation and Maintenance Manual.

Procedures

The EAP Officer should be aware of the storage height and rainfall conditions, and be able to estimate when the spillway is likely to overflow. Details for obtaining information on rainfall, storage and river gauge heights from the Bureau of Meteorology website is given in Appendix 7 of the EAP.

- Two hours before the spillway is estimated to overflow, the EAP officer shall visit the dam if safe access is possible, and visually inspect the Dam for any deficiencies.
- Check for new cracking or increased crack widths in the spillway face and the roller compacted main wall. Appendix B gives a guide for inspecting the Dam for deficiencies.
- Advise any tourists or campers at the dam that they should consider leaving the site immediately, while access and egress to the site is open. If they are unable to leave the site because of local stream rises or other reasons they should seek higher ground above the Dam crest on the left bank of the river and await evacuation by police and emergency services.
- Close the gates to the dam site and display the dam site closed sign.
- Read the storage height gauge and rain gauge at the EAP Officer's residence at one-hour intervals.
- Notify the Police in Georgetown, and the Executive Officer, Local Disaster Management Group, Etheridge Shire Council that a spillway discharge is likely, the gates on the access road at Rycon Homestead have been closed and a sign installed that the dam site is closed. Also provide information of parties that are at the dam site and maybe unable to leave safely.
- At a reasonable time, notify the PE, NCA of storage height and that a spillway discharge is likely. Regularly update PE, NCA during the rainfall event - at least daily or as directed by the PE, NCA.
- Notify property owners and residents at Rycon Homestead, The Oaks Homestead and Kidston that the dam site has been closed and a spillway discharge is likely.
- If the storage level is predicted to reach 589.72m, the EAP Officer is to implement the Major Overflow Event in the EAP.
- When the preceding twelve-hour rainfall is less than 50mm and the storage height gauge is less than 587.0m and falling, and local stream rises have fallen sufficiently to allow access to and egress from the site, the EAP Officer is to make an inspection of the Dam and advise the PE, NCA.
- Once given permission by the PE, NCA the dam site can be opened to the public. The site may be closed for extended periods following an event due to flood waters on the access road.
- EAP Officer advises the Police in Georgetown, and the Executive Officer, Local Disaster Management Group, Etheridge Shire Council that the site has been opened to the public and stands down.

References

- Emergency Action Plan, Copperfield River Gorge Dam

Appendix B

INSPECTING FOR DEFICIENCIES: SUMMARY

TYPE OF DEFICIENCY	LOOK FOR
SEEPAGE	A water flow or sand boil on the lower portion of the downstream slope or toe area, especially at the groins. Leakage around conveyance structures such as outlet works. Wet areas or areas where the vegetation appears greener or more lush on the embankment slope or toe area. Blocked toe drains. An increase in the amount of water being released from toe drains. (Remember to take into account changes in the reservoir level.) Turbidity or cloudiness of the seepage.
CRACKING	Desiccation Cracking: A random honeycomb pattern of cracks usually found on the crest and the downstream slope. Transverse Cracking: Cracks that are perpendicular to the length of the dam usually found on the crest. Longitudinal Cracking: Cracks that are parallel to the length of the dam. Longitudinal cracks may be associated with stability problems in the slopes.
INSTABILITY	Slides on the upstream or downstream slopes. Bulging, especially at the toe of the dam.
DEPRESSIONS	Misalignment in the crest and embankment slopes found by sighting along fixed points. Sinkholes found by checking and probing each depression. Remember, sinkholes have steep, bucket like sides while minor depressions have gently sloping, bowl like sides.

MAINTENANCE CONCERNS	Inadequate Slope Protection: Check for bald areas or areas where the protection is sparse or damaged. Surface Runoff Erosion: Check for gullies or other signs of erosion. Make sure to check the low points along the upstream and downstream shoulders and groins since surface runoff can collect in these areas. Inappropriate Vegetative Growth: Check for excessive and deep rooted vegetative growth. Debris: Check for debris on and around the dam, especially near outlet works or spillway inlets. Animal Burrows: Check for damage caused by burrowing animals.

Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered above are very serious. If you observe any of the following deficiencies, you should consult with the PE, NCA:

- Sand boils or turbid seepage.
- Seepage that has increased since the last inspection (taking the reservoir level into consideration).
- Cracking that extends below the reservoir level or potential reservoir level.
- Transverse and longitudinal cracking.
- Deep seated slides or bulging associated with slides.
- Sinkholes or other large depressions.
- Deep rooted vegetation that might need to be removed.

If you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with the PE, NCA.

APPENDIX 10

ENVIRONMENTAL INCIDENT ALERTS

ENVIRONMENTAL INCIDENT ALERT

REGIONAL SERVICE DELIVERY DIVISION

DATE OF INCIDENT:

INCIDENT NOTIFIED BY:

TIME OF NOTIFICATION:

LOCATION OF INCIDENT:

SUMMARY OF INCIDENT AS NOTIFIED:

-
- Provide a brief dot point summary of the situation based on the information available

POTENTIAL IMPACTS:

-
- (this information can be based on advice from the company or source of the incident)
- Likelihood of unlawful environmental harm
- Likelihood of potential risk to public health (if public health risk is identified notify Queensland Health and provide details in this alert)

DERM's PLANNED ACTIONS:

-
- What actions has DERM taken
- What actions are proposed to be taken and timeframe for doing these

NEXT UPDATE ON INCIDENT EXPECTED:

-
- Date/time estimate

COMMUNICATION:

-
- What communications have been made?
- What public notifications have been made?
- What public notifications are expected?

MAP OR PLAN OF SITE:

-
- Where possible attach a map or plan which identifies the site and key features

Region:		
Briefing Officer:	Telephone: (07)	Date:
Approving Officer:	Telephone: (07)	Date:

From: Brown Damien
Sent: Wednesday, 24 February 2010 2:29 PM
To: Birchley Michael; Buckley Andrew; Hart Randall; Pappalardo Joe
Cc: Miles Rhonda
Subject: Environmental Incident Alert Process for Regional Service Delivery
Importance: High

Good afternoon

As you are aware, Minister Jones' office has requested to be informed immediately of any environmental incidents, the impacts of such and proposed actions by the department. Due to the volume and urgent nature of these alerts I have attached a template that we will use to ensure that consistent and timely responses are provided across Regional Service Delivery, a similar process to what is used for DLO responses.

The attached template is to be used to advise as soon as possible on environmental incidents, such as fish kills, mine discharges, potential environmental harm due to spills, etc. **All information is to be approved by the relevant RSD** and emailed to the following parties:

- John Bradley, Director General;
- Terry Wall , Associate Director General;
- Debbie Best, DDG
- Michael Dart, Senior Policy Advisor to Minister Kate Jones;
- Joshua Cooney, Ministerial Media Officer to Kate Jones;
- Paul Michaels, Director DERM Media unit;
- Damine Brown, ADG RSD
- Kim Harycki , PA RSD

The email is to be sent **by the RSD only**. The email heading is to read "(Minister Jones) Environmental Incident Alert - *subject*" and a brief description is to be provided in the body of the email.

This process is not intended to replace suitable briefing notes on issues when time avails or phone contact with people like me to alert on incidents in a timely way. It is intended only to provide a suitable early alert to a wide group of parties of an incident that we have been notified of. It is not intended to be an onerous process or to delay any action or response. The template should be completed as quickly as possible and if something is unknown, then write in "unknown", don't hold up providing the advice seeking further information, early is better.

I would appreciate you distributing this template to officers within your region for **immediate use**.

If you have any queries in relation to the use of this form, please contact Kim direct.

Regards

Damien Brown
Assistant Director-General
Regional Service Delivery
Telephone: [redacted]
Mobile: [redacted]
Email: [redacted]
www.derm.qld.gov.au

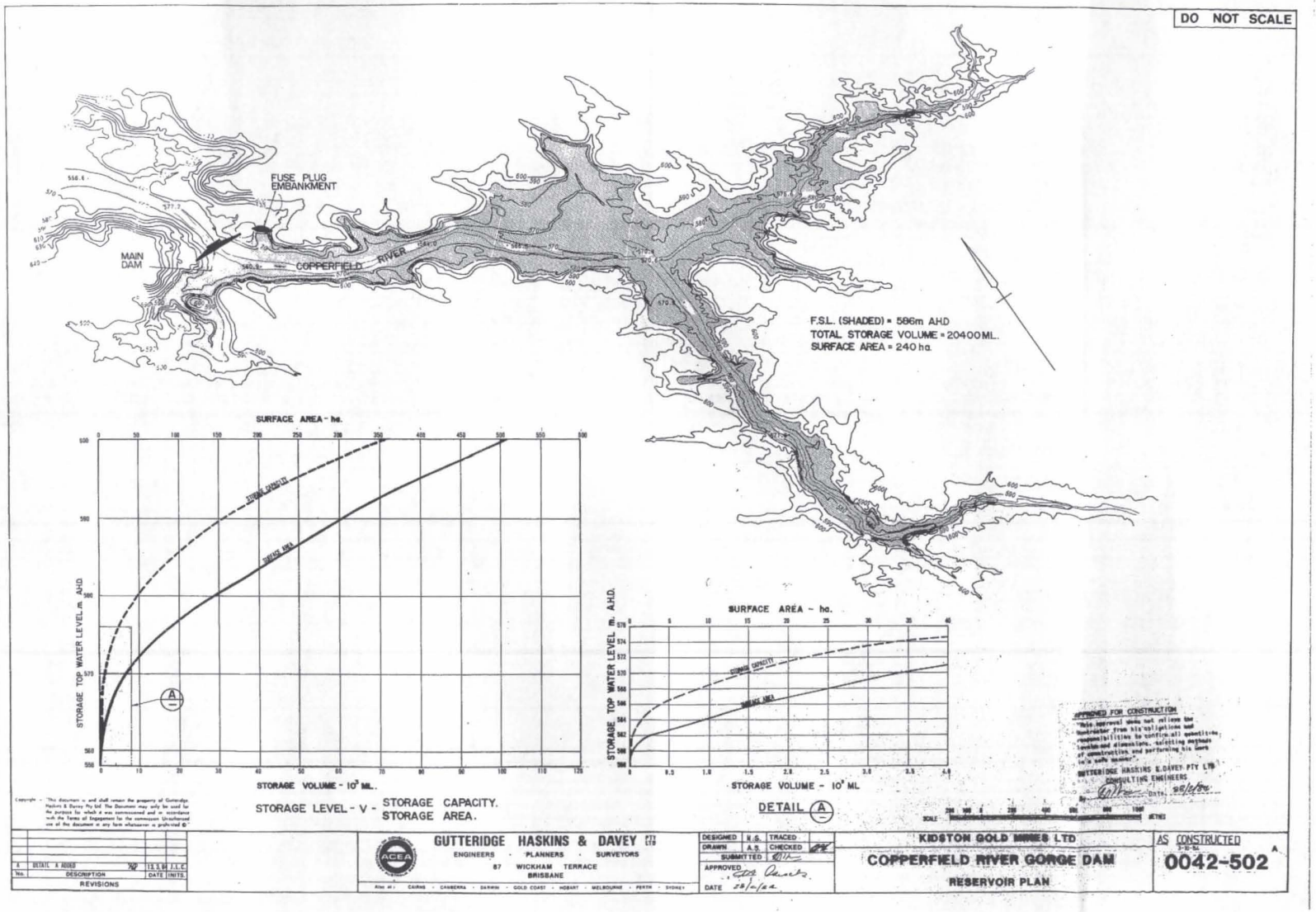
Department of Environment and Resource Management
Level 13
400 George Street, Brisbane Q 4000
GPO Box 2454, Brisbane Q 4001

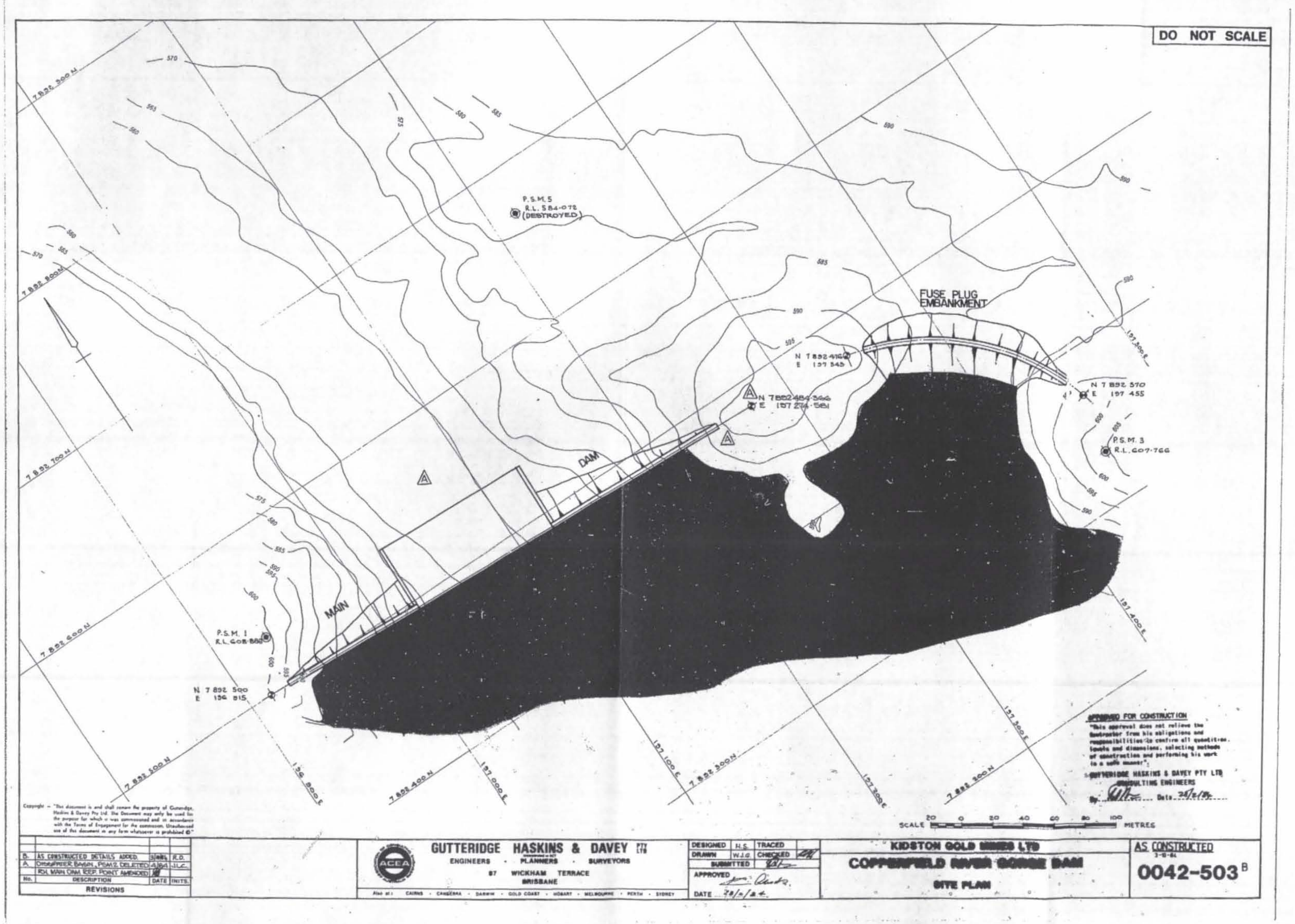
Relevant email addresses:-

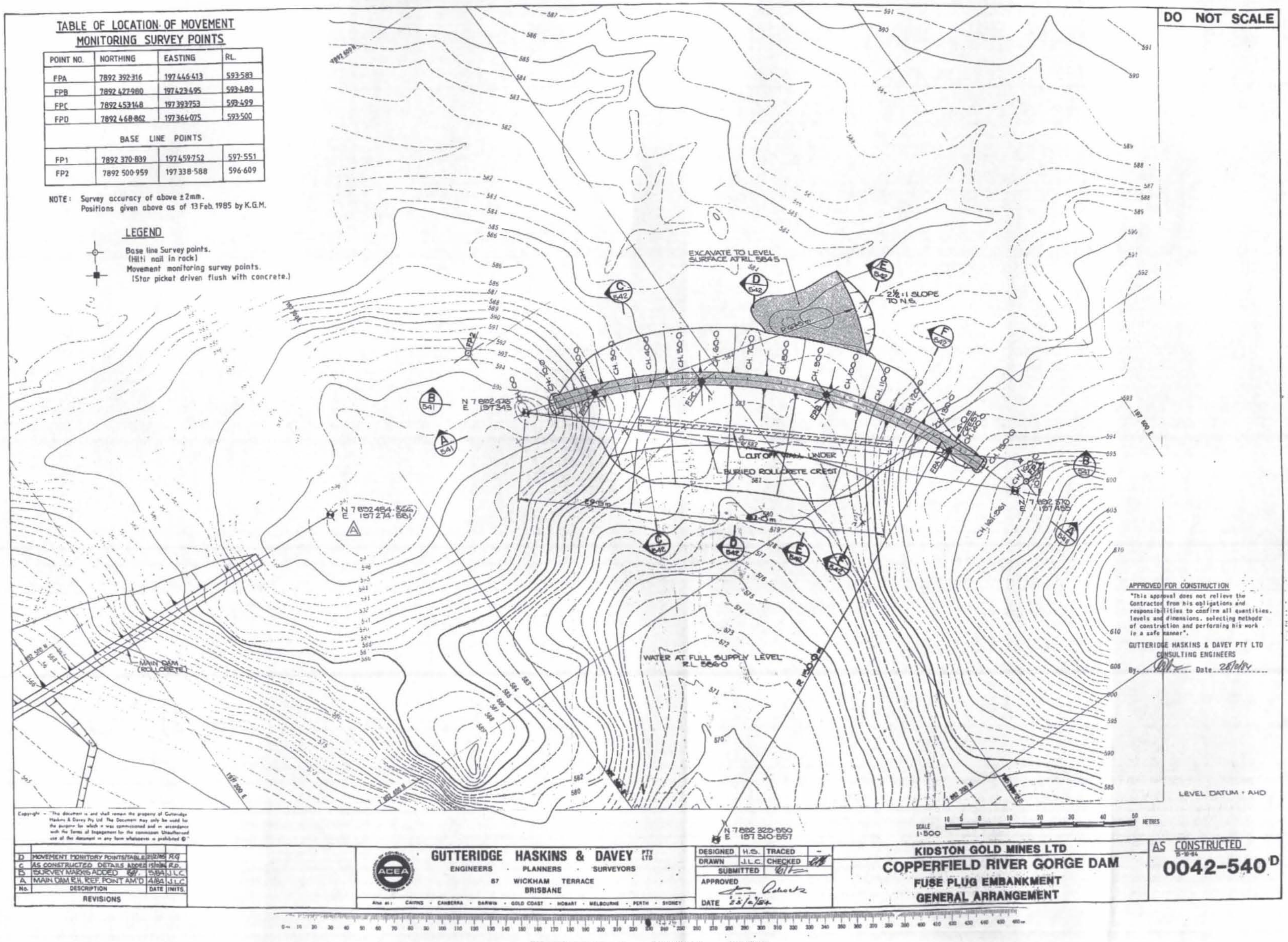
[redacted]

[redacted]

DRAWINGS

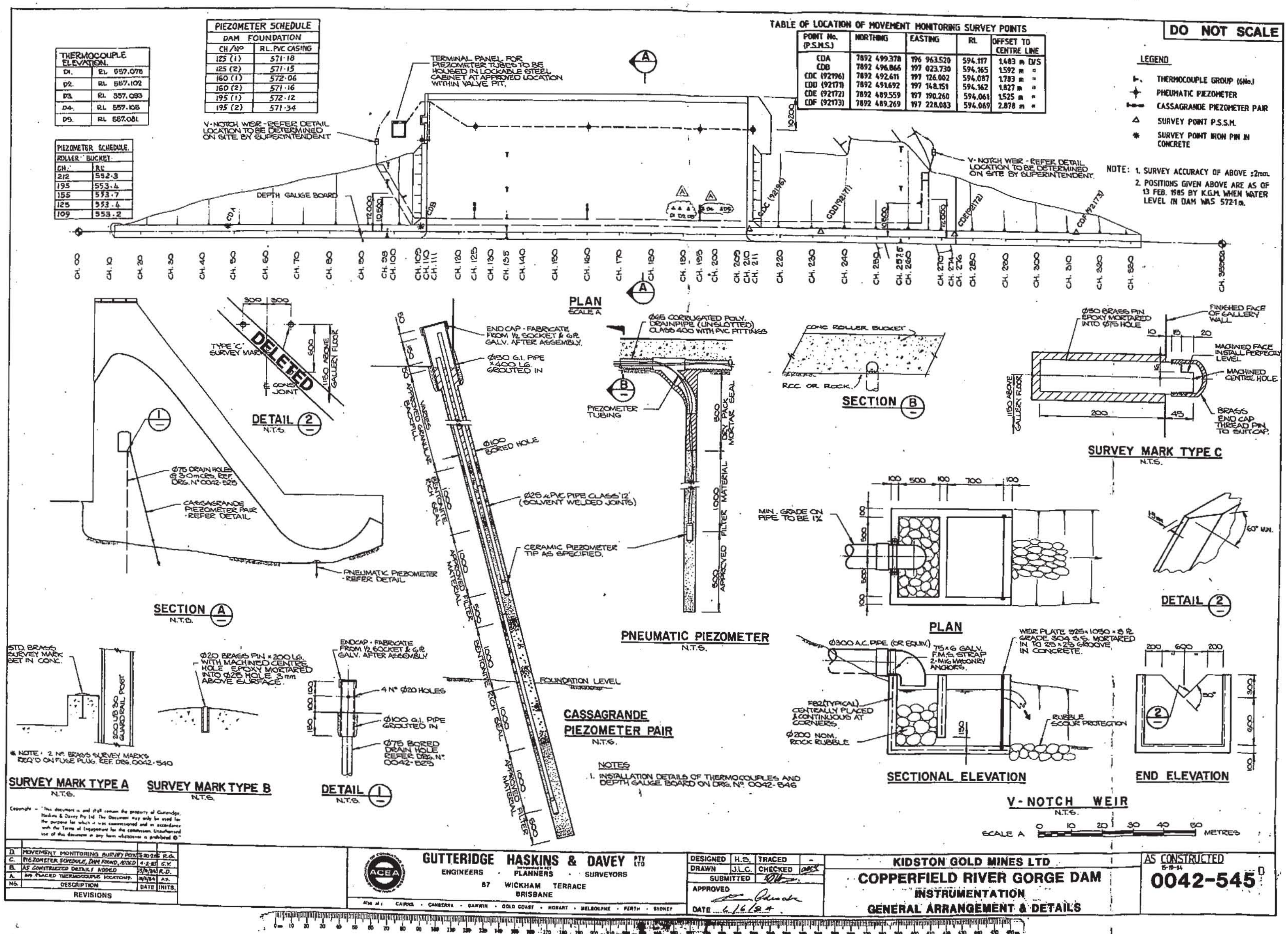

DO NOT SCALE
FUSE PLUG EMBANKMENT
MAIN DAM
COPPERFIELD RIVER
F.S.L. (SHADED) = 586m A.H.D
TOTAL STORAGE VOLUME = 20400 ML.
SURFACE AREA = 240 ha.
SURFACE AREA - ha.
STORAGE CAPACITY
SURFACE AREA
STORAGE TOP WATER LEVEL m. A.H.D.
STORAGE VOLUME - 10³ ML.
STORAGE LEVEL - V - STORAGE CAPACITY. STORAGE AREA.
DETAIL A
APPROVED FOR CONSTRUCTION
GUTTERIDGE HASKINS & DAVEY PTY LTD
CONSULTING ENGINEERS
GUTTERIDGE HASKINS & DAVEY PTY LTD
ENGINEERS · PLANNERS · SURVEYORS
87 WICKHAM TERRACE
BRISBANE
KIDSTON GOLD MINES LTD
COPPERFIELD RIVER GORGE DAM
RESERVOIR PLAN
AS CONSTRUCTED
0042-502
REVISIONS


DO NOT SCALE
P.S.M.5
R.L. 584·072
(DESTROYED)
FUSE PLUG
EMBANKMENT
MAIN
DAM
P.S.M.3
R.L. 607·766
P.S.M. 1
R.L. 608·882
N 7 892 570
E 157 455
N 7 892 500
E 156 815
SCALE
METRES
GUTTERIDGE HASKINS & DAVEY PTY LTD
ENGINEERS · PLANNERS · SURVEYORS
87 WICKHAM TERRACE
BRISBANE
KIDSTON GOLD MINES LTD
COPPERFIELD RIVER GORGE DAM
SITE PLAN
AS CONSTRUCTED
0042-503 B
REVISIONS



POINT NO.	NORTHING	EASTING	RL.
FPA	7892 392·316	197 446·413	593·583
FPB	7892 427·980	197 423·495	593·489
FPC	7892 453·148	197 393·753	593·499
FPD	7892 468·862	197 364·075	593·500
BASE LINE POINTS			
FP1	7892 370·839	197 459·752	597·551
FP2	7892 500·959	197 338·588	596·609

No.	DESCRIPTION	DATE	INITS.
D	MOVEMENT MONITORY POINTS/TABLE	21/2/85	R.G.
C	AS CONSTRUCTED DETAILS ADDED	15/10/84	R.D.
B	SURVEY MARKS ADDED	5/84	J.L.C.
A	MAIN DAM R.H. REF. POINT AM'D	4/84	J.L.C.


DO NOT SCALE
PIEZOMETER SCHEDULE
DAM FOUNDATION
THERMOCOUPLE ELEVATION
TABLE OF LOCATION OF MOVEMENT MONITORING SURVEY POINTS
LEGEND
THERMOCOUPLE GROUP (6No.)
PNEUMATIC PIEZOMETER
CASSAGRANDE PIEZOMETER PAIR
SURVEY POINT P.S.S.M.
SURVEY POINT IRON PIN IN CONCRETE
PLAN
SCALE A
SECTION A
DETAIL 2
PNEUMATIC PIEZOMETER
CASSAGRANDE PIEZOMETER PAIR
SECTION B
SURVEY MARK TYPE C
PLAN
SECTIONAL ELEVATION
END ELEVATION
V-NOTCH WEIR
SURVEY MARK TYPE A
SURVEY MARK TYPE B
DETAIL 1
GUTTERIDGE HASKINS & DAVEY PTY LTD
ENGINEERS · PLANNERS · SURVEYORS
87 WICKHAM TERRACE BRISBANE
KIDSTON GOLD MINES LTD
COPPERFIELD RIVER GORGE DAM
INSTRUMENTATION
GENERAL ARRANGEMENT & DETAILS
AS CONSTRUCTED
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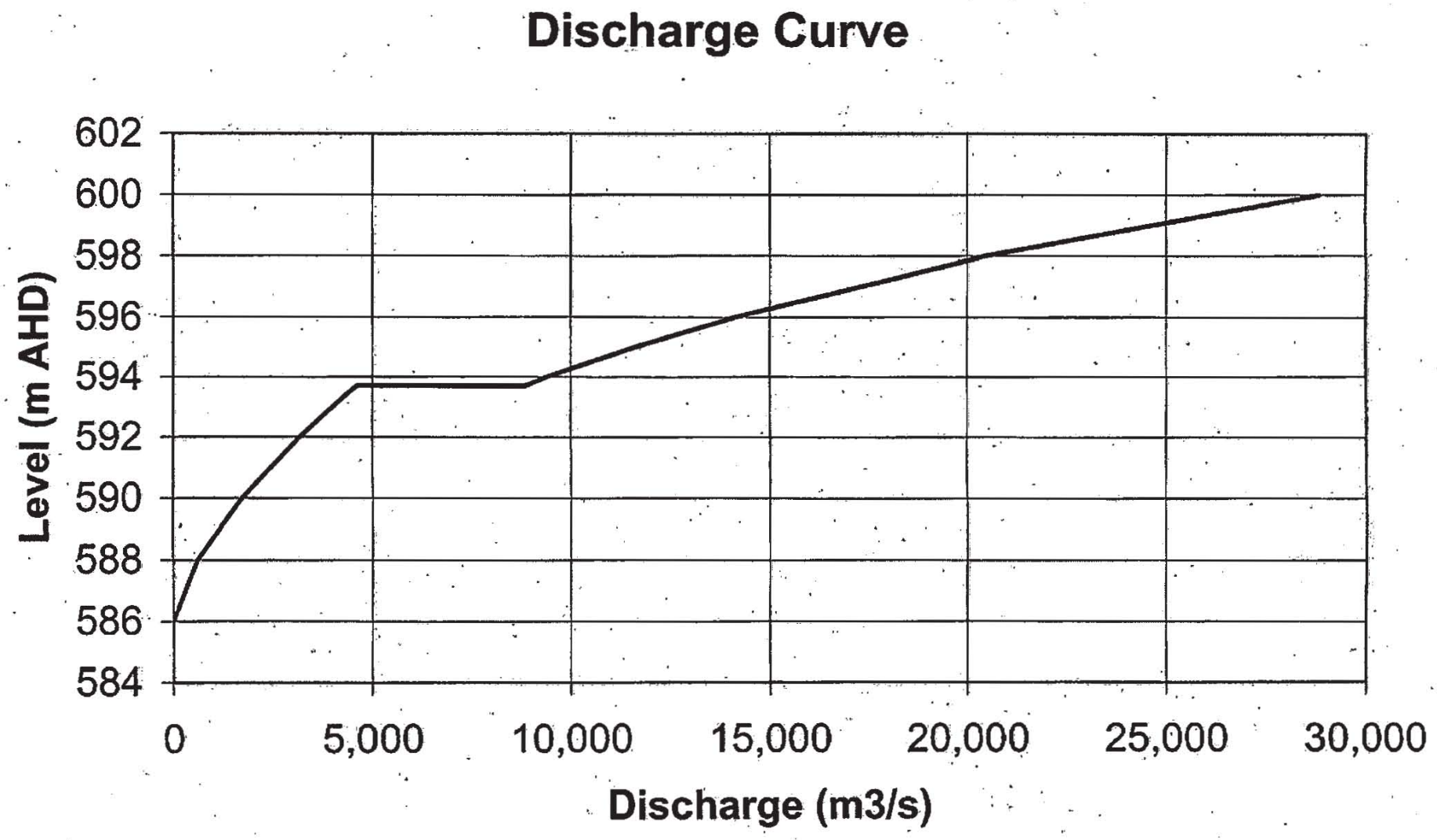

Discharge Curve
Level (m AHD)
602
600
598
596
594
592
590
588
586
584
0
5,000
10,000
15,000
20,000
25,000
30,000
Discharge (m3/s)

Copperfield River Gorge Dam
Design Flood Hydrology

Elevation (m AHD)	Storage (m^3)	Overflow Length (m)				Discharge (m^3/s)				Total outflow (m^3/s)
		Main Dam	Spillway	Top width of Fuse Plug	Earth Embankment	Main Dam	Spillway	Fuse Plug	Earth Embankment	
558	0	0	100							
560	1,000,000	0	100							
570	2,000,000	0	100							
572	3,000,000	0	100							
574	6,000,000	0	100							
580	10,000,000	0	100							
582	15,000,000	0	100							
584	17,000,000	0	100							
586	20,400,000	0	100				0			0
588	25,500,000	0	100				608			608
590	31,000,000	0	100				1,720			1,720
592	38,130,000	0	100				3,160			3,160
593.5	45,250,000	0	100	130			4,416	0		4,416
593.7	45,650,000	0	100	130			4,594	17		4,611
593.71	45,670,000	0	100	130			4,603	4,255		8,858
593.75	45,750,000	0	100	131			4,639	4,304		8,942
594	46,250,000	240	100	133	0	0	4,865	4,522	0	9,387
595	50,000,000	240	100	142	7	326	5,805	5,476	10	11,618
596	55,000,000	240	100	142	32	923	6,799	6,277	131	14,130
598	63,000,000	240	100	142	79	2,611	8,937	7,983	916	20,448
600	71,500,000	240	100	142	139	4,797	11,262	9,822	2,962	28,843

Copperfield River Gorge Dam
Design Flood Hydrology
Based on Revised PMP Estimates

TABLE F1 - Inflow and Outflow Hydrographs for the 6 hour Critical Storm Duration for the Design AEPs - Copperfield River Gorge Dam

													Dam Crest Flood										Prob Max Flood	
AEP (1 in Y)	50		100		200		500		1000		2000		5000		7000		10000		50000		100000		810000	
Flow (m3/s)	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
Time Inc (hrs)																								
0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.3	163	10	171	10	197	12	236	14	261	16	298	18	364	22	384	23	412	25	553	33	638	39	1028	62
0.6	321	38	338	40	388	46	456	54	512	61	576	68	707	84	745	89	797	95	1090	129	1267	149	2086	243
0.9	527	85	549	89	631	102	747	121	843	136	945	152	1150	187	1217	197	1304	211	1800	288	2102	334	3505	553
1.2	612	143	640	150	737	172	881	205	998	231	1128	259	1388	317	1471	335	1582	359	2221	497	2617	580	4497	1199
1.5	739	208	774	218	896	250	1080	299	1231	337	1400	381	1741	468	1851	496	1998	533	2854	833	3395	1041	6024	2001
1.8	902	282	948	296	1105	341	1345	409	1543	464	1767	527	2222	681	2369	747	2566	833	3725	1318	4465	1611	8088	3000
2.1	1113	370	1171	388	1373	450	1685	543	1942	627	2234	770	2827	1045	3019	1131	3277	1245	4795	1898	5766	2303	10501	4116
2.4	1306	472	1380	496	1628	577	2003	761	2316	923	2671	1101	3400	1452	3633	1563	3947	1711	5797	2568	6977	3105	12714	10120
2.7	1621	592	1711	633	2015	804	2479	1053	2866	1252	3302	1473	4185	1913	4470	2054	4852	2241	7098	3312	8526	3921	15439	12003
3.0	1804	803	1904	884	2251	1066	2772	1363	3210	1603	3700	1872	4698	2411	5022	2583	5451	2814	7986	4048	9595	9029	17418	13892
3.3	2107	1030	2224	1100	2623	1336	3218	1684	3719	1970	4280	2289	5428	2934	5796	3140	6286	3384	9189	8905	11030	9743	19987	16678
3.6	2328	1263	2454	1344	2897	1616	3554	2019	4112	2352	4733	2725	6005	3443	6417	3659	6959	3948	10182	9418	12224	10685	22111	19270
3.9	2566	1496	2706	1587	3196	1898	3918	2357	4534	2741	5218	3167	6621	3942	7078	4196	7672	7631	11215	10050	13450	11711	24204	21805
4.2	2810	1731	2963	1833	3500	2183	4290	2701	4965	3136	5712	3567	7247	4544	7744	7738	8392	8363	12240	10870	14654	12713	26165	24137
4.5	2990	1960	3155	2074	3730	2464	4578	3042	5293	3485	6095	3973	7735	7719	8262	8264	8953	8873	13014	11709	15547	13730	27510	25989
4.8	3136	2177	3308	2301	3910	2731	4802	3341	5554	3822	6387	4368	8111	8123	8659	8653	9377	9078	13569	12383	16164	14858	28299	27295
5.1	3307	2382	3487	2517	4118	2984	5053	3617	5838	4148	6703	6701	8499	8484	9064	8905	9805	9408	14095	13000	16731	15794	28915	28194
5.4	3405	2574	3591	2718	4242	3211	5193	3879	5991	4521	6872	6872	8702	8715	9269	9078	10015	9652	14298	13506	16914	16394	28841	28645
5.7	3511	2747	3701	2900	4365	3401	5330	4119	6134	6134	7022	7021	8871	8857	9436	9256	10181	9868	14418	13866	16986	16718	28543	28678
6.0	3534	2899	3721	3060	4385	3570	5344	4331	6141	6142	7010	7011	8842	8856	9396	9355	10123	10002	14222	14054	16687	16789	27637	28247
6.3	3535	3024	3719	3186	4368	3710	5302	5302	6075	6075	6915	6915	8674	8662	9204	9319	9898	10006	13781	14032	16095	16540	26242	27314
6.6	3526	3124	3706	3277	4339	3822	5246	5247	5991	5992	6800	6801	8488	8501	8991	9173	9651	9891	13306	13820	15464	16080	24804	26060
6.9	3494	3195	3669	3348	4281	3908	5153	5154	5868	5887	6636	6638	8243	8232	8717	8963	9338	9696	12745	13477	14738	15490	23250	24640
7.2	3437	3242	3605	3398	4192	3963	5023	5024	5699	5700	6424	6426	7938	7952	8380	8385	8958	9428	12101	13024	13923	14793	21603	23100
7.5	3359	3269	3519	3427	4078	3993	4864	4864	5498	5499	6177	6177	7590	7579	7998	7996	8532	8997	11408	12480	13060	14050	19938	21480
7.8	3265	3276	3416	3434	3944	3996	4681	4682	5273	5274	5902	5904	7212	7226	7587	7592	8076	8142	10688	11867	12177	13435	18288	19938
8.1	3157	3265	3299	3421	3794	3974	4481	4590	5029	5030	5609	5610	6816	6805	7157	7158	7603	7649	9963	11149	11296	12708	16717	18481
8.4	3038	3236	3171	3388	3632	3929	4269	4498	4774	4775	5306	5308	6411	6425	6721	6728	7125	7157	9247	10398	10437	11821	15219	16978
8.7	2911	3190	3035	3339	3463	3862	4050	4392	4513	4600	4999	5000	6007	5997	6287	6286	6652	6674	8553	9670	9611	11038	13818	15507
9.0	2779	3126	2894	3273	3289	3777	3829	4313	4252	4507	4694	4696	5610	5623	5862	5867	6191	6173	7889	7892	8827	10155	12523	14117
9.3	2645	3044	2750	3195	3115	3677	3608	4210	3994	4388	4395	4572	5225	5215	5452	5450	5747	5768	7261	7263	8092	9316	11335	13179
9.6	2510	2952	2607	3098	2941	3564	3392	4088	3742	4298	4105	4435	4856	4868	5059	5064	5324	5307	6673	6675	7408	7411	10253	12161
9.9	2376	2852	2465	2987	2771	3441	3182	3947	3500	4180	3828	4342	4505	4600	4688	4686	4925	4945	6125	6127	6776	6779	9272	11067
10.2	2244	2745	2325	2871	2606	3310	2980	3796	3267	4041	3564	4229	4175	4489	4338	4559	4550	4606	5618	5620	6194	6198	8384	9982
10.5	2116	2634	2191	2750	2447	3174	2786	3637	3047	3887	3314	4092	3865	4366	4011	4408	4201	4510	5151	5153	5661	5664	7584	7871
10.8	1992	2520	2061	2627	2294	3018	2603	3473	2838	3723	3079	3936	3576	4254	3707	4312	3876	4376	4722	4724	5173	5175	6863	7131
11.1	1874	2405	1936	2504	2149	2861	2429	3307	2642	3552	2859	3767	3307	4112	3424	4182	3576	4262	4328	4580	4728	4731	6215	6465
11.4	1761	2289	1817	2380	2011	2708	2265	3137	2458	3377	2654	3591	3057	3950	3162	4027	3298	4118	3968	4403	4323	4560	5633	5867
11.7	1653	2175	1705	2258	1881	2558	2112	2951	2286	3203	2462	3412	2826	3775	2920	3855	3042	3953	3640	4299	3955	4401	5111	5329
12.0	1551	2062	1598	2139	1759	2413	1968	2772	2126	3012	2285	3231	2613	3591	2697	3673	2808	3774	3340	4156	3620	4294	4642	4852
12.3	1455	1952	1497	2023	1644	2273	1834	2601	1976	2823	2120	3038	2416	3404	2492	3485	2590	3587	3068	3992	3316	4150	4221	4507
12.6	1364	1845	1403	1910	1536	2139	1709	2438	1838	2643	1968	2843	2235	3216	2303	3296	2391	3396	2817	3809	3040	3981	3843	4371
12.9	1278	1742	1314	1802	1438	2010	1592	2283	1709	2472	1827	2657	2068	3014	2129	3102	2208	3205	2591	3817	2789	3796	3503	4250
13.2	1198	1643	1231	1698	1342	1888	1484	2137	1590	2311	1696	2481	1915	2813	1970	2895	2041	2999	2384	3420	2562	3601	3198	4094
13.5	1123	1548	1153	1598	1254	1772	1384	1998	1480	2158	1576	2315	1774	2623	1824	2699	1888	2795	2196	3224	2355	3402	2924	3914
13.8	1053	1458	1080	1503	1172	1662	1290	1868	1378	2015	1465	2159	1645	2443	1689	2513	1747	2603	2025	3013	2168	3204	2676	3720
14.1	987	1371	1012	1413	1096	1558	1204	1746	1284	1880	1363	2012	1526	2275	1566	2339	1619	2422	1869	2804	1998	2989	2453	3516
14.4	926	1290	948	1328	1026	1460	1124	1632	1196	1754	1268	1875	1416	2117	1453	2176	1501	2253	1727	2606	1843	2779	2252	3314
14.7	868	1213	889	1248	960	1368	1050	1525	1116	1637	1181	1748	1318	1969	1349	2024	1392	2094	1597	2420	1702	2581	2070	3107
15.0	815	1140	834	1172	899	1282	981	1424	1041	1527	1101	1628	1224	1832	1254	1882	1293	1947	1479	2247	1573	2395	1905	2887

ENVIRONMENTAL INCIDENT ALERT

REGIONAL SERVICE DELIVERY DIVISION

DATE OF INCIDENT:

INCIDENT NOTIFIED BY:

TIME OF NOTIFICATION:

LOCATION OF INCIDENT:

SUMMARY OF INCIDENT AS NOTIFIED:

-
- Provide a brief dot point summary of the situation based on the information available

POTENTIAL IMPACTS:

-
- (this information can be based on advice from the company or source of the incident)
- Likelihood of unlawful environmental harm
- Likelihood of potential risk to public health (if public health risk is identified notify Queensland Health and provide details in this alert)

DERM's PLANNED ACTIONS:

-
- What actions has DERM taken
- What actions are proposed to be taken and timeframe for doing these

NEXT UPDATE ON INCIDENT EXPECTED:

-
- Date/time estimate

COMMUNICATION:

-
- What communications have been made?
- What public notifications have been made?
- What public notifications are expected?

MAP OR PLAN OF SITE:

-
- Where possible attach a map or plan which identifies the site and key features

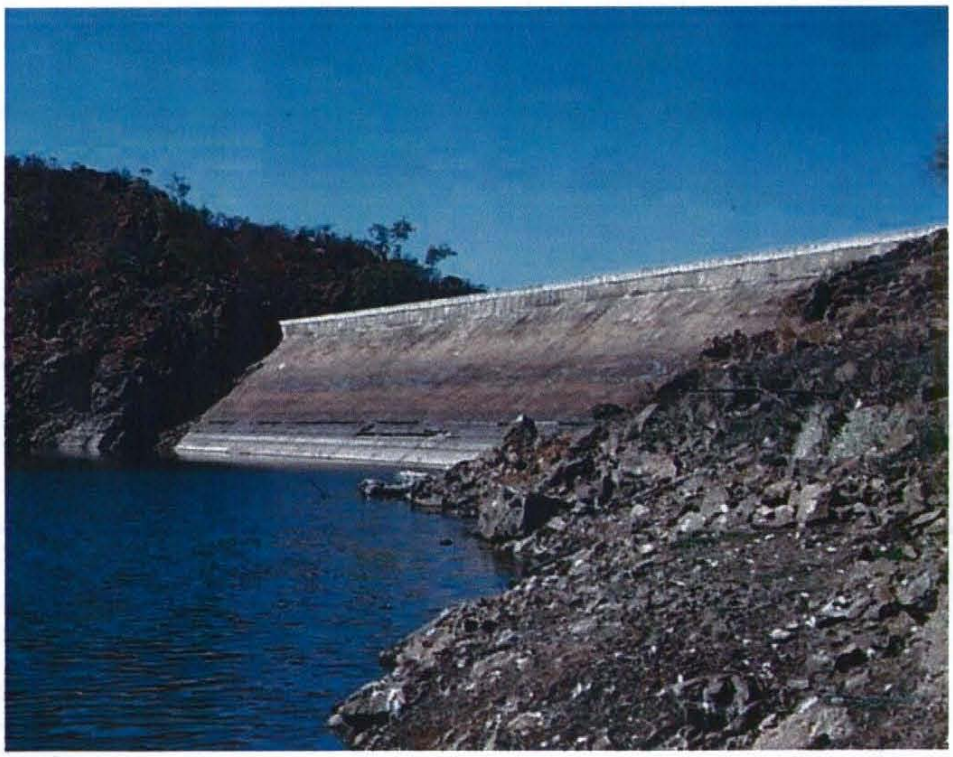
Region:		
Briefing Officer:	Telephone: (07)	Date:
Approving Officer:	Telephone: (07)	Date:

Department of Environment
and Resource Management

EMERGENCY ACTION PLAN

Corella Dam

Revision 8, October 2010



Queensland Government

EMERGENCY ACTION PLAN – CORELLA DAM

Prepared by:
Non-Commercial Assets
Department of Environment and Resource Management

October 2010

Preparation And Authorisation

This Emergency Action Plan was prepared by Principal Engineer, Non-Commercial Assets.

Preparation:

Date: _____

William Steen, Principal Engineer,
Non-Commercial Assets, DERM

Approved:

Date: _____

Daniel Larsen, A/Regional Manager,
Water Services, Central West Region, DERM

Revision Status

Revision No.	Date	Revision Description
0	20 February 2004	Original Issue
1	8 September 2004	Updated Notification Listing
2	18 February 2005	Updated Notification Listing
3	November 2005	EAP Update - November 2005
4	January 2007	EAP Update - January 2007
5	18 September 2007	Updated Notification Listing
6	March 2008	Contacts list updated and documentation revision
7	October 2009	Contacts list updated and documentation revision
8	October 2010	Contacts list updated and documentation revision

CONTENTS PAGE

1.0 CONTROLLED COPY DISTRIBUTION LIST

Copy Number	Position	Location
1	EAP Officer	Cloncurry
2	EAP Backup 1	Cloncurry
3	EAP Backup 2	Cloncurry
4	Regional Manager, Water Services, North Region, DERM	Cairns
5	Principal Engineer, Non-Commercial Assets	Rockhampton
6	Regional Manager, Water Services, Central West Region, DERM	Rockhampton
7	Director Dam Safety, DERM	Brisbane
8	Officer In Charge, Police	Cloncurry
9	Disaster District Coordinator	Mt Isa
10	Chief Executive Officer, Local Disaster Management Group, (CEO)	Cloncurry Shire Council
11	Director, Disaster Operations, Emergency Management Queensland	Brisbane
12	Area Director, Emergency Management Queensland	Mt Isa
13	Regional Director, Northern Region, Emergency Management Queensland	Townsville
14	Station "Corella Park" (Anthony McMillan)	Via Cloncurry

2.0 NOTIFICATION LIST

Title/Name	Phone Business	Phone A/H	Phone Mobile	Fax
EAP Officers UHF radio channel 40 EAP Officer (John Doyle)(Note 1) EAP Backup 1 (Logitharan Lokanantham) (Note 1) EAP Backup 2 (Alby Anderson)	[redacted]			
Regional Management Regional Service Director North Region (Andrew Buckley) Regional Manager, Water Services, Central West Region (Ed Donohue) Regional Manager, Water Services, North Region (Nigel Kelly) Principal Engineer, Non-Commercial Assets (William Steen)				
Dam Safety Group Director Dam Safety (Peter Allen) Principal Engineer, Dam Safety (Ron Guppy)				

Note 1: Satellite phone carried by EAP officers at site will vary. Use emergency number in first instance.

NOTIFICATION LIST (continued)

TITLE/NAME	Phone Business	Phone A/H	Phone Mobile/Satellite	Fax
Counter Disaster Groups Regional Director, Northern Region, Emergency Management Queensland (Warren Bridson) Area Director, Mt Isa Emergency Management Queensland (Elliott Dunn) Executive Officer Local Disaster Management Group (CEO Craig Turnour) Emergency Management Queensland Duty Officer Chemical Hazards Emergency Management Services Scientific Unit (Michael Logan) Queensland Fire and Rescue Services Chemical Hazards Unit	[redacted] 000			
Police Police Cloncurry Officer In Charge (In an emergency 000) Disaster District Coordinator (Senior Sergeant Cameron Barwick)	[redacted]			
Landowners "Timberu" (Col Thomson) "Mt Rosby"(Harold McMillan) "Corella Park" (Anthony & Jane McMillan) "Carsland" (Mark McMillan)	[redacted]			

3.0 PREPARATION AND USE OF THIS EMERGENCY ACTION PLAN

3.1 PURPOSE

The purpose of this Emergency Action Plan is to pre-plan the co-ordination of necessary actions by the Department of Environment and Resource Management (DERM), and to provide timely notification to police, local counter disaster groups, the Department's Dam Safety Group and affected persons in the event of an emergency condition or potential emergency condition associated with Corella Dam.

3.2 SCOPE

This document applies to Corella Dam, and:

- Identifies emergency conditions which could endanger the integrity of the dam and which require immediate action;
- Prescribes procedures that are to be followed in the event of an emergency condition developing;
- Describes roles and responsibilities for EAP officers and Departmental staff;
- Predicts flood levels at "Corella Park" Station for various scenarios;
- Provides inspection officers with a list of potential problems that could arise at the dam.

3.3 REFERENCES

Workplace Health and Safety Act 1995

DERM-RoadTek Memorandum of Understanding (2009)

Standing Operating Procedures

Operation and Maintenance Manual

Storage Log Book

Corella Dam FIA, GHD July 2008

3.4 DEFINITIONS

Emergency:

An emergency is an acute situation, which endangers life or property. For this Emergency Action Plan an emergency is an event described in Section 6 - EMERGENCY EVENTS AND ACTIONS.

EAP Officer:

EAP Officer is responsible for actions during events outlined in this Emergency Action Plan.

EAP Backup 1 and 2:

EAP Backup 1 and 2 are to undertake the duties of the EAP Officer in that officer's incapacity to undertake those duties described in this Emergency Action Plan through absence or otherwise, and to assist the EAP Officer in times of emergency.

3.5 ABBREVIATIONS

AHD	Australian Height Datum
DERM	Department of Environment and Resource Management
EAP	Emergency Action Plan
FIA	Failure Impact Assessment

3.6 PERSONNEL AFFECTED AND RESPONSIBILITIES

3.6.1 EAP Officer

EAP Officer shall:

- Monitor the dam for any potential emergency conditions.
- Follow the Emergency Action Plan in time of emergency. If unable to notify Principal Engineer, Non-Commercial Assets then contact shall be made with Regional Manager, Water Services, Central West Region.
- During an emergency event, report to and receive instructions from the Principal Engineer, Non-Commercial Assets or if cannot be contacted, the Regional Manager, Water Services, Central West Region, or if cannot be contacted, the Regional Manager, Water Services, North Region.
- In an emergency event, take steps to ensure personal safety and the safety of other EAP Officers and the public.
- During an emergency maintain records and take photographs.
- Immediately fax or phone all recordings to the Principal Engineer, Non-Commercial Assets for evaluation during the emergency or if cannot be contacted, the Regional Manager, Water Services, Central West Region.
- During an emergency event, provide status reports to the Executive Officer, Local Disaster Management Group, Cloncurry Shire Council. These reports shall contain factual information such as water level and rainfall recordings. Projections or opinions based on past experience of similar events or specialist knowledge may be given. The EAP Officer may give ONLY factual information to the media and the public.

- In the likelihood of adverse weather or stream flow conditions or at any other time that EAP Officer is unable to fulfil the duties, advise EAP Backup 1 and 2 of any intended absence from the area and leave a point of contact.
- Immediately notify the EAP Backup officers when the Emergency Action Plan is being initiated.
- Make contact with telephone numbers and facsimile numbers of the Notification List of the Emergency Action Plan by 1st September each year.
- Notify the Principal Engineer, Non-Commercial Assets in writing of any changes to names and numbers on the Notification List of the Emergency Action Plan.
- Notify Principal Engineer, Non-Commercial Assets in writing of names and contact details of personnel undertaking and/or relieving the role of EAP Officer and EAP Backup 1 and 2.
- Keep the Emergency Action Plan in a clean, secure facility, which is easily accessible during an impending emergency event.
- Maintain the Storage Log Book as described in Section 3.7.
- After an emergency event, with the exception of Event 1, prepare an Emergency Event Report as described in Section 3.8. Immediately after the event this report shall be sent to Principal Engineer, Non-Commercial Assets.

3.6.2 EAP Backup 1 and 2

EAP Backup 1 and 2 shall:

- Assist the EAP Officer in times of emergency.
- Undertake the responsibilities of the EAP Officer should that person be unavailable.
- If, during adverse weather conditions, EAP Backup 1 and 2 have not been contacted by EAP Officer they shall:
    - Attempt to contact EAP Officer ,
    - Enact the Emergency Action Plan if contact with the EAP Officer cannot be made.

3.6.3 Principal Engineer, Non-Commercial Assets

Principal Engineer, Non-Commercial Assets shall:

- Ensure this Emergency Action Plan is implemented.
- Approve the person undertaking and/or relieving in the role of EAP Officer and EAP Backup 1 and 2.
- Ensure the EAP Officer and EAP Backup 1 and 2 are conversant with the Emergency Action Plan.
- Review the Emergency Action Plan in consultation with Regional Manager, Water Services, Central West Region, by 1st September each year.
- Ensure the Emergency Action Plan is distributed according to the Distribution List and that the police and counter disaster organisations are conversant with the plan.
- Notify Director, Dam Safety and Regional Manager, Water Services, Central West Region, of any emergency situation.
- Only on delegation from the Regional Manager, Water Services, Central West Region at the time of each event, act for and on behalf of the Regional Manager during the emergency.
- Monitor emergency condition.
- Evaluate situation on best available information.
- Advise Director, Dam Safety and Regional Manager, Water Services, Central West Region during an emergency event.
- Post analyse and report event to Director Dam Safety and Regional Manager, Water Services, Central West Region.
- Provide an environmental alert to Regional Manager, Water Services, Central West Region. A template is provided in Appendix 9.
- Within thirty (30) days of an event, present an Emergency Event Report to Director Dam Safety and Regional Manager, Water Services, Central West Region.

3.6.4 Regional Manager, Water Services

Regional Manager, Water Services, Central West Region, shall:

- Review each Emergency Action Plan in consultation with the Principal Engineer, Non-Commercial Assets by 1st October each year.
- Direct the actions of departmental personnel during an emergency to protect life and property to the maximum extent considered possible under the prevailing conditions and with the resources available.
- Delegate role of Regional Manager, Water Services, Central West, in his/her absence.

- Authorise this Emergency Action Plan.
- Review environmental incident alerts and forward to the Regional Services Director, Central West Region and the Regional Manager Water Services North Region. Forward a copy of any alert for toxic spills to the Regional Manager, Environmental Services North Region.

3.6.5 Regional Manager, Environmental Services, North Region

Regional Manager, Environmental Services, North Region, shall:

- Review environmental incident alert and provide advice to the Regional Services Directors, North and Central West Regions.

3.6.6 Regional Services Director, Central West Region

Regional Services Director, Central West Region shall:-

- Review and approve environmental incident alerts and forward to Assistant Director General, Regional Service Delivery.

3.7 STORAGE LOG BOOK

EAP Officer shall ensure events described in this Emergency Action Plan are recorded in the Storage Log Book. All new entries are to be copied and forwarded to Principal Engineer, Non-Commercial Assets monthly.

Entries shall be a record of water levels, rainfall, weather observations, inspections, maintenance carried out, and comments identifying problems and unusual events.

All entries shall be written legibly and be unedited and signed by the person making the entry. Errors made shall be struck out and initialled.

The storage log book shall be kept permanently in the RoadTek office in Cloncurry. It must be available on request and its location known to EAP Backup Officers and Principal Engineer, Non-Commercial Assets.

3.8 EMERGENCY EVENT REPORT

Where required in Section 6.2 EVENTS, after the Emergency Event, EAP Officer shall prepare an Emergency Event Report. This report should be prepared promptly and forwarded to the Principal Engineer, Non-Commercial Assets.

The report may be free format but shall contain at least:

- A description of the event summarised from the Storage Log Book
- Description of any observed damage or other consequences
- Photographs
- A summary of dam water levels and other data recorded during the event and the times of these recordings such as;
    - Rainfall

- Seepage flows and observations.
- Water level within the storage, at the Barkly Highway Bridge, and at "Corella Park" station.

- Details of communication which took place during the emergency
- Comment on the adequacy of the Emergency Action Plan
- Any recommendations or suggested changes to the Emergency Action Plan
- Any further comments considered necessary

3.9 COMMUNICATIONS

During an emergency, an open line of communication shall be maintained between EAP Officer, Principal Engineer, Non-Commercial Assets and the Regional Manager, Water Services, Central West Region.

Emergency lines of communication override normal management reporting. However, where possible the Principal Engineer, Non-Commercial Assets shall advise the Regional Service Director and Director Dam Safety of an emergency event.

The primary means of communications shall be by telephone.

EAP officers who visit the dam during an emergency event shall have mobile and satellite phones at all times and use a vehicle equipped with UHF radio. If, during the emergency event, mobile/satellite telephone communications fail, UHF radio communication shall be attempted. This may require stationing another vehicle and EAP officer midway between the dam and Cloncurry to relay messages from the officers at the dam and EAP Officer.

If there is a total communication failure, the EAP Officer shall take action that is reasonable under the circumstances and in accordance with the Workplace Health and Safety Act. The details of this action and the reasons for it shall be recorded in the Storage Log Book and Emergency Event Report.

If there is a communication failure with officers at the dam during an emergency event, the EAP Officer shall notify the Executive Officer, Local Disaster Management Group, Cloncurry Shire. EAP Officer shall contact "Corella Park" Station and inform them of the communications failure with the dam.

Should primary means of communication fail, Principal Engineer, Non-Commercial Assets shall, in consultation with Regional Manager, Water Services, Central West Region, assess the situation and establish alternative means of communication.

4.0 PREDICTED FLOOD LEVELS AND FLOOD TRAVEL TIMES

4.1 PREDICTED FLOOD LEVELS

The following table displays the flood levels and travel times. Note that the information for a 1 in 100 AEP and 1 in 10 000 AEP are without dam failure.

Location	Scenario		
	Sunny Day Failure	1 in 100 AEP No Failure	1 in 100 AEP With Failure
Barkly Highway Bridge Deck Level: 259.56m AHD	EL 262.1m Travel time 2hrs 28mins	EL 259.46m Travel time 8hrs 31mins	EL 262.0m Travel time 10hrs 6mins
Corella Park Floor Level: 206.78- 207.63m AHD	EL 205.84m Travel time 4.5hrs	EL 208.4m Travel time 9.5hrs	EL 206.94m Travel time 12hrs
Carsland Floor Level: 186.37m AHD (New House) 186.44m AHD (Old House)	EL 181.49m Travel time 6hrs	EL 184.5m Travel time 12hrs	EL 183.28m Travel time 14hrs
Burke Developmental Road Bridge	EL 169.36m Travel time 6.5hrs	EL 170.45m Travel time 12.5hrs	

5.0 INSPECTING THE DAM

5.1 INSPECTION SAFETY PROTOCOL

Refer to Appendix 3: Inspection Safety Protocol. The Inspection Safety Protocol must be observed.

5.2 POTENTIAL PROBLEM IDENTIFICATION

EAP officers inspect the dam weekly and complete an inspection checklist. EAP Officer also visits the dam monthly and completes a monthly inspection report. Both weekly and monthly inspection checklists are sent to Principal Engineer, Non-Commercial Assets who will check and evaluate these reports.

It is important that, providing it is safe to do so, the dam is inspected during an emergency event or shortly thereafter by visiting EAP officers. Potential problems that can be identified during these inspections are discussed in Potential Problem Identification – Appendix 4. Any abnormalities shall be immediately brought to the attention of Principal Engineer, Non-Commercial Assets.

5.3 DAM DETAILS

Critical details of the dam are as follows:

Elevations:

Feature	Elevation (metres) AHD
Embankment Crest	304.66
Embankment Parapet wall	306.08
Main spillway crest	297.90
Auxiliary spillway crest	299.40

A schematic sketch showing the general arrangement of spillways and relevant levels is shown in the Drawings

Storage Capacity Curve:

Refer to Drawings attached.

Spillway Rating Curve:

Refer to Drawings attached.

The deck level of Corella River Bridge at the Barkly Hwy is EL 259.56m AHD.

6.0 EMERGENCY EVENTS AND ACTIONS

6.1 GENERAL

The following events are defined as emergency events:

- Reservoir level near or at the Spillway Crest and heavy rainfall, forecast or commencing, in the catchment.
- Reservoir spilling over and heavy rainfall at about 25mm in the first thirty minutes commencing or continuing in the catchment.
- Increase in seepage, not due to storage rise.

Additional cracking or increased crack widths in mass concrete face. The following are situations that start events:

- Reservoir level approaching the Main Spillway Crest and heavy rainfall continuing in the catchment.
- Reservoir level approaching the Auxiliary Spillway and heavy rainfall continuing in catchment.
- Corella River in flood at the Barkly highway and waters within 2.5m of deck level.
- Earthquake/Tremor.
- Landslide near dam or into storage.
- Toxic spill within storage/catchment.
- Increase in seepage, not due to storage rise.
- Additional cracking or increased crack widths in gunite face.

The wet season requires a heightened state of awareness because the storage is more likely to be at an elevated height at the time of a flood event. At this time of the year, the EAP Officer shall determine if an overflow is likely, given the storage height and the rainfall conditions, and the likely spillway discharge.

The EAP Officer shall obtain rainfall information from "Timberu", the Bureau of Meteorology website and the gauge at the RoadTek office.

Contact details for the manager at "Timberu" are detailed in Section 2, Notification List, "Landowners," of this document.

The Bureau of Meteorology updates their website hourly from 9am. During an event the website shall be accessed hourly.

The site is www.bom.gov.au. The closet Bureau rain gauges are at Cloncurry and Mt Isa.

- Left Click - Queensland area of the map of Australia.
- Scroll down to Flood Warnings, Rainfall and River Information.
- Left Click - Queensland Flood Warning Centre.
- Scroll down to "Zoom in to:"
- Left Click – Gulf and Peninsula
- Scroll down to table under map and go to column displaying "Latest Rainfall Data"
- For the Flinders River Basin, Left Click – 1hr under Latest Rainfall Data – Read rainfall data for Cloncurry AWS for Flinders River and rainfall data for Mount Isa for Leichardt River.
- Move to top tool bar and left click on back arrow
- Left Click – 3hr for stations as above – read rainfall data.
- Move to top tool bar and left click on back arrow
- Left Click – 24 hr for stations as above – read rainfall data.
- Move to top tool bar and left click on back arrow
- Scroll to table under map and go to column displaying "Radar"
- Left Click Morington and read radar data for Morington Is at "512 km" site

A storage gauge measuring height in AHD has been established on the concrete face slabs adjacent the stairs on the right abutment. Heights, at 1m increments, have been painted on the face slabs in large letters. These should be visible from the air.

Section 6.2 below describes the actions to be taken in the event of an emergency. The events describe actions to be undertaken by the EAP Officer. However the EAP Officer may assign EAP Backup 1 and/or 2 or other officers to assist him undertake these actions.

6.2 EVENTS

The maximum storage height on record is 301.70m in January 2004. Any overflow events that do not reach this level are regarded as small to medium events. The procedures to be followed for these events are outlined in Standing Operating Procedures for Small to Medium Spillway Overflows (SOP 14). A copy of this procedure is included as Appendix 7.

When the reservoir level approaches EL 301.7m AHD the gauge boards at the dam will be inaccessible at this point as there will be over 2 metres of water flowing through the auxiliary spillway. The second set of gauge boards at the auxiliary spillway will also be flooded; the EAP officers should then shift to bridge on the Barkly Highway where the deck level is EL 259.56m AHD (Event 1).

The following events are defined as emergency events:

- Major Overflow Event - Reservoir level approaching EL 301.70m and heavy rainfall continuing in the catchment.
- Sunny Day Failure or Earthquake, Tremor or Landslide into the storage
- Increase in seepage, not due to storage rise, and/or additional cracking or increased crack widths in dam wall.
- Toxic spill within storage/catchment.

The actions that are to be undertaken by the EAP Officer in each emergency event are described in the following sections of this chapter. The EAP Officer may assign EAP Backup 1 and/or 2 or other EAP officers to assist him undertake these actions.

EVENT 1

Water level approaching the deck level of the Barkly Highway Bridge. (Deck Level of Barkly Highway bridge is EL 259.56m AHD. Equivalent to 1:100 AEP Event).

Access to the dam site and the auxiliary spillway is no longer possible.

The EAP Officer shall:

- Ensure that the access gate remains locked and the sign remains DAM SITE CLOSED DUE TO UNSAFE CONDITIONS. (A depth indicator is located in the auxiliary spillway and passage across the auxiliary spillway should not be attempted for a depth greater than 0.1m.)
- Site an EAP Backup Officer on the Cloncurry side of the bridge and monitor water levels relative to the deck level.
- Notify the Police in Cloncurry, and the Executive Officer, Local Disaster Management Group, Cloncurry Shire of the storage height and assessment of spillway discharges, the depth of water level at the Barkly Highway Bridge, and that the residents of "Corella Park" may experience flooding.

- Notify the Principal Engineer, Non-Commercial Assets of the storage height and assessment of spillway discharges, the water level at the Barkly Highway Bridge and depth of rainfall occurring in catchment. Notification should be at hourly intervals whilst safe. Rainfall information can be obtained from "Timberu" station and the Bureau of Meteorology website. See section 6.1 for details.

- "Corella Park" station should be informed of the situation and that they may experience some flooding. Note that it is the role of the Emergency Services to initiate an evacuation. All of the information gathered by the EAP Officers shall be passed on to the Police and Emergency services.

- Notify property owner "Timberu" that the dam site remains closed.

- A sudden rise in water level in the order of 2 metres will indicate that Corella Dam has failed. The EAP Officer should immediately notify the Police in Cloncurry and Executive Officer, Local Disaster Management Group, Cloncurry Shire Council of the latest water level information and indications are that Corella Dam has failed and recommend that "Corella Park" be notified to evacuate.

- This Event ends when the reservoir level is less than 100mm above the main spillway crest and falling and there has been no rain on the catchment for twelve hours. EAP Officer carries out a final dam and spillway check and advises Police in Cloncurry, the Executive Officer, Local Disaster Management Group, property owner "Timberu" and Principal Engineer, Non-Commercial Assets that the emergency event is at an end.

- The EAP Officer may stand down

- EAP Officer unlocks the entrance gate to the dam site, adjusts the sign located adjacent the entrance gate to read DAM SITE OPEN once the site is determined safe by the Principal Engineer, Non-Commercial Assets.

- Promptly after the event, compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.

EVENT 2

Earthquake/Tremor felt in Area/Landslide.

Failure of the dam at elevated storage levels could overtop the Barkly Highway Bridge at the Corella River.

Note: EAP officers visiting the dam after seismic activity should take due caution when approaching the Barkley Highway Bridge or other similar structures as these structures may have been damaged.

The EAP Officer shall:

- Check the dam and spillway for springs, deformations, slumps, slope failure, cracking and erosion. Using the guidelines outlined in appendix 4.

- **If anything unusual is observed;**
    - Clear the Clem Walton Park and picnic areas adjacent the Corella River downstream of the dam.
    - Clear the camping area upstream of the auxiliary spillway.
    - Lock the entrance gate with a chain and padlock and adjust sign located adjacent the entrance gate to read DAM SITE CLOSED DUE TO UNSAFE CONDITIONS.
    - Notify the Police in Cloncurry, and the Executive Officer, Local Disaster Management Group, Cloncurry Shire that the dam should be considered unsafe and of the possibility of dam failure.
    - Report any damage immediately to the Principal Engineer, Non-Commercial Assets.
    - Notify property owner "Timberu" that the dam site is closed.
- After the event (usually within 24 hours), compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.

Principal Engineer, Non-Commercial Assets shall:

- If thought necessary, after considering EAP Officer's verbal and written reports, arrange for inspection of the dam by an experienced Dam Safety Engineer.
- Report Dam Safety Engineers findings to Director Dam Safety and obtain clearance to end the event.
- Instruct EAP Officer to notify EAP Backup 1 and 2, Police in Cloncurry, the Executive Officer, Local Disaster Management Group, property owner "Timberu" that the emergency event is at an end and the dam site is open.

EVENT 3

Toxic spill within the Catchment/Storage

Note: Under no circumstances shall EAP officers approach spills where the nature or toxicity of the substance is not known.

On detection or notification of a toxic or hazardous substance contaminating the catchment or storage, the EAP Officer shall:

- Identify the hazardous substance or chemical, if possible.
- Seek advice from the Queensland Fire and Rescue Service at Mt Isa or the Chemical Hazards and Emergency Management Unit, on the nature of the hazard.

- Notify landowners upstream and downstream of the dam and visitors to the dam site who may be affected.
- Take reasonable steps to isolate the spill or containment from the dam (containment embankment) or prevent further contamination.
- Notify the Police in Cloncurry.
- Notify the Executive Officer, Local Disaster Management Group, Cloncurry Shire.
- Notify the Principal Engineer, Non-Commercial Assets.
- Notify property owner "Timberu".
- This Event ends when advice is received from the Queensland Fire and Rescue Service or the Chemical Hazards and Emergency Management Unit that the spill is no longer a toxic hazard.
- After the event, compile an Emergency Event Report and forward unedited copies to Principal Engineer, Non-Commercial Assets.

EVENT 4

Increase in seepage not due to storage rise, additional cracking or increased crack widths in gunite face.

The dam had significant leaks through the damaged gunited face slabs, and recent history related this leakage to storage height. The gunited face slabs were repaired in 2006 to the level of AHD 304 m (approx).

Leakage should be observed and noted at the downstream vee notch weir at the time of weekly and monthly inspections or at any other time the dam is visited. EAP officers taking the readings should ensure that the vee notch is not affected by tailwater and that weeds and debris are cleared from the entrance of the vee. If leakage rates rise for no corresponding rise in water level or if additional cracking or increased cracking in the gunite face is observed, the EAP Officer shall:

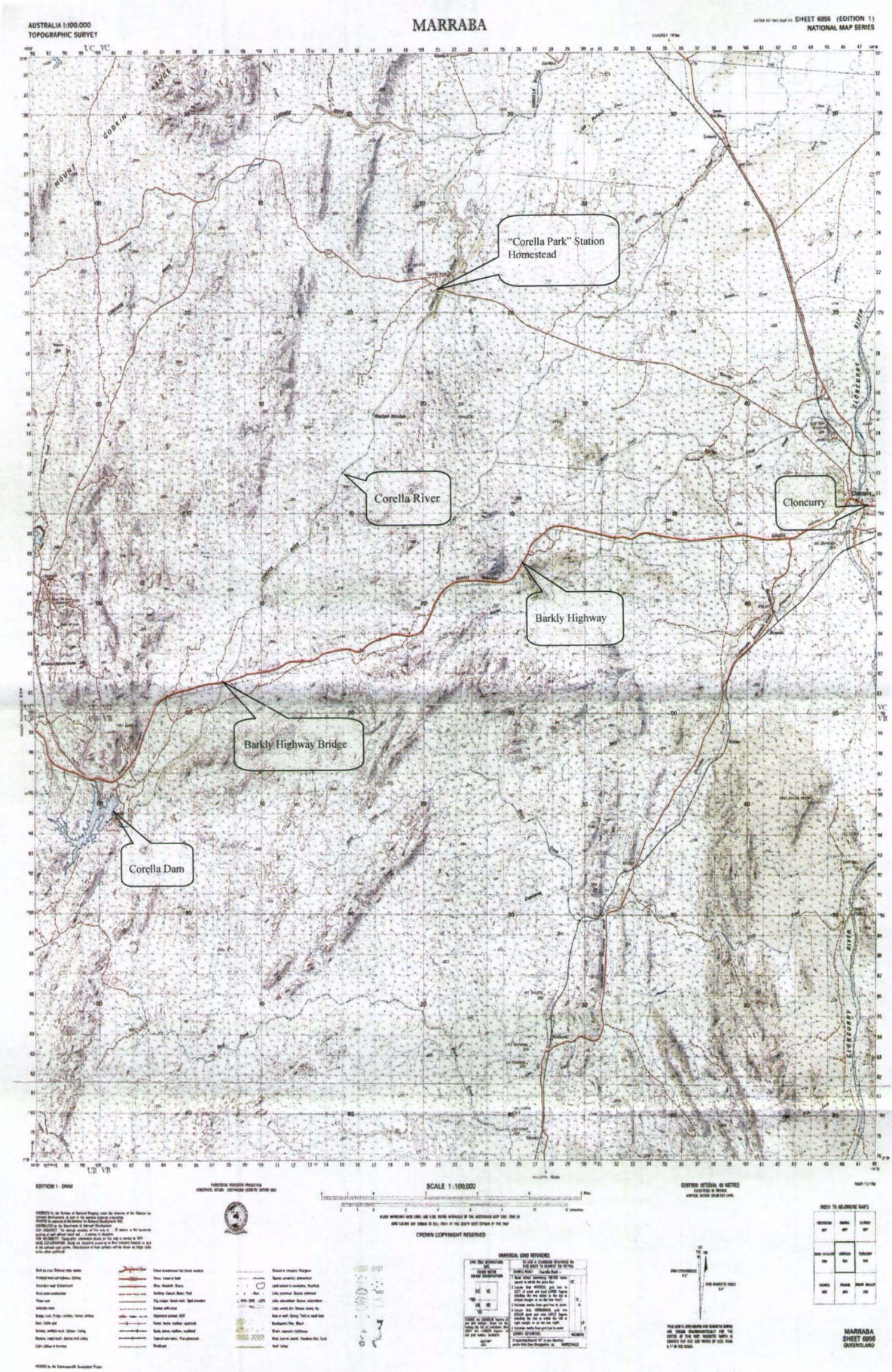
- Observe and quantify seepage, take water samples, observe cloudiness.
- If seepage is through the dam embankment or its foundation inspect the upstream gunite face for any signs of new cracks, displacements across cracks or joints, or whirlpools that might indicate the source of new or increased seepage.
- Immediately notify Principal Engineer, Non-Commercial Assets.
- Monitor and record and take photographs at regular intervals until advised otherwise by Principal Engineer, Non-Commercial Assets.
- This Event ends when advised by Principal Engineer, Non-Commercial Assets

- After the event compile Emergency Event Report and forward to Principal Engineer, Non-Commercial Assets

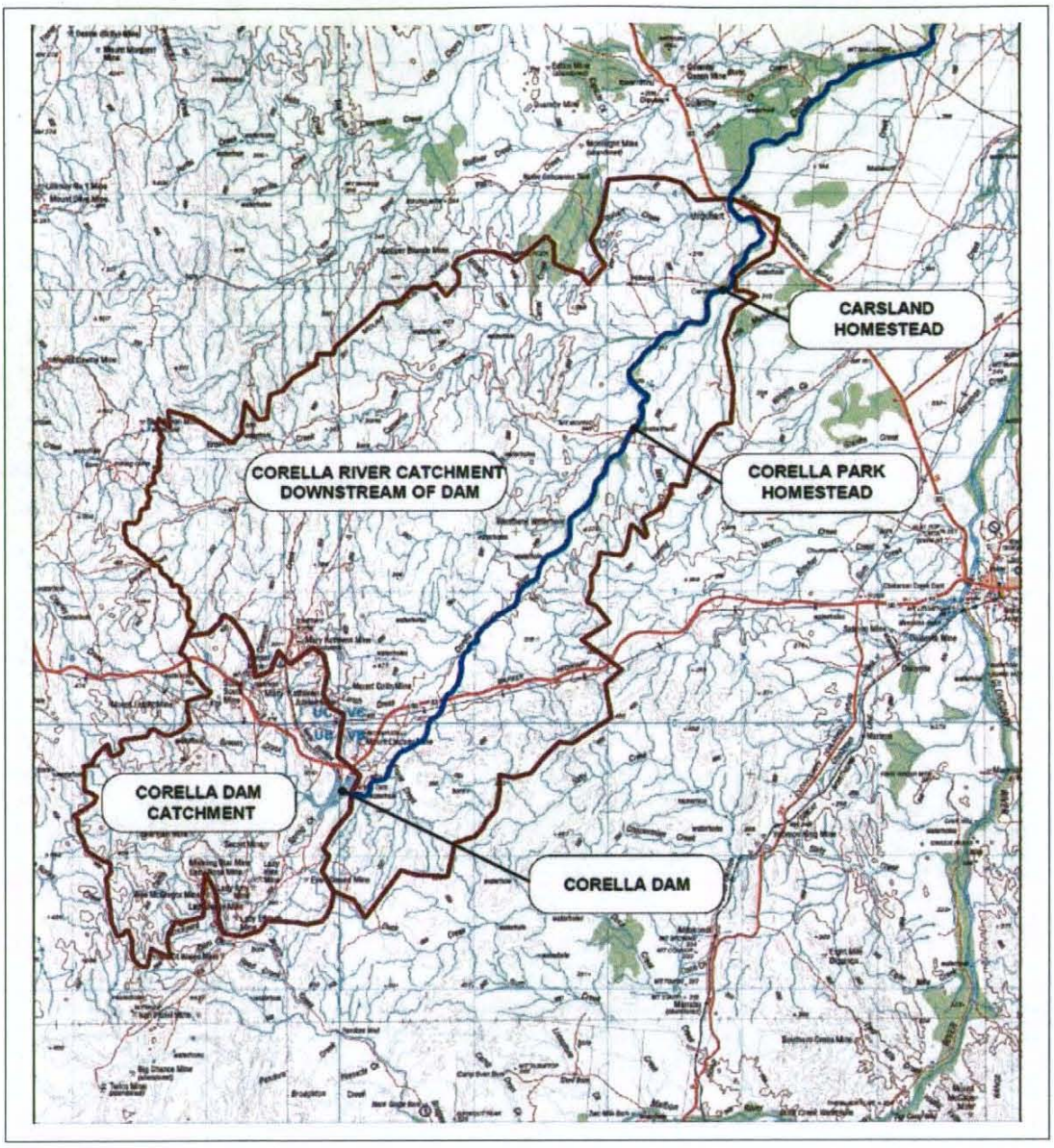
Principal Engineer, Non-Commercial Assets shall:

- If thought necessary, after considering EAP Officer's verbal and written reports, arrange for inspection of the dam by an experienced Dam Safety Engineer.
- Report Dam Safety Engineers findings to Director Dam Safety and obtain clearance to end the event.

APPENDIX 1
LOCALITY PLAN


AUSTRALIA 1:100,000
TOPOGRAPHIC SURVEY
MARRABA
SHEET 6856 (EDITION 1)
NATIONAL MAP SERIES
"Corella Park" Station Homestead
Corella River
Cloncurry
Barkly Highway
Barkly Highway Bridge
Corella Dam
SCALE 1:100,000
CROWN COPYRIGHT RESERVED
MARRABA
SHEET 6856
QUEENSLAND

APPENDIX 2
CATCHMENT BOUNDARY



LEGEND

Catchment Boundary

Corella River

APPENDIX 3
INSPECTION SAFETY PROTOCOL

APPENDIX 3 INSPECTION SAFETY PROTOCOL

All Emergency Action Plan (EAP) officers who visit the dam site are to observe this protocol.

(1) A satellite phone with backup to be available at all inspections.

(2) More than one person to be at site at all times.

(3) Inspections are to be carried out only when conditions are deemed to be safe as per inspection and risk assessment/s.

(4) The holder of the after hours phone is to be advised of any inspection and subsequent completion. This person is to be contacted if any reasonable delay is anticipated.

(5) When necessary a certified boat with operable motor, oars, life jackets, and extra fuel will be utilised.

(6) All personnel likely to be involved are to be informed of the above, and to be made aware that they are mandatory requirements.

(7) All personal are to have had the site specific safety induction.

APPENDIX 4
POTENTIAL PROBLEM IDENTIFICATION

INSPECTION OF CONCRETE AND MASONRY DAMS

INSPECTING FOR DEFICIENCIES: SUMMARY

TYPE OF DEFICIENCY	LOOK FOR
SURFACE DEFECTS	Honeycomb: Voids around aggregate. Stratification: Non-uniform layers of aggregate in concrete. Form Slippage: Uneven joints and surfaces. Stains. Impact damage.
DISPACEMENT	Displacement at joints between blocks. Volume change in concrete. Closing or opening of joints. Loss of joint filler. Cracking. Debonding of lifts. Tilting, shearing, or shifting of hardware.
LEAKAGE and SEEPAGE	Significant new leakage on downstream face Wetness in abutment or foundation adjacent to toe. Major changes in leakage/seepage pattern or flow. Water spurting or running out of joints or cracks. Turbidity of the seepage.
MAINTENANCE CONCERNS	Vegetation in joints between concrete blocks. Large accumulations of debris. Missing or deteriorated joint filler. Quality and condition of previous repairs.

Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

INSPECTION OF EMBANKMENT DAMS

INSPECTING FOR DEFICIENCIES: SUMMARY

TYPE OF DEFICIENCY	LOOK FOR
SEEPAGE	A water flow or sand boil on the lower portion of the downstream slope or toe area, especially at the groins. Wet areas or areas where the vegetation appears greener or more lush on the embankment slope or toe area. Turbidity or cloudiness of the seepage.
CRACKING	Desiccation Cracking: A random honeycomb pattern of cracks usually found on the crest and the downstream slope. Transverse Cracking: Cracks that are perpendicular to the length of the dam usually found on the crest. Longitudinal Cracking: Cracks that are parallel to the length of the dam. Longitudinal cracks may be associated with stability problems in the slopes.
INSTABILITY	Slides on the upstream or downstream slopes. Bulging, especially at the toe of the dam.
DEPRESSIONS	Misalignment in the crest and embankment slopes found by sighting along fixed points. Sinkholes found by checking and probing each depression. Remember, sinkholes have steep, bucket like sides while minor depressions have gently sloping, bowl like sides.
MAINTENANCE CONCERNS	Inadequate Slope Protection: Check for bald areas or areas where the protection is sparse or damaged. Surface Runoff Erosion: Check for gullies or other signs of erosion. Make sure to check the low points along the upstream and downstream shoulders and groins since surface runoff can collect in these areas. Inappropriate Vegetative Growth: Check for excessive and deep rooted vegetative growth. Debris: Check for debris on and around the dam, especially near the spillway. Animal Burrows: Check for damage caused by burrowing animals.

Note: This tabulation taken from Dam Safety Surveillance Field Manual-August 2005

WHEN TO GET FURTHER ASSISTANCE

Several of the deficiencies covered above are very serious. If you observe any of the following deficiencies, you should consult with the PE, NCA:

- Sand boils or turbid seepage.
- Seepage that has increased since the last inspection (taking the reservoir level into consideration).
- Cracking that extends below the reservoir level or potential reservoir level.
- Transverse and longitudinal cracking.
- Deep seated slides or bulging associated with slides.
- Sinkholes or other large depressions.
- Deep rooted vegetation that might need to be removed.

Remember, whenever you are unsure whether or not a condition poses a threat to the safety of the dam, you should discuss your findings with the PE, NCA.

APPENDIX 5
Emergency Event Phone Numbers

Event Phone Numbers for RoadTek Officer

All Emergency Events

Police in Cloncurry
Phone 07 4742 1200, A/H [redacted]

Executive Officer, Local Disaster Management Group, Cloncurry Shire
Craig Turnour
Phone [redacted]; A/H [redacted]

RoadTek Backup 1
Logitharan Lokanantham
Phone [redacted], A/H [redacted]

RoadTek Backup 2
Alby Anderson
Phone [redacted]

Principal Engineering, Non-Commercial Assets, DERM
William Steen
Phone [redacted], A/H [redacted], Mobile [redacted]

if unable to contact then:

Regional Manager, Water Services, Central West Region, DERM
Ed Donohue
Phone [redacted], A/H [redacted], Mobile [redacted]

Event Phone Numbers for Principal Engineer, Non-Commercial Assets

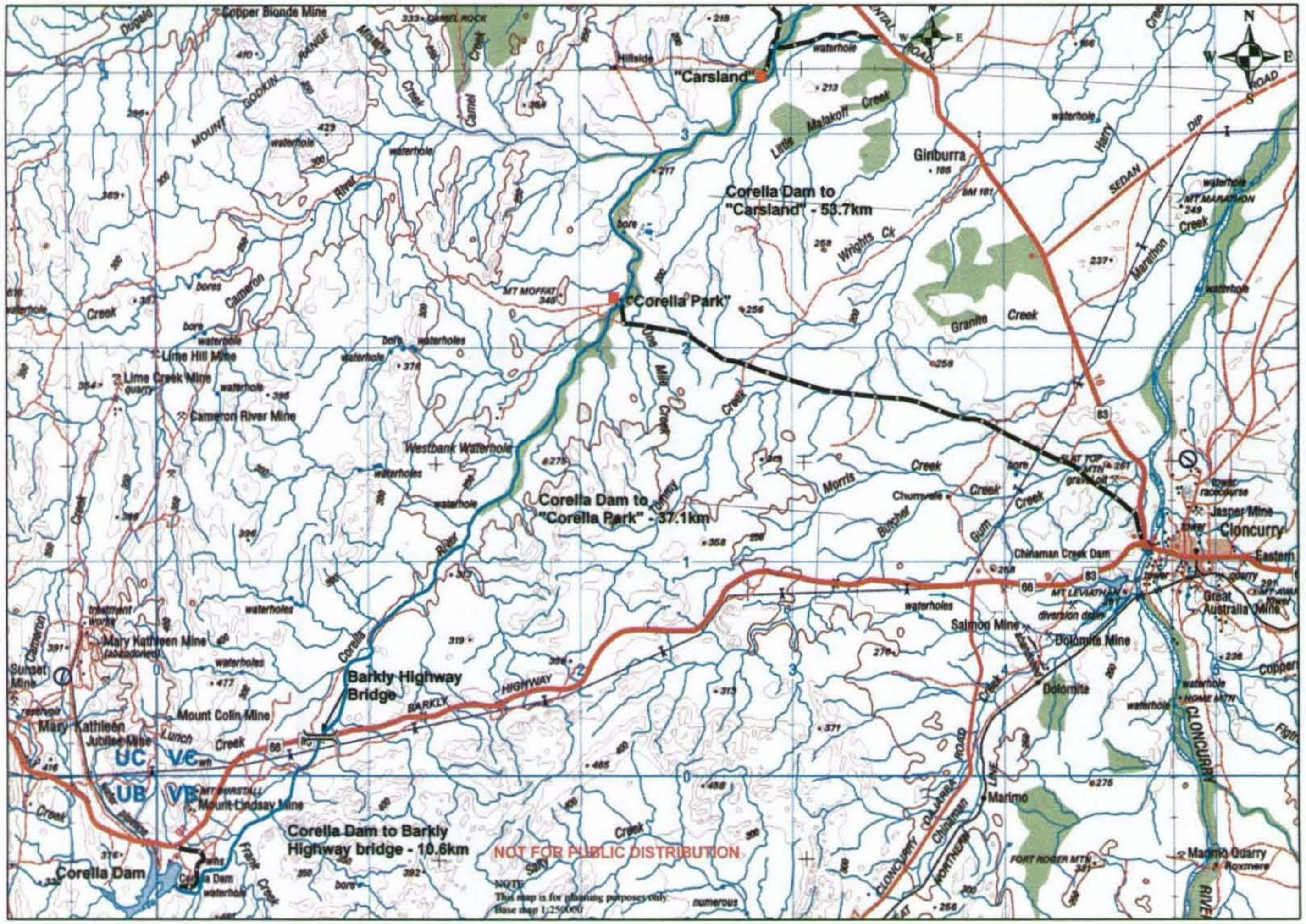
All Emergency Events

RoadTek Officer,
John Doyle
Phone [redacted], Mobile [redacted]

Director Dam Safety, DERM
Peter Allen
Phone [redacted], A/H [redacted], Mobile [redacted]

Regional Manager, Water Services, Central West Region, DERM
Ed Donohue
Phone [redacted], A/H [redacted], Mobile [redacted]

APPENDIX 6
Property Access Plans


"Carsland"
Corella Dam to "Carsland" - 53.7km
"Corella Park"
Corella Dam to "Corella Park" - 37.1km
Barkly Highway Bridge
Corella Dam to Barkly Highway bridge - 10.6km
NOT FOR PUBLIC DISTRIBUTION
Corella Dam
Cloncurry

APPENDIX 7
Small to Medium Spillway Overflows (SOP 14)

Department of Environment and Resource Management

Corella Dam

Standing Operating Procedures

for

Small to Medium Spillway Overflows

SOP - 14

Distribution, Approval and Revision Control

Distribution

Copy Number	Position	Location
1	RoadTek Works Manager, Asset Services North	Cairns
2	Regional Manager, Water Services, North Region, DERM	Cairns
3	Director, Dam Safety, DERM	Brisbane
4	RoadTek Engineer	Cloncurry
5	RoadTek Officer (EAP)	Cloncurry
6	RoadTek Officer (Inspections)	Cloncurry

Authorisation

Approved:

_____ Date: _____.

Principal Engineer, Non-Commercial Assets, DERM

Revision Status

Revision No.	Date	Revision Description
0	July 2010	Original Issue

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Appendices